TRANSPORTATION ENVIRONMENTAL STUDY REPORT

PRELIMINARY DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT STUDY

CLASS ENVIRONMENTAL ASSESSMENT FOR PROVINCIAL TRANSPORTATION FACILITIES (2000)
GROUP 'B' PROCESS

GWP 8-00-00

HIGHWAY 401

FROM 1.0 KM WEST OF HESPELER ROAD EASTERLY
TO THE WELLINGTON COUNTY/HALTON REGION BOUNDARY, 25.8 KM

ecoplans MRC
Members of MMM GROUP

November, 2012

HIGHWAY 401

FROM 1.0 KM WEST OF HESPELER ROAD EASTERLY TO THE WELLINGTON COUNTY/HALTON REGION BOUNDARY, 25.8 KM

PRELIMINARY DESIGN AND ENVIRONMENTAL ASSESSMENT STUDY

CLASS ENVIRONMENTAL ASSESSMENT FOR PROVINCIAL TRANSPORTATION FACILITIES (2000)
GROUP 'B' PROCESS

TRANSPORTATION ENVIRONMENTAL STUDY REPORT

Prepared for the Ministry of Transportation by:

McCormick Rankin and Ecoplans, Members of MMM Group Limited

Prepared by:

Greg Moore, B.E.S.
Senior Environmental Planner
Ecoplans

and

Mark Mueller, B.E.S.
Project Planner
McCormick Rankin

Reviewed by:

Jim Dowell, P.Eng.
Project Manager
McCormick Rankin

THE PUBLIC RECORD

Copies of this document have been submitted to the following offices of the Ministry of the Environment to be placed in the Public Record:

Guelph District Office
1 Stone Road West
Guelph, ON
N1G 4Y2

West Central Region Office
12th Floor, 119 King Street West
Hamilton, ON
L8P 4Y7

This Transportation Environmental Study Report is also available for review during regular business hours at:

Ministry of Transportation
West Region
Front Lobby
659 Exeter Road
London, ON
N6E 1L3

Region of Waterloo
Administrative Headquarters
150 Frederick Street
P.O. Box 9051, Station C
Kitchener, ON
N2G 4J3

City of Cambridge
50 Dickson Street
PO Box 669
Cambridge, ON
N1R 5W8

Wellington County
Administration Centre
Clerk's Office
74 Woolwich Street
Guelph,
ON N1H3T9

Township of Puslinch
7404 Wellington Road #34
R.R. #3
Guelph, ON
N1H 6H9

Hespeler Library
5 Tannery Street East
Cambridge, ON
N3C 2C1

Wellington County Library
Puslinch Branch
29 Wellington Road 46 South
(Aberfoyle) R.R. #3
Guelph, ON
N1H 6H9

Ce document hautement spécialisé n'est disponsible qu'en anglais en vertue du règlement 411/97, qui en exempte l'application de la Loi sur les services en français. Pour de l'aide en français, veuillez communiquer avec le ministère des Transports, Bureau des services en français au: 905-704-2045 ou 905-704-2046.

MINISTRY OF TRANSPORTATION ONTARIO
PRELIMINARY DESIGN AND CLASS ENVIRONMENTAL ASSESSMENT STUDY

HIGHWAY 401 IMPROVEMENTS
From 1.0 km west of Hespeler Road easterly to the Wellington County / Halton Region boundary, 25.8 km
GWP 8-00-00

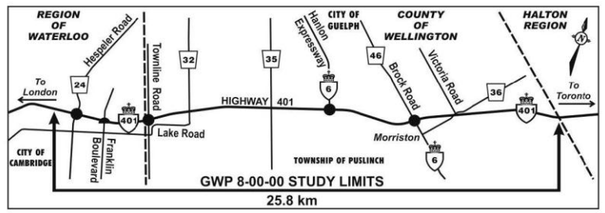
NOTICE OF COMPLETION
TRANSPORTATION ENVIRONMENTAL STUDY REPORT

THE STUDY

The Ontario Ministry of Transportation (MTO) has completed the Preliminary Design and Class Environmental Assessment (Class EA) Study to identify capacity, geometric and operational improvements along the Highway 401 corridor from 1.0 km west of Hespeler Road easterly to the Wellington County / Halton Region boundary, within the Region of Waterloo and the County of Wellington, as shown in the Key Plan. McCormick Rankin was retained by MTO to undertake this study. The study team has identified operational and capacity needs, evaluated alternatives and recommended a plan to address the long-term requirements for the Highway 401 corridor.

The recommended plan includes:

- Widening Highway 401 from 6 lanes to 10 lanes consisting of 8 general purpose lanes and 2 High Occupancy Vehicle (HOV) lanes;
- Two additional auxiliary lanes between the Hanlon Expressway and Highway 6 South/Brock Road;
- Reconstruction of the existing Highway 401 pavement to address deteriorated conditions;
- Reconstruction and/or modification of interchanges and crossing structures; and
- Expansion of carpool lots at the Highway 6 South/Brock Road and Townline Road interchanges.



THE PROCESS

This study is following the approved environmental planning process for Group "B" projects under the *Class Environmental Assessment* (Class EA) *for Provincial Transportation Facilities* (2000). Two rounds of Public Information Centres (PICs) were held for this project and a Transportation Environmental Study Report (TESR) has now been completed. The TESR will be available starting **Wednesday November 21, 2012** for a 30-day public review period on the project website **www.highway401-hespeler-halton.ca** and at the following locations during regular business hours:

Ministry of Transportation
West Region
Front Lobby, 659 Exeter Road
London, ON
N6E 1L3

Ministry of the Environment
West Central Region Office
12th Floor, 119 King Street West
Hamilton, ON
L8P 4Y7

Ministry of the Environment
Guelph District Office
1 Stone Road West
Guelph ON
N1G 4Y2

Region of Waterloo Administrative Headquarters
150 Frederick Street
Kitchener, ON
N2G 4J3

City of Cambridge
City Clerk
50 Dickson Street,
Cambridge, ON
N1R 5W8

Hespeler Library
5 Tannery Street East,
Cambridge, ON
N3C 2C1

Wellington County Administration Centre
County Clerk's Office
74 Woolwich Street
Guelph, ON
N1H 3T9

Wellington County Library
Puslinch Branch
29 Brock Road South
(Aberfoyle) RR #3
Guelph, ON
N1H 6H9

Township of Puslinch
7404 Wellington Road #34
RR #3
Guelph, ON
N1H 6H9

Interested persons are encouraged to review this document and provide comments by **Friday December 21, 2012**. If, after consulting with the Ministry's consultants and staff, you have serious unresolved concerns, you have the right to request the Minister of the Environment (11th Floor, Ferguson Block, 77 Wellesley Street West, Toronto, ON M7A 2T5) issue a Part II Order (Bump-up) for this project. This may lead to the preparation of an Individual Environmental Assessment. A copy of the Part II Order request should be forwarded to the MTO and McCormick Rankin at the addresses below. If there are no outstanding concerns after **Friday December 21, 2012**, the project will be considered to have met the requirements of the Class EA and can proceed to the next stage of the study, Detail Design.

COMMENTS

To obtain additional information or provide comments, please visit the study website or contact:

Mr. Roger Ward, LEL
Senior Project Manager
Ministry of Transportation
West Region, Planning & Design Section
659 Exeter Road, 3rd Floor
London, ON N6E 1L3
Phone: (519) 873-4547
Toll Free: 1-800-265-6072
Fax: (519) 873-4600
e-mail: Roger.A.Ward@ontario.ca

Mr. Jim Dowell, P.Eng.
Consultant Project Manager
McCormick Rankin
2655 North Sheridan Way, Suite 300
Mississauga, ON L5K 2P8
Phone: (905) 823-8500
Toll Free: 1-877-562-7947
Fax: (905) 823-8503
e-mail: jdowell@mrc.ca

Comments and information are being collected to assist the MTO in meeting the requirements of the Ontario Environmental Assessment Act. Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act. All comments will be maintained on file for use during the study and, with the exception of personal information, may be included in study documentation and become part of the public record.

If you have any accessibility requirements in order to participate in this project, please contact one of the Project Team members listed above.

Visit us at www.highway401-hespeler-halton.ca

Ontario

TABLE OF CONTENTS

LIST OF EXHIBITS

GLOSSARY

AANDC -	Aboriginal Affairs and Northern Development Canada
ANSI -	Areas of Natural and Scientific Interest
CEAA -	Canadian Environmental Assessment Act
CH -	Conservation Halton
CHER -	Cultural Heritage Evaluation Reports
CHU -	Crop Heat Unit
Class EA -	Class Environmental Assessment for Provincial Transportation Facilities (1999, as amended 2000)
CLI -	Canada Land Inventory
dBA -	Decibels (A-weighted)
DFO -	Department of Fisheries and Oceans, Canada
GRCA -	Grand River Conservation Authority
GTA -	Greater Toronto Area
G.W.P. -	Group Work Project
HADD -	Harmful Alteration, Disruption or Destruction
HOV -	High Occupancy Vehicle
INAC -	Indian and Northern Affairs Canada
LRT -	Light Rail Transit
MBCA -	Migratory Birds Convention Act
MDS -	Minimum Distance Separation
MEI -	Ontario Ministry of Energy and Infrastructure
MNR -	Ontario Ministry of Natural Resources
MOE -	Ontario Ministry of the Environment
MTCS -	Ontario Ministry of Tourism, Culture and Sport
MTO -	Ontario Ministry of Transportation
NHIC -	Natural Heritage Information Centre
NSA -	Noise Sensitive Area
NWPA -	Navigable Waters Protection Act
OHBG -	Ontario Heritage Bridge Guidelines
OLA -	Outdoor Living Area
OMAFRA -	Ontario Ministry of Agriculture, Food and Rural Affairs
OPP -	Ontario Provincial Police
OPSS -	Ontario Provincial Standard Specifications
OWRA -	Ontario Water Resources Act
PIC -	Public Information Centre
PPS -	Provincial Policy Statement
PSW -	Provincially Significant Wetland
PTTW -	Permit to Take Water
RFD -	Rural Freeway Divided
ROW -	Right-of-Way
SAR -	Species at Risk
SPM -	Suspended Particular Matter
SWMP -	Storm Water Management Practices
TESR -	Transportation Environmental Study Report
WHPA -	Wellhead Protection Areas

1.0 THE ENVIRONMENTAL ASSESSMENT PROCESS

1.1 The Ontario Environmental Assessment Act

The Ministry of Transportation's Class Environmental Assessment for Provincial Transportation Facilities (MTO Class EA) was approved under the Ontario Environmental Assessment Act in the fall of 1999 and amended in 2000. This document defines the group of projects and activities, and the environmental assessment processes that MTO has committed to follow for these projects. Provided that the MTO Class EA process is followed and its requirements are met for a project, the requirements of the Ontario Environmental Assessment (EA Act) are fulfilled, so a separate individual approval under the EA Act is not required. The MTO Class EA process is principle based.

The following principles underlie the Class EA process for Group A, B and C projects:

- Transportation engineering principles;
- Environmental protection principles;
- External consultation principles;
- Evaluation principles that are intended to achieve the best overall balance of these principles;
- Documentation principles;
- Bump-up principles; and
- Environmental clearance principles to proceed.

This project is following the Class EA process for Group 'B' projects. Group 'B' projects are major improvements to provincial transportation facilities and generally include:

- Improvements to existing highways and freeways providing a significant increase in capacity;
- New interchanges or modifications to existing interchanges;
- Major realignments;
- New or modified water crossings or watercourse alterations; and
- New highway service facilities.

The Class EA process for Group 'B' projects is shown in **Exhibit 1-1**.

The study schedule for this Preliminary Design Study and Class EA is shown later in **Exhibit 6-1.**

The Class EA process for a Group 'B' project includes submission of a Transportation Environmental Study Report (TESR). This TESR will be filed for a 30-day period of public and external agency review. If concerns are raised during this review period that cannot be resolved through discussions with MTO, members of the public, interested groups or technical agencies may request the Minister of the Environment to "bump-up" (i.e. make a Part II Order for) this project, thereby requiring an individual environmental assessment. This would require submission of a formal letter (as required by Section 5 (1) of the Ontario Environmental Assessment Act) to the Ministry of the Environment (MOE) for formal review and approval.

The decision whether a "bump-up" (i.e. Part II Order) is appropriate or necessary rests with the Minister of the Environment.

If no "bump-up" requests are outstanding by the end of the 30-day review period, the project is considered to have met the requirements of the Class EA, and MTO may proceed to tender and construct the project subject to resolving any commitments documented in this TESR during the subsequent design phases and obtaining any other outstanding environmental approvals. Resolution of commitments and minor changes from the Recommended Plan will be documented in a Design and Construction Report.

1.2 The Canadian Environmental Assessment Act

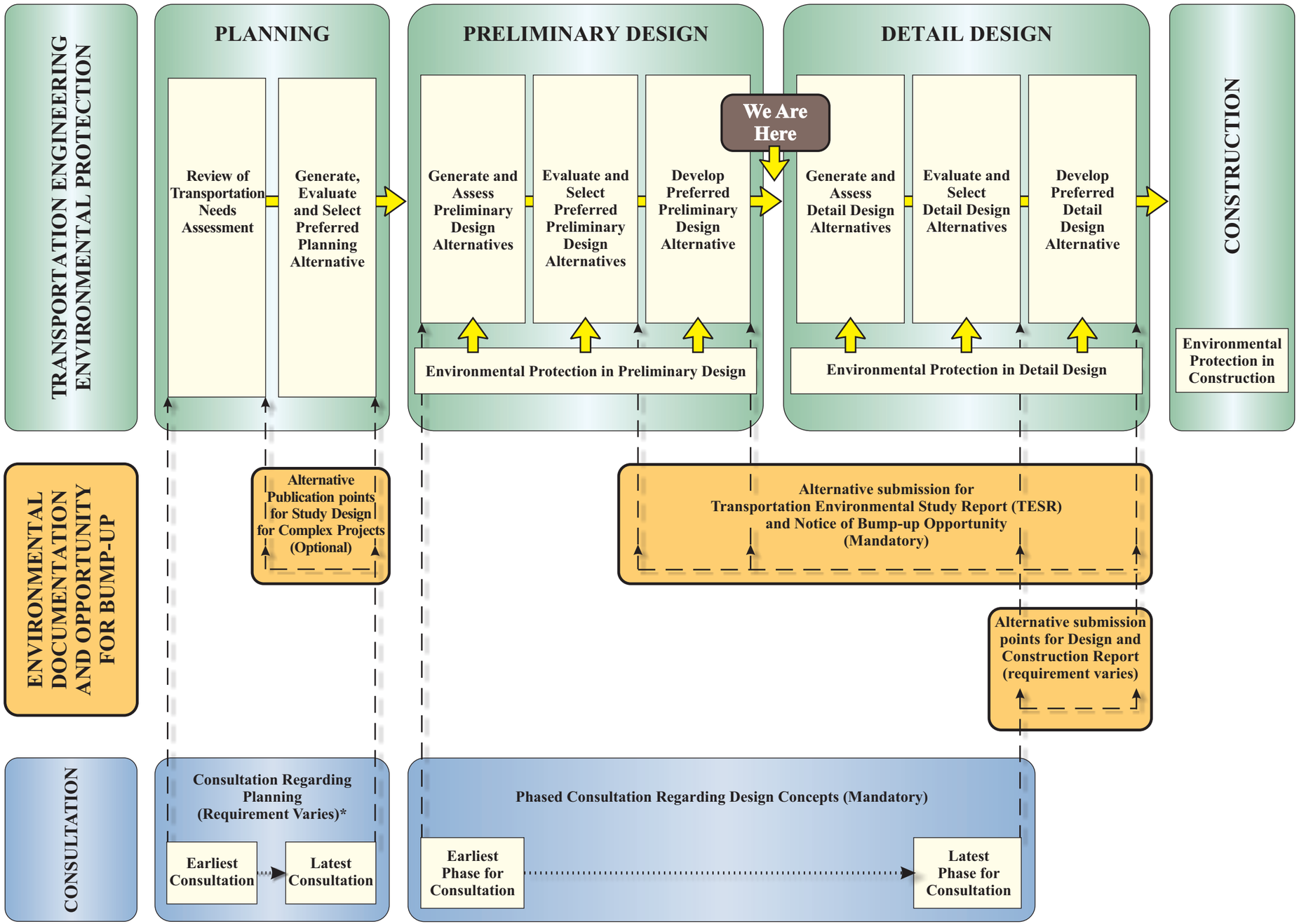
The new Canadian Environmental Assessment Act, 2012 (CEAA 2012) and associated regulations came into effect on July 6, 2012. Under CEAA 2012, a federal environmental assessment is required of "designated projects." A designated project is one that includes one or more physical activities that are set out in the regulations under CEAA 2012 or by order of the federal Minister of Environment.

This Preliminary Design and Class Environmental Assessment Study was reviewed by the Project Team against the federal Regulations Designating Physical Activities, and it was determined that the study is not "designated" and therefore will not require consideration of a federal environmental assessment. However, the project may need federal permits/approvals (e.g., Fisheries Act) to meet the requirements of other federal legislation.

This project is following the Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings (2006). The Protocol requires MTO and their Fisheries Specialists to determine whether this project will result in Harmful Alteration, Disruption or Destruction of Fish Habitat (HADD). A HADD or No HADD notification form is then submitted to the Department of Fisheries and Oceans Canada (DFO) for confirmation and/or support of the findings. Consultation has been initiated with DFO staff to review the project generally and determine the federal requirements.

Any required federal approvals will be addressed during the detail design phase.

This page intentionally left blank



*Mandatory if a Study Design is prepared.

Source: Class Environmental Assessment for Provincial Transportation Facilities (2000)

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Overview of Class EA Process
For Group B Projects

EXHIBIT
1-1

1.3 Purpose of the Transportation Environmental Study Report

This Transportation Environmental Study Report (TESR) documents the environmentally significant aspects of the planning, design and construction for the improvements to 25.8 km of the Highway 401 corridor from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary, as a Group 'B' project as defined in the Class Environmental Assessment for Provincial Transportation Facilities (1999, as amended 2000).

The Highway 6 EA Study (WP 65-76-05) from Freelton to Guelph received EA approval in early 2009, and involves a new alignment of Highway 6 from Freelton to the Hanlon Expressway. A portion of this new alignment parallels the Highway 401 corridor from just east of the Concession to the Hanlon Expressway.

This TESR also amends the Highway 6 EA Study by modifying the Hanlon Expressway and Highway 6 South/Brock Road interchanges to accommodate the improvements to Highway 401 within the study limits. However, the EA approved alignment for Highway 6 from Freelton to Guelph remains unchanged.

The TESR includes:

- A description of the project and its purpose;
- The existing natural, social, economic and cultural environmental factors;
- The analysis and evaluation of alternatives that were considered, the anticipated environmental effects and proposed mitigation measures; and
- Commitments to further work, consultation, and monitoring associated with project implementation.

Additional information about the Class Environmental Assessment process for Group 'B' projects is contained in the Class Environmental Assessment for Provincial Transportation Facilities (1999, as amended 2000). Readers interested in this information are encouraged to refer to that document.

As required under the Class EA, this TESR is being made available to the public, other interested parties and external agencies for a 30-day review from Wednesday November 21, 2012 to Friday December 21, 2012. A notice of TESR submission was placed in local newspapers and letters were mailed to notify government agencies, affected property owners and members of the public on the Project Team's mailing list. During the review period, parties are encouraged to bring their project concerns to the attention of the Ministry of Transportation (MTO). If after consulting with MTO's consultants and staff, you have serious unresolved concerns, you have the right to request the Minister of the Environment (77 Wellesley Street West 11th Floor, Ferguson Block, Toronto, ON M7A 2T5) to "bump-up" (i.e. make a part II Order for) this project. A copy of the bump-up request should be sent to the Ministry of Transportation and McCormick Rankin at the following addresses:

Mr. Jim Dowell, P. Eng.
Project Manager
McCormick Rankin
2655 North Sheridan Way,
Suite 300
Mississauga, ON L5K 2P8
Tel: (905) 823-8500
Toll Free: 1-877-562-7947
Fax: (905) 823-8503
e-mail: jdowell@mrc.ca

Mr. Greg Moore, B.E.S
Environmental Planner
Ecoplans
2655 North Sheridan Way,
Suite 280
Mississauga, Ontario, L5K 2P8
Tel: (905) 823-4988
Toll Free: 1-877-562-7947
Fax:(905) 823-2669
e-mail: gmoore@ecoplans.com

Mr. Roger Ward, LEL
Senior Project Manager
Ministry of Transportation
West Region
Planning & Design Section
659 Exeter Road, 3rd Floor
London, ON N6E 1L3
Phone: (519) 873-4547
Toll Free: 1-800-265-6072
Fax: (519) 873-4600
e-mail: Roger.A.Ward@ontario.ca

This page intentionally left blank

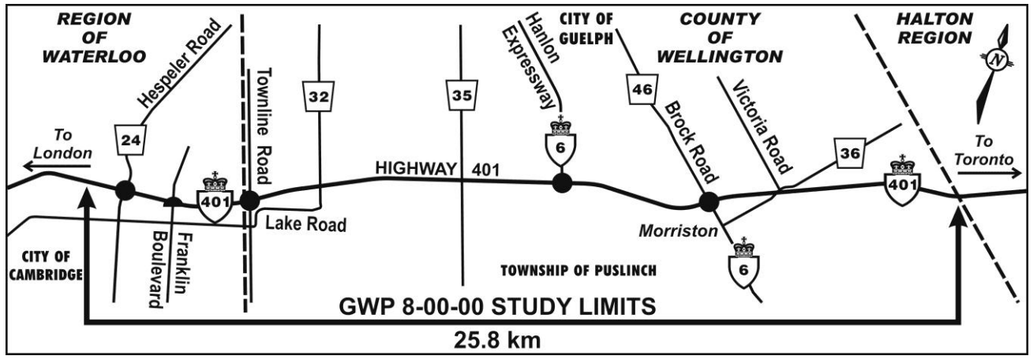
2.0 PROJECT SUMMARY

2.1 Description of Project

2.1.1 Project Location

The study area includes the Highway 401 corridor from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region boundary through the City of Cambridge and the Township of Puslinch. The area includes the existing Highway 401 corridor, interchanges and immediate surrounding area for a total project length of 25.8 km. **Exhibit 2-1** displays the study area.

Exhibit 2-1: Study Area



2.1.2 Technically Preferred Plan

Based on a comprehensive review and analysis of alternatives for the improvements to Highway 401 within the study limits, and comments received by local residents, members of the public, external agencies, and the municipalities of the City of Cambridge, the Township of Puslinch, County of Wellington, and Regional Municipality of Waterloo, the technically preferred plan consists of:

- Widening Highway 401 from 6 general purpose lanes to 10 lanes consisting of 8 general purpose lanes and 2 High Occupancy Vehicle lanes (HOV) between 1.0 km west of Hespeler Road to the Hanlon Expressway (Highway 6 North) and between proposed Highway 6 South and the Wellington County/Halton Region boundary.
- Widening Highway 401 between the Hanlon Expressway and proposed Highway 6 South from 6 general purpose lanes to 10 lanes consisting of 8 general purpose lanes and 2 High Occupancy Vehicle Lanes (HOV) with two additional auxiliary lanes (that connect the two Highway 6 interchanges).
- Upgrading one horizontal curve and 26 vertical curves to meet 120 km/h design standards.
- Reconstruction of existing Highway 401 within the project limits to address deteriorated pavement condition.
- Improving crossing road vertical alignment where replacement of the crossing structure is required to accommodate highway expansion.
- Reconstruction and/or modification of the interchanges at Hespeler Road, Franklin Boulevard, Townline Road, Hanlon Expressway, proposed Highway 6 South, and Brock Road to accommodate future highway expansion and to improve operations:
    - Reconstruction of the Hespeler Road interchange (with a partial shift to the east) to accommodate Highway 401 widening;
    - Replacement of the Franklin Boulevard structure (on the existing alignment) to accommodate Highway 401 widening;
    - Ramp realignments at the Townline Road interchange to accommodate Highway 401 widening and modify the E-N/S ramp radius to improve the operational performance of the ramp;
    - Modification to the EA Approved (WP 65-76-05) W-N ramp at the Hanlon Expressway interchange to improve traffic flow between Highway 401 Eastbound and Highway 6 Northbound;
    - Replacement of the Brock Road crossing structure and realignment of Highway 6 with a roundabout on the connector road to proposed Highway 6 as a modification to EA Approved WP 65-76-05).
- Expansion of the existing carpool lots at the Highway 6 /Brock Road and Townline Road interchanges.

The technically preferred plan includes the provision of HOV lanes. An HOV lane is a specially designed lane that is designated for use by certain types of vehicles with a specified number of occupants. On Ontario highways, HOV lanes are for use by passenger vehicles with two or more occupants. HOV lanes can offer travel time savings to those who choose to carpool or take transit.

2.1.3 Related/Adjacent Studies and Projects

The following studies fall within or near the study limits of this Preliminary Design Study. The Project Team is considering these studies in the study of improvements to Highway 401. The studies mentioned below are illustrated in **Exhibit 2-2**.

MTO Studies

Highway 401 Widening – from 0.5 km west of Regional Road 8 easterly to 0.5 km east of Hespeler Road (Highway 24) (EA Approved)

To the west of this project Highway 401 is a 6-lane freeway, which will be widened to 10 lanes from King Street (Waterloo Regional Road 8) to Hespeler Road (Waterloo Regional Road 24) under WP 4-00-00. The recommended plan includes construction of two additional lanes to the outside of Highway 401 in each direction as well as interchange improvements at Hespeler Road. The modifications to the Hespeler Road interchange are considered to be interim interchange improvements.

As part of the staged implementation for rapid transit initiatives in the Region of Waterloo, bus by-pass shoulders will be provided on the Highway 401 shoulder west of the Hespeler Road interchange between Highway 8 and Hespeler Road. The results of this initiative, as well as the ultimate configuration of WP 4-00-00 have been assessed and considered in the development of the preferred plans for the Hespeler Road interchange and Highway 401 improvements to the east of Hespeler Road.

GTA-West Corridor EA Study

The GTA-West Corridor Study has identified a preliminary route planning study area, which includes the area immediately west and east of Milton, north of Highway 401. The study area includes the 6-lane section of Highway 401 adjacent to the eastern study limit of this project. In response to input received on the draft Transportation Development Strategy Report, MTO carried additional analysis and consultation to further examine the recommendations in the Halton area. This additional work was completed in Spring 2012, and the updated Transportation Development Strategy Report is expected to be released in Fall 2012. Consultation between the two Project Teams is ongoing.

Niagara-GTA Corridor Planning and EA Study

Consultation with the public and stakeholders provided strong support for the recommendation to enhance transit service and improve the performance of the existing transportation system. The feedback received regarding highway expansion options has provided a rationale for further analysis. MTO is proceeding to undertake additional analysis and consultation.

Brantford Cambridge Transportation Corridor (EA Terms of Reference Approved)

The Ontario Ministry of Transportation (MTO) initiated an Individual Environmental Assessment (EA) study under the Environmental Assessment Act to address the long-term problems and opportunities (to 2031) relative to the inter-regional movement of people and goods in the Brantford to Cambridge area. The Brantford to Cambridge Transportation Corridor Individual EA replaced the former Highway 24 Transportation Corridor Class EA Study.

On July 17, 2009 the EA Terms of Reference was approved by the Minister of Environment. The Ministry of Transportation is currently assessing its planning priorities and schedule for starting the Individual EA Study. The EA Terms of Reference contains an overview of the EA process, which provides a framework to guide future EA study.

A portion of the Brantford to Cambridge Transportation Corridor analysis area overlaps the project limits of the Highway 401 study. The east limit of the analysis area is located west of Wellington Road 35.

Highway 6 (Hanlon Expressway) Improvements and Highway 6 Freelton to Guelph (New) (EA Approved)

The Highway 6 EA Study (WP 65-76-05) received EA approval in early 2009 and involves a new alignment of Highway 6 (west of existing) from Freelton to Highway 401 in order to address the capacity deficiencies on Highway 6.

A portion of the alignment connecting the proposed Highway 6 to the Hanlon Expressway utilizes the Highway 401 corridor.

The preferred plan for widening Highway 401 in the section between the Hanlon Expressway and proposed Highway 6 includes the EA approved alignment and modifications to the Hanlon Expressway, proposed Highway 6, and Brock Road Interchanges.

Changes to the Highway 6 EA approved configuration that are impacted or require revision by a widened Highway 401 require EA approval as part of this current study.

Additional Studies

- Structure Rehabilitation – Wellington Road 35, Hanlon Expressway, and Wellington Road 32 (rehabilitations planned for summer 2012-2013) , and Hespeler Road southbound structure (rehabilitation planned for 2014-2015).
- Service Centre Redevelopments (Redevelopment Underway).
- Highway 7 New (EA Approved) from Kitchener to Guelph.

Municipal Studies

- Region of Waterloo – Franklin Boulevard Improvements Class EA (EA Approved).
- City of Cambridge – Highway 401 Pedestrian and Cyclist Bridge Feasibility Study (between Franklin Boulevard and Hespeler Road) – Study Complete.

Other Studies

- GO Transit/Metrolinx – Expand Rail Service from Georgetown to Kitchener (EA Approved).
- Windsor to Montreal High Speed Rail Project.

Highway 7 New (EA Approved)

Highway 6 (Hanlon Expressway) Improvements (EA Approved)

GTA-West Corridor EA Study – A Preliminary Route Planning Study Area has been identified, and includes the area immediately west and east of Milton, north of Highway 401 (Not Shown). In response to input received on the draft Transportation Development Strategy Report, MTO carried out additional analysis and consultation to further examine the recommendations in the Halton area. The additional work was completed in Spring 2012, and the updated Transportation Development Strategy Report is expected to be released in Fall 2012.

City of Cambridge - Highway 401 Pedestrian and Cyclist Bridge Feasibility Study (between Franklin Boulevard and Hespeler Road) (Study Completed).

Structure Rehabilitation – Wellington Road 35, Highway 6 North (Hanlon Expressway), Wellington Road 32, and Hespeler Road (southbound structure).

Highway 401 Widening - from 0.5 km west of Regional Road 8 easterly 5.5 km to 0.5 km east of Hespeler Road (Highway 24) (EA Approved, identified 10 lanes west of Hespeler).

Highway 6 (New) Freelton to Guelph (EA Approved)

Service Centre Redevelopments (Redevelopment Underway)

Region of Waterloo - Franklin Boulevard Improvements Class EA (EA Approved).

Brantford to Cambridge Transportation Corridor Study (EA Terms of Reference Approved)

Region of Waterloo - Rapid Transit EA

Niagara-GTA Corridor Planning and EA Study - Consultation with the public and stakeholders provided strong support for the recommendations to enhance transit service and improve the performance of the existing transportation system. The feedback received regarding highway expansion options has provided a rationale for further analysis. MTO is proceeding to undertake additional analysis and consultation.

G.W.P. 8-00-00 STUDY LIMITS

LEGEND:

- MTO Studies
- Municipal Studies

Other Studies Not Shown:

- GO Transit/Metrolinx - Expand Rail Service from Georgetown to Kitchener (EA Approved).
- Windsor to Montreal High Speed Rail Project.

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Related Studies

EXHIBIT
2-2

3.0 TRANSPORTATION NEEDS AND OPPORTUNITIES

This Preliminary Design and Class Environmental Assessment Study was initiated to determine the need and timing for operational and safety improvements required on Highway 401 from 1.0 km west of Hespeler Road to the Wellington County/Halton Region boundary.

Highway 401, from Hespeler Road easterly to the Halton Region boundary, is a six lane divided Class I freeway with a concrete median barrier and design speed of 120km/h (RFD 120) with a posted speed of 100 km/h. It is a key transportation corridor in Ontario, linking major cities and providing a corridor for international trade and economic development.

This Class EA is examining future transportation needs and opportunities to the Year 2031, and considering options to accommodate future transportation improvements in the Highway 401 corridor. The need for improvements is discussed below.

Existing and Future Traffic Conditions

- The Highway 401 corridor between Hespeler Road and the Wellington County/Halton Region boundary is currently operating at constrained levels during peak hours and is approaching the operational capacity of the 6-lane freeway.
- Future traffic forecasts include the most recent land use allocations from the Province's Places to Grow initiative and the reduction in vehicle trips based on the planned long-term GO Transit expansions to the Region of Waterloo along the Georgetown and Milton GO Train service corridors. These forecasts indicate that travel demand will exceed the existing capacity for the Highway 401 corridor and that by the year 2016, 8 lanes will be required to accommodate those demands, and that 10 lanes will be needed by 2031.
- Expansion of Highway 401 is also required to accommodate the high percentage of heavy trucks (21% - 31%) that use Highway 401 for interregional and international movement of goods.

Pavement

- The existing pavement structure is nearing the end of its service life and is not capable of handling the future traffic volumes. Considering the age of the existing concrete underneath some of the asphalt combined with the need to expand the highway, it is preferable to reconstruct the existing lanes at the time of Highway 401 expansion.

Bridges

- There are 16 bridge sites within the study limits. These include 10 underpasses, one railway overpass, and 5 large concrete culverts. Nearly all of the existing bridges were constructed 40 and 50 years ago and now require extensive rehabilitation. All of the bridges except the Townline Road underpass (constructed in 2004) are not long enough to accommodate a widened Highway 401, and replacement is to be considered in place of rehabilitation. New bridges will be designed with a 75 year service life.

The Province has a vision for managing traffic congestion on Provincial highways as future traffic continues to grow. This vision includes High Occupancy Vehicle (HOV) lanes, and seeks to manage traffic congestion by adding HOV lanes to many provincial highways to get people and goods to their destination safely and in less time.

HOV lanes improve highway efficiency by:

- Moving more people in fewer vehicles;
- Encouraging carpooling and public transit use by improving reliability and travel times for HOV lanes; and
- Providing more efficient movement of other vehicles, including trucks in the general purpose lanes.

The study reviewed the provision of HOV lanes within the study limits, since this provides the opportunities as noted above, and allows a future opportunity to connect to the proposed HOV network in the Greater Golden Horseshoe.

The proposed improvements to Highway 401 may also provide the opportunity to upgrade the horizontal and vertical curves to 120 km/h design standards, improve crossing road vertical alignments, and update the designation limits of Highway 401.

This page intentionally left blank

4.0 EXISTING ENVIRONMENTAL FEATURES

Exhibits 4-1 and **4-2** illustrate the existing conditions of the study area. Existing features within the study area are described in the following sub-sections.

4.1 Natural Environment

4.1.1 Designated Areas

Background information was reviewed to determine the presence of designated areas within the vicinity of the project study area. 'Designated natural areas' include evaluated wetlands, Provincially Significant Wetlands (PSW's), Environmentally Sensitive Areas (ESA's), Significant Wildlife Habitat (SWH), Provincial Parks, Conservation Reserves and Areas of Natural and Scientific Interest (ANSI's).

Findings indicate there are 7 PSW's and one unevaluated wetland within the study area. From west to east across the study area, these include:

- Speed River Wetland Complex PSW;
- Puslinch Lake – Irish Creek Wetland Complex PSW;
- Cranberry Oil Well Bog Complex PSW;
- Mill Creek Wetland PSW;
- Lower Mountsberg Creek Swamp Complex PSW;
- Badenoch-Moffat Wetland Complex PSW;
- Guelph Junction Wetland Complex PSW; and
- Unevaluated cattail marsh west of Highway 6 South/Brock Road.

The Mountsberg Wildlife Centre is the only ANSI within the study area.

Significant Wildlife Habitat has been identified by the MNR Land Information Ontario (LIO) database. Deer Wintering Areas bisect the study area at the Speed River Wetland Complex PSW in the far western portion of the study area, and the Mill Creek Wetland Complex PSW.

There are no ESA's, Conservation Reserves, or Provincial Parks located within the study area limits.

4.1.2 Vegetation

The study area has been modified through a long history of agricultural and residential development and now contains a mosaic of natural and human-impacted land-use components.

Large portions of the study area consist of culturally influenced and altered landscapes associated with active agriculture, existing transportation facilities (Highway 401 and local roads), and industrial and commercial development. Vegetation within these areas is dominated by tolerant cultural meadow species with occasional tree clusters, hedgerows and edge species. Remnant natural and semi-natural vegetation communities that exist within the study area, vary from upland forest and thicket features to various types of swamps, marshes and open water communities.

A total of 358 vascular plant species have been identified within the study area to date. An additional 57 plants were identified only to genus. Of the 358 species identified, 77% are native to Ontario.

4.1.3 Wildlife

The landscape mosaic within the study area provides habitat for a range of common, generalist wildlife species that are tolerant of urban and semi-urban, rural and agricultural conditions. Aquatic and riparian areas likely provide some habitat for waterfowl, herons, passerines and mammals, as well as some reptile and amphibian species. Within the broader landscape (i.e., beyond 120 m of the existing ROW), the woodland and wetland habitat mosaic associated with various PSW's and ANSI's can be expected to support a greater number of wildlife species given the higher habitat quality and diversity. These areas likely function as wildlife movement corridors.

<u>Birds</u>

During vegetation and aquatic surveys in September, October and November 2009, the following bird species were identified within the study area:

- Mourning Dove (Zenaida macroura);
- Blue Jay (Cyanocitta cristata);
- Black-capped Chickadee (Poecile atricapillus);
- American Crow (Corvus brachyrhynchos);
- Turkey Vulture (Cathartes aura);
- American Goldfinch (Carduelis tristis);
- Cedar Waxwing (Bombycilla cedrorum);
- Red-winged Blackbird (Agelaius phoeniceus); and evidence of
- Pileated Woodpecker (Dryocopus pileatus - excavated cavities).

Given the time of year, most migratory non-resident breeding birds were not observed. Other species expected within the study area include habitat generalist, disturbance-tolerant, urban-adapted species such as American Robin (Turdus migratorius), European Starling (Sturnus vulgaris), and Song Sparrow (Melospiza melodia). Numerous migratory passerines are also expected within the vicinity of the study area during the breeding bird season (i.e., warblers, sparrows, flycatchers).

<u>Amphibians and Reptiles</u>

Three amphibian species were observed within the study area:

- Northern Leopard Frog (Rana pipiens);
- American Toad (Anaxyrus americanus); and
- Green Frog (Lithobates clamitans).

Other species that were not observed directly but are expected to be found within the study area include:

- Gray Treefrog (Hyla versicolor);
- Spring Peeper (Pseudacris crucifer);
- Western Chorus Frog (Pseudacris triseriata); and
- Wood Frog (Lithobates sylvaticus).

Breeding habitat for these species is present in the wetlands and/or watercourses within the study area.

Two snake species, Eastern Gartersnake (Thamnophis sirtalis) and Dekay's Brownsnake (Storeria dekayi), were observed during field surveys. A single record for Blanding's Turtle (roadkill) was reported by MNR on June 14, 2008 at the far eastern end of the study area limits. This species is likely associated with suitable habitat found within the Mountsberg Reservoir Marsh located south of the study area.

Wetland habitats for other reptile species such as Snapping Turtle (Chelydra serpentina) and Midland Painted Turtle (Chrysemys picta margina) are present within the study area. These species are often observed wherever suitable habitats including dug ponds, ditches, natural and man-made wetlands are present. Herpetofauna habitat is also present generally, along the watercourses and associated riparian areas within the study area.

Mammals

Three mammal species were observed in the study area during field surveys:

- White-tailed Deer (Odocoileus virginianus);
- Raccoon (Procyon lotor); and
- Porcupine (Erethizon dorsatum).

At least eight other common mammal species, which are disturbance-tolerant and adapted to urban areas, are expected to be present within the study area. These species include:

- Eastern Cottontail (Sylvilagus floridanus);
- Woodchuck (Marmota monax);
- Grey Squirrel (Sciurus carolinensis);
- Beaver (Castor canadensis);
- Coyote (Canis latrans);
- Striped Skunk (Mephitis mephitis);
- Muskrat (Ondatra zibethicus);
- Eastern Chipmunk (Tamias striatus); and
- Red Fox (Vulpes vulpes).

Significant Wildlife Habitat and Wildlife Movement

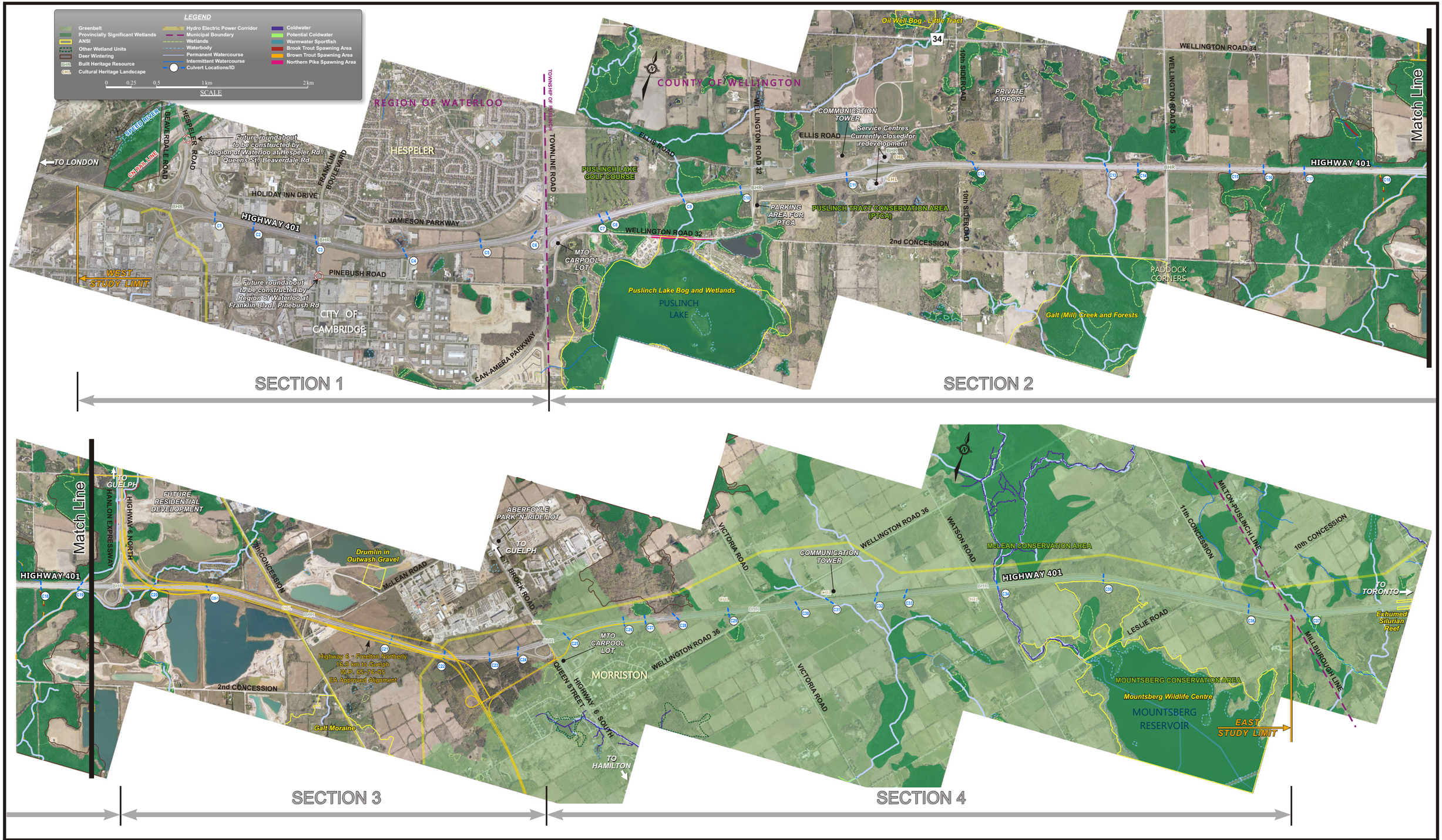
Wildlife habitat significance is identified by MNR using the Significant Wildlife Habitat Technical Guide (OMNR 2000), in which "significant wildlife habitat" is broadly categorized as:

- Seasonal concentration areas (e.g. conifer forests for deer wintering);
- Rare vegetation communities or specialized habitats for wildlife;
- Habitats of species of conservation concern, excluding the habitats of endangered and threatened species; and
- Animal movement corridors.

One vegetation community located along the banks of Irish Creek on the south side of Highway 401 (Puslinch Lake-Irish Creek Wetland Complex PSW) was classified as Winterberry Organic Thicket Swamp, a provincially rare vegetation community type. No provincially rare species were found in this unit, but one regionally rare species, Dotted Smartweed, was recorded. While no species of conservation concern were observed within this community, it may provide suitable refuge and food supply for a variety of species. The berries on Winterberry remain on the shrub in winter and therefore are an important food resource for numerous species of birds. These species are typically abundant within Wellington County and Waterloo Region. Evidence of deer (tracks, scat, bedding, paths) was observed throughout the study area, particularly along wetland and watercourse edges, indicating frequent and regular use.

Deer Wintering Areas were identified in the MNR LIO database, which bisect the study area at the location of the Speed River Wetland Complex PSW and the Mill Creek Wetland PSW.

Potential movement corridors for wildlife such as ungulates and other mammals exist along the major creeks and associated habitats within the study area such as Irish Creek, Aberfoyle Creek, Bronte Creek, and Kilbride Creek. Other movement corridors may include the hydro corridor located on the north side of Highway 401 that runs parallel to the highway (approximately 140 m from edge of pavement), from east of Highway 6 South/Brock Road to the Halton Region boundary.



GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Existing Conditions

EXHIBIT
4-1

REGION OF WATERLOO

COUNTY OF WELLINGTON

TOWNSHIP OF PUSLINCH

HESPELER

SPEED RIVER

BEAVERDALE ROAD

HESPELER ROAD

TO LONDON

HOLIDAY INN DRIVE

FRANKLIN BOULEVARD

HIGHWAY 401

JAMIESON PARKWAY

EAGLE STREET

PINEBUSH ROAD

WEST STUDY LIMIT

REGION OF WATERLOO IS CURRENTLY REVIEWING A POTENTIAL ROUNDABOUT AT FRANKLIN BOULEVARD / PINEBUSH ROAD (Franklin Boulevard Improvements Class EA - Region of Waterloo)

CITY OF CAMBRIDGE

CAN-AMERA PARKWAY

TOWNLINE ROAD

ELLIS ROAD

PUSLINCH LAKE GOLF COURSE

WELLINGTON ROAD 32

MTO CARPOOL LOT

PUSLINCH LAKE

34

COMMUNICATION TOWER

PRIVATE AIRPORT

SERVICE CENTRE

SERVICE CENTRE

PARKING AREA FOR PTCA

PUSLINCH TRACT CONSERVATION AREA (PTCA)

10th SIDEROAD

2nd CONCESSION

WELLINGTON ROAD 35

WELLINGTON ROAD 34

PADDOCK CORNERS

Match Line

SECTION 1

SECTION 2

CITY OF CAMBRIDGE OFFICIAL PLAN (2004)

- Class 1 Industrial General Corridor
- Commercial
- Urban Residential
- Commercial Class 5 (Big box retail)
- Provincially Significant Wetlands
- Unevaluated Wetlands

COUNTY OF WELLINGTON OFFICIAL PLAN TOWNSHIP OF PUSLINCH LAND USE SCHEDULE (Updated 2008)

- Agriculture - Primary
- Agriculture - Secondary
- Recreational
- Greenlands
- Rural Industrial
- PA7-3 (Proposed development Area)
- PA7-1 (Economic development Area)

COUNTY OF WELLINGTON OFFICIAL PLAN MORRISTON LAND USE SCHEDULE (Updated 2005)

- Residential
- Urban Centre (Central Business District)

CITY OF CAMBRIDGE BIKEWAY NETWORK MASTER PLAN (2008)

- Existing Bicycle Route
- Proposed Route (2008 Network)
- Approved Regional Route (From Regional Municipality of Waterloo Cycling Master Plan 2004)
- Conceptual Route / Desired Connection (Requires further study)

SCALE 0 0.25 0.5 1 km 2 km

Match Line

TO GUELPH

HANLON EXPRESSWAY

HIGHWAY 6 NORTH

FUTURE RESIDENTIAL DEVELOPMENT

7th CONCESSION

McLEAN ROAD

ABERFOYLE PARK 'N' RIDE LOT

TO GUELPH

BROCK ROAD

2nd CONCESSION

MTO CARPOOL LOT

QUEEN STREET

MORRISTON

HIGHWAY 6 SOUTH

TO HAMILTON

WELLINGTON ROAD 36

VICTORIA ROAD

COMMUNICATION TOWER

WATSON ROAD

McLEAN CONSERVATION AREA

11th CONCESSION

MILTON-PUSLINCH LINE

10th CONCESSION

HIGHWAY 401

TO TORONTO

LESLIE ROAD

MILLBURO LINE

MOUNTSBERG CONSERVATION AREA

MOUNTSBERG RESERVOIR

EAST STUDY LIMIT

SECTION 3

SECTION 4

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Existing Conditions -
Land Use Designation

EXHIBIT
4-2

4.1.4 Fisheries and Aquatic Habitat

A total of 38 water crossings (both watercourses and drainage features) were assessed during field surveys between May 2009 and June 2010. These assessments were conducted following the guidelines outlined in the Environmental Guide to Fish and Fish Habitat, "Section 4 – Field Investigations" (MTO 2009). Fish community sampling was also conducted on those watercourses where fisheries information was limited or absent, or where community composition was not clear. Spawning surveys were also conducted in the fall of 2009 on a selection of coldwater streams known to support Brook and Brown Trout (C19, and 20) to assess or confirm spawning locations within the reaches of the proposed future highway ROW.

The 38 water crossings were grouped into three categories based on their potential to support fish use (Direct use, no direct use/indirect contribution, and some limited potential to support use). The locations of water crossings are shown in **Exhibit 4-1**. Specifically, 15 crossings were identified as supporting direct fish use within the project limit, 4 do not support fish directly (i.e., indirect habitat only) and the remaining 19 do not support fish habitat at all.

The 15 crossings that support direct fish use include C8, C9, C13, C14, C16-C20, C20-1, C30-32, C34 and C37. Seven of these crossings support coldwater fish communities, with Brook Trout, Brown Trout, and/or Rainbow Trout present within the system generally. The remaining eight support cool/warmwater communities with varying diversity from a single species (C8 and C16) to 11 species (C31).

There is one crossing (C34) that is known to support Redside Dace, a Species At Risk, within the proposed Highway ROW reaches. Two other crossings (C31 and C32) have also been identified/mapped by the MNR as regulated habitat for Redside Dace. Redside Dace are designated as Endangered by COSEWIC and COSSARO, receive species protection and pending habitat protection under the Endangered Species Act, and are listed as Special Concern on Schedule 3 under the SARA.

The other four crossings (C4, C10, C15 and C36) were assessed as supporting indirect fish habitat based on their lack of direct fish use but presence of some connectivity to a receiving watercourse downstream that does support direct use. They provide nutrients and allocthanous materials to those receiving watercourses downstream of the highway crossing thereby supporting fish indirectly. For example, the watercourse associated with C4 appears to convey roadside drainage to a large pond located on the north side of the existing highway. Although the watercourse is intermittent, relatively steep and does not appear to have any upstream connection, the feature conveys nutrients and allochthanous inputs to the pond feature further downstream (north) which was identified to support direct fish use.

The remaining 19 crossings were classified as not supporting direct or indirect fish habitat based on their characteristics and lack of connectivity with other watercourses. These features have been categorized as local roadside drainage or highway drainage features only. Any potential impacts to these features will be managed through the standard construction related mitigation measured outlined in **Section 8.5**.

4.1.5 Species of Conservation Concern

The NHIC database, MNR Guelph and Aurora, Grand River Conservation Authority (GRCA), Conservation Halton (CH), and DFO were consulted for information on species of conservation concern, which are defined here as:

- Species "designated" by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and/or listed under the Canadian Species at Risk Act (SARA);
- Species that are "designated" by COSSARO (Committee on the Status of Species at Risk in Ontario) and/or are listed under the Ontario Endangered Species Act (2007);
- Provincially rare species, with an S-rank of S1 to S3 (S-ranks are set by NHIC to identify protection priorities for rare species in Ontario. Ranks range from S1 (critically imperiled) to S5 (secure), with species ranked S1 to S3 (vulnerable) considered rare.); or
- Regionally recognized species (Regional status of plant species was assessed using the *Region of Waterloo Significant Species List: Native Vascular Plants 1999* (Regional Municipality of Waterloo 1999)).

The following summarizes the key points with respect to species of conservation concern within the study area:

- One vascular plant species, Butternut (*Juglans cinerea*) designated as "Endangered" by COSEWIC and the MNR and listed under the Canadian Species at Risk Act and the Ontario Endangered Species Act (2007) was found in two locations within the study area.
- One provincially rare species (S3) was observed in the study area: Sharp-fruit Rush (*Juncus acuminatus*). In addition, eight species considered rare exotics in the province (S-rank of SE1-SE3) were found in the study area.
- A total of twenty-one plant species with regional rankings (Regional Municipality of Waterloo 1999) were observed within the study area, including:
    - 15 regionally significant species:
        - Ontario Aster (Aster ontarionis var. ontarionis),
        - Large Yellow Lady's Slipper (Cyprepedium calceolus var. pubescens),
        - Linear-leaved Willow-herb (Epilobium leptophyllum),
        - Black Huckleberry (Gaylussacia baccata),
        - Sharp-fruit Rush (Juncus acuminatus),
        - Canada Rush (Juncus canadensis)
        - Cardinal Flower (Lobelia cardinalis),
        - Hairy Honeysuckle (Lonicera hirsuta),
        - Canada Moonseed (Menispermum canadense),
        - Fragrant White Water-lily (Nymphaea odorata),
        - Sweet Coltsfoot (Petasites frigidus),
        - Northern Beech Fern (Phegopteris connectilis),
        - Purple-flowering Raspberry (Rubus odoratus),
        - River Bulrush (Scirpus fluviatilis) and
        - Rock Elm (Ulmus thomasii).

- 4 species listed as regionally significant with the expectation that additional research may prove otherwise, Burreed Sedge (*Carex sparganoides*), Virginia Stickseed (*Hackelia virginiana*), Dotted Smartweed (*Polygonum punctatum*) and Highbush Blueberry (*Vaccinium corymbosum*).
- 2 species considered regionally significant only if they are demonstrably indigenous (most populations in the Region of Waterloo are thought to be of non-indigenous origin), Black Walnut (*Juglans nigra*) and Eastern Cottonwood (*Populus deltoids ssp. monolifera*).

- 1 aquatic species (Redside Dace) designated as Endangered by the COSEWIC and COSSARO, protected under the Endangered Species Act and listed as Special Concern on Schedule 3 of the SARA.

A review of potential Species at Risk designated under federal or provincial legislation was completed for the study area prior to the initiation of field work in 2009 and was updated in 2012 to reflect any changes to the listing of species.

Forty-eight (48) potential SAR, including 8 vascular plant species and 40 wildlife and aquatic species, are known to, or have the potential to occur, within the general vicinity of the study area based on a review of MNR's NHIC database (March 2011), ongoing consultation with MNR Guelph and Aurora, relevant Ontario Breeding Bird Atlas (OBBA) records from 2001-2005, and Ecoplans field observations (2009).

This list of potential SAR was refined by determining whether suitable habitat was present within the study area. Based on a review of suitable habitat for these species and professional judgment, only two have been confirmed directly within the study area limits (Butternut and Blanding's Turtle).

According to the MNR regional SAR lists provided to Ecoplans for Wellington County and Waterloo Region (September 2011), Henslow's Sparrow is "historically known to occur" in these regions. According to MNR data provided to Ecoplans in 2009, several observations for Henslow's Sparrow were recorded in the early 1970's near Crieff (southwest of the Highway 6 South/Brock Road Interchange) but that habitat is no longer present and/or suitable.

Henslow's Sparrow is generally considered extirpated from the province, as it has been over a decade since a mated pair has been observed. In Ontario, Henslow's Sparrow have mainly been recorded inhabiting pastureland and uncut and abandoned hayfields with highly specific habitat requirements (i.e., preference for tall, dense grass cover, thick thatch layer, avoidance of shrub and tree layers, large open areas of grassland, adjacent to low-lying wet areas) (Environment Canada 2010). Given that the proposed connector road is located entirely within conifer plantations, no suitable habitat for Henslow's Sparrow is present in the study area.

Per consultation with MNR, one species, Redside Dace (*Clinostomus elongates*) (RSD), has the potential to occur within the headwaters of Bronte Creek and within the upstream portions of Mountsberg Creek and associated tributaries (above the reservoir), which includes creek crossings located at culverts. This designation is based on historical records of RSD in portions of these watercourses. There are no recent records for this species within the watercourses crossing the study area, however, these portions of Mountsberg and Bronte Creek are currently regulated by MNR as habitat for RSD.

According to MNR staff there are two records of Redside Dace in Mountsberg Creek (C34) upstream of the reservoir. Although these records are historic (1970's), these sites have not been sampled recently and it is MNR's opinion that Redside Dace likely persist in the reaches within the highway ROW upstream of the reservoir. MNR indicated that habitat within the watercourse downstream of the reservoir has been degraded by the warming effects of the reservoir.

In addition to the confirmed presence of Redside Dace in C34, MNR has mapped C31 and C32 as regulated habitat for Redside Dace, although this species is not believed to currently occupy the ROW reaches of these two crossings. The mapping is based on MNR's assessment criteria as outlined in the Ontario Regulation 242/08, which states:

> "*a stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains the baseflow, coarse sediment supply or surface water quality of a part of a stream or other watercourse described in subparagraph i or ii, provided the part of the stream or watercourse has an average bankfull width of 7.5 metres or less.*"

The general habitat characteristics preferred by Redside Dace are known to include pools and slow flowing areas of small headwater streams with moderate-high channel gradients, overhanging grasses and shrubs, undercut banks, instream boulders and large woody debris. However, substrate preference is variable and includes silt, gravel and boulders (Recovery Strategy, 2010). Although this habitat is present, scattered throughout the reaches of both systems, the systems themselves are impacted by the surrounding agricultural and road infrastructure land uses.

Additional review during detail design should identify if there are any new species of conservation concern that have been designated federally or provincially after the completion of the preliminary design study.

4.2 Groundwater

A groundwater assessment study was carried out to characterize the local hydrogeological conditions within the study area. The findings of the groundwater assessment study are provided in **Section 8.6** The following summarizes the existing hydrogeological conditions within the study area.

4.2.1 Aquifers

4.2.1.1 Overburden Aquifer System

For the purposes of this study, the overburden aquifer system has been divided based on Conservation Authority jurisdiction.

Grand River Conservation Authority (GRCA) Jurisdiction

The portion of GRCA jurisdiction through which the study area passes is primarily composed of outwash gravel, Port Stanley Till and ice contact kames and esker formations. Well records indicate that there are 26,323 wells located within the GRCA and that both the overburden and bedrock aquifers are used for water supply. The cities of Kitchener/Waterloo, Cambridge and Guelph rely almost exclusively on groundwater to meet municipal supply demand. The main aquifer of interest is the Puslinch Aquifer, which is located within the Township of Puslinch. This confined aquifer consists of outwash sand and gravel which ranges in thickness from 5 m to 10 m and is confined by up to 35 m of lacustrine sediments and till.

Hamilton Region Conservation Authority (HRCA) Jurisdiction

The HRCA jurisdiction consists mainly of Wentworth Till and is known to have overburden thickness ranges from 10 m to 30 m. In general, the overburden aquifer is not considered an important source of water supply. However, the area located within The Township of Puslinch contains the Valens Outwash Aquifer which is composed of outwash deposits and some Wentworth Till. Wells screened within this aquifer range from 10 m to 39 m deep and obtain water from sand and gravel deposits up to 15 m in thickness (MOE, 2003).

Conservation Halton (CH) Jurisdiction

The predominant formation throughout the CH portion of the study area is the Wentworth Till, which ranges from 10 m to 30 m in thickness and is not considered a significant source of water supply. An area of outwash gravel is encountered in the middle portion of CH jurisdiction. No references could be found which indicated this formation's use as a source of water supply.

4.2.1.2 Bedrock Aquifer System

For all three Conservation Authority jurisdictions, the bedrock aquifer consists of fractured rock formations and may be hydraulically connected to the overlying overburden aquifer, where deposits of silt and clay are not in contact with the bedrock surface. Exposure of the bedrock formation at surface through the eastern portion of the study area provides evidence that portions of the bedrock aquifer can be considered unconfined. In general, the dolostone and limestone formations of the Guelph-Amabel bedrock unit are expected to yield sufficient amounts of water to meet domestic supply demands.

4.2.2 Groundwater Flow

In general, the unconfined water table flow direction will match existing local topography until a recharge/discharge area is intercepted. Flow within the deeper, confined aquifers will follow regional trends. It is anticipated that groundwater within the deep aquifers will most likely flow south-southeast towards Lake Ontario. Shallow groundwater flow is directed towards major surface water features such as the Speed River and wetlands.

It should be noted that zones of influence related to large scale dewatering (i.e. municipal supply wells, active quarrying operations) were not assessed as part of this study.

4.2.3 Groundwater Recharge and Discharge

The majority of study area can be considered a recharge zone, relying on rainfall events to recharge underlying aquifers. The highest probability of groundwater recharge into the overburden and subsequent confined/bedrock aquifers occurs at areas designated as wetlands. Discharge areas mainly occur along the Speed River but will also occur downward to lower aquifer units that are hydraulically connected and separated by thin, discontinuous silt and clay layers.

4.2.4 Aquifer Susceptibility

Based on observed quaternary geology, there are three major areas within the study area. Areas composed of the Wentworth Till are of low permeability, and as such, the unconfined aquifer is less susceptible to impacts due to the decreased rate of infiltration though the till. Areas of ice-contact sand are more susceptible to contamination due to the increased permeability of subsurface soils. Finally, higher permeability areas of outwash gravel/ice-contact gravel are the most susceptible to surface activities.

General locations that could have high groundwater susceptibility as a result of road improvements have been identified. Rationale for the selection of these areas is provided below.

- The area is located within 250 m of the current Highway 401 alignment;
- The area is identified as having a geologic formation of higher permeability (sand and/or gravel);
- The area is adjacent to a Provincially Significant Wetland; and
- The area falls within a Wellhead Protection Area.

4.2.5 Wellhead Protection Areas

Wellhead protection refers to the process of identifying the area from which a well will potentially draw its water supply. Groundwater is heavily relied upon for the provision of municipal servicing to the west of the study area (Cambridge, Kitchener, and Waterloo). As such, Wellhead Protection Areas (WHPAs) have been established throughout the study area. Establishing controls on land use management actions within these areas can minimize the potential for contaminants to reach the well.

4.3 Socio-Economic Environment

4.3.1 Project Location

The study area is located within the Region of Waterloo, City of Cambridge, Wellington County, and Township of Puslinch, as shown on **Exhibit 1-1**. The west study limit is 1 km west of Hespeler Road, and the east study limit is located at the Wellington County/Halton Region boundary.

4.3.2 Adjacent Land Uses

The land adjacent to the Highway 401 right-of-way from Hespeler Road easterly to Townline Road has varied uses including commercial, industrial, and residential. From Townline Road easterly to the Wellington County/Halton Region boundary, the lands adjacent to the Highway 401 right-of-way are primarily rural consisting of agricultural and resource extraction uses, woodlands and some wetlands. **Exhibit 4-2** illustrates the land use designations as identified by the City of Cambridge Official Plan and the County of Wellington Official Plan. A summary of the general land uses is below:

1 km West of Hespeler Road to Hespeler Road Interchange

The land to the west of the Hespeler Road interchange is primarily industrial and commercial land. There is a provincially significant wetland (PSW) north of Highway 401.

Hespeler Road to Franklin Boulevard

A big-box retail shopping centre is located in the southeast quadrant of the Hespeler Road interchange. The shopping centre has an access road opposite the W-N/S interchange ramp terminal with a grade separated structure from the S-E ramp. A shopping mall is also located in the northeast quadrant of the Hespeler Road interchange, adjacent to the E-N/S ramp. A residential area is located in the southwest quadrant of the Franklin Boulevard interchange and there is a small wooded area along the ROW west of the Franklin Boulevard interchange. The remaining land throughout this section is industrial.

Franklin Boulevard to Townline Road

The land from Franklin Boulevard easterly to Townline Road is primarily industrial with two small areas classified as unevaluated wetlands.

Townline Road to Wellington Road 32

An MTO carpool lot is located in the southeast quadrant of the Townline Road Interchange. The Puslinch Lake Golf Course lies on the north side of Highway 401. The remaining land within this area is classified as either secondary agriculture or greenlands.

Wellington Road 32 to Wellington Road 35

The land adjacent to Highway 401 within this area is classified mainly as secondary agriculture and greenlands. The Puslinch Tract Conservation Area is located south of Highway 401 between Wellington Road 32 and Sideroad 10. MTO service centres are located on either side of Highway 401, and a private airport is situated on the north side of Highway 401. The land in the southwest corner of Highway 401 at Wellington Road 35 is classified as primary agriculture.

Wellington Road 35 to the Hanlon Expressway

The land within this portion of Highway 401 is classified as agricultural and greenlands. Land classified as primary agriculture is located on either side of the highway. The Hanlon Expressway interchange is surrounded by a wooded area and wetlands. This area is classified as the Galt Creek and Forest Wellington County Environmentally Sensitive Area. The northwest quadrant of the Hanlon Expressway interchange is designated as a major fish spawning area. The land on the south side of the interchange is owned by the University of Guelph and is leased to the St. Lawrence Cement Group (Dufferin Aggregates) for aggregate extraction.

Hanlon Expressway to Highway 6 South/Brock Road

The land throughout this section of Highway 401 is classified mainly as secondary agriculture, and used primarily for mineral aggregate extraction. Companies such as Telephone City Gravel, Dufferin Aggregates, St. Mary's Cement, Capital Paving, and Custom Aggregates are located in this area. A large industrial area is located north of Highway 401 at Brock Road. The business area of the community of Morriston is located on Highway 6 South, south of Highway 401 with adjacent residential areas.

Highway 6 South/Brock Road to Watson Road

The land throughout this area is classified mainly as agriculture and greenlands. The area to the east of the Highway 6 South/Brock Road interchange remains industrial in the north and residential in the south. The agricultural land surrounding Morriston is classified as secondary agriculture, with the remaining agricultural land classified as primary agriculture.

Watson Road to the Wellington County / Halton Region Boundary

The land adjacent to Highway 401 through this region is classified as secondary agriculture and greenlands. The McLean Tract Conservation Area is located north of Highway 401 and the Mountsberg Conservation Area is located south of Highway 401.

4.3.3 Agriculture

An Agricultural Impact Assessment was carried out to identify the existing agricultural uses within the study area and provide input for the comprehensive review process to assess the impact on agriculture of the proposed expansion of Highway 401. The following provides an overview of the agricultural features within the study area.

Physiography and Climate

The western section of the study area (west limit to approximately Townline Road) is within the Waterloo Hills Physiographic Region. The surface soils in this area comprise sandy hills (sandy till, kame and kame moraine) with outwash sands in the lower hollow/valley areas. The soils in this area are generally well drained.

The central and east section of the study area (Townline Road to approximately the Wellington County/Halton Region boundary) is within the Horseshoe Moraine Physiographic Region. The lower areas in the moraine are associated with old glacial spillways with broad gravel and sand terraces and swampy valleys. Topography is often steep with irregular slopes. The soil material is coarse and often stony.

The extreme eastern section of the study area is within the Flamborough Plains Physiographic Region. This region is characterized as a shallow tract of drift materials on the Niagara cuesta (Niagara Escarpment and surrounding areas to the east and west). The soils are either boulder glacial till or sand and gravel materials. The soils are generally wet and swampy or shallow to bedrock.

The majority of the study area is located within the 2900 - 3100 average accumulated Crop Heat Units available for warm season crops in Ontario. The Crop Heat Units (CHU) index was originally developed for field corn and has been in use in Ontario for 30 years. CHU averages range between <2100 east of Parry Sound to over 3500 near Windsor. The higher the CHU value, the longer the growing season and the greater the opportunity for growing value crops.

Soil Capability for Agriculture

The Canada Land Inventory (CLI) system combines attributes of the soil to place the soils into a seven-class system of land use capabilities. The CLI soil capability classification system groups mineral soils according to their potential and limitations for agricultural use. The first three classes are considered capable of sustained production of common field crops, the fourth is marginal for sustained agriculture, the fifth is capable for use of permanent pasture and hay, the sixth for wild pasture and the seventh class is for soils or landforms incapable for use for arable culture or permanent pasture. Organic or Muck soils are not classified under this system.

An overall assessment of the lands within the study area included areas of Not Mapped soils within the City of Cambridge, and a mix of mostly Class 1, Class 2, Class 3 and Organic soils. Smaller areas of Class 4, Class 5 and Class 6 soils were noted at various locations within the study area. Organic soils were located in the lower wet areas (near Puslinch Lake and the Hanlon Expressway). The greatest concentration of Class 1 soils is between Victoria and Watson Roads.

Agriculture Land Use

The study area is a mix of land uses including, but not limited to: agricultural, aggregate, ponds, woodlots, built up, urban, commercial, industrial and institutional. Aggregate operations and ponds were more prevalent near the Hanlon Expressway interchange. The majority of agricultural lands were noted near Wellington Road 35, to the west of Highway 6 South/Brock Road, east of the community of Morriston to Watson Road and to the west of Concession Road 7. There are numerous severed parcels and nonfarm residences located along the adjacent side roads and cross roads in the study area. The majority of the urban areas are associated with the City of Cambridge.

Artificial Drainage

Artificial drainage involves the construction of or installation of tile drains in agricultural fields to reduce the excess water in the soil profile. The installation of tile drainage is an expense incurred by the landowner and as a result is considered an investment in agriculture.

OMAFRA Artificial Drainage System Maps were reviewed to determine if an agricultural tile drainage system had been registered within the study area. The OMAFRA maps revealed that artificial agricultural tile drainage systems (both Random and Systematic) were registered to a few parcels on both sides of the Highway 401 between Victoria and Watson Roads. An additional parcel of land on the north side of Highway 401 and west of Victoria Road was registered with Systematic tile drainage.

Systematic tile drainage systems require the placement of equally spaced lateral lines connected to headers that drain to a suitable outlet. Systematic tile drains are for the drainage of large sections of fields. Random tile drainage systems require the placement of tile drains in the low areas of the fields with a draw to a suitable outlet.

Irrigation

Irrigation equipment is used to provide water to crops in a timely fashion. Irrigation equipment may be owned by the farm operator or rented as required for the crop.

No visual evidence of the use of irrigation within the study area was observed.

Organic Farming

Organic farming is a production management system that is based on the minimal uses of off-farm inputs. Organic is a labelling term that denotes that a farm has been certified and adheres to standards that maintain the integrity of organic agricultural products.

Organic farms must go through a certification process to achieve the Organic Status. These farms are susceptible to wind-blown contaminants and as such should be documented with regard to proximity to the proposed undertaking.

No Organic operations were noted in a review of the Canadian Organic Growers online data set.

Minimum Distance Separation I

The Minimum Distance Separation (MDS) calculation is a tool provided by the OMAFRA, and used to determine a recommended distance between a livestock operation and another land use. The objective is to prevent land use conflicts and to minimize nuisance complaints from odour (the MDS does not account for noise or dust issues). MDS I calculations are employed to determine the minimum distance separation for new development from existing livestock facilities, while MDS II calculations are used to determine the minimum distance separation for new or expanding livestock facilities from existing or approved development.

Discussion with staff from the OMAFRA indicates that the Minimum Distance Separation Calculations are not required for Environmental Assessments for road development or realignment. Given this, MDS calculations are not required for the proposed improvements to Highway 401.

4.3.4 Property Waste and Contamination

A Contamination Overview Study was carried out to identify areas of actual or potential property waste or contamination. Several broad Areas of Potential Environmental Concern were identified by this report.

Potential Site Contamination - High

The following areas of high potential correspond to locations within the study area where land uses consist of commercial and industrial operations that could impact soil and/or groundwater.

West Extent (from 1 km west of the Hespeler Road interchange to the Townline Road interchange)

- Waterloo Concession 1 Dump which was active in the 1970s, is located north of Highway 401 approximately 750 m west of the Hespeler Road interchange.
- Two rail lines cross Highway 401 approximately 500 m and 750 m from the Hespeler Road interchange.
- Industrial facilities are located north and south of Highway 401, west of the Hespeler Road interchange.
- Industrial facilities are located north and south of Highway 401, east and west of the Franklin Boulevard interchange which include Havlik Machining, Rockwell Automation, Plastico Industries, several logistics companies, Pinebush Water Treatment facility, etc.

Central Section (from the Townline Road interchange to the Highway 6 South interchange)

- The highway service centres located north and south of Highway 401 approximately 3 km east of the Townline Road interchange in Cambridge.
- Puslinch Concession 2 Dump (active during the 1940s and 1950s) is located north of Highway 401 and 1.5 km east of the Townline Road Interchange.
- Kerr Industrial Park located west of the Highway 6 South/Brock Road Interchange.

East Extent (from the Highway 6 South interchange to the Wellington County/Halton Region Boundary)

- A MTO patrol yard is located approximately 750 m southeast of the Highway 6 South/Brock Road Interchange.

Potential Site Contamination - Moderate

Several areas were found to be of moderate potential and are summarized below. These areas represent land uses that are agricultural/livestock operations whose buildings may be directly affected by the project; or are small commercial/industrial properties suspected of using chemical compounds or performing activities that could impact soil and/or groundwater, however may not be directly impacted by road improvements.

Central Section (from the Townline Road interchange to the Highway 6 South interchange)

- One former gas station was located 300 m south of Highway 401 and 2 km east of the Townline Road interchange.
- One small commercial residence was observed to have fuel pumps. This was observed north of Highway 401 and 1.5 km east of the Townline Road interchange.
- Two large agricultural properties equipped with barns were observed north of Highway 401 along Wellington Road 35. The buildings on these properties may be directly affected by road improvements.
- A small light industrial area located south of Highway 401 on the east side of 7th Concession Road.
- One potential former gas station located north of the Highway 6 South/Brock Road interchange.

East Extent (from the Highway 6 South interchange to the Wellington County/Halton Region Boundary)

- One small commercial residence was located south of Highway 401 along Wellington Road 36.
- A small cemetery is located 300 m north of Highway 401 on the east side of Wellington Road 46.
- One agricultural property equipped with a barn was observed north of Highway 401 approximately 500 m east of the Wellington Road 36 overpass. The building of this property may be directly affected by road improvements.
- One area of fertilizer demonstrations was observed 250 m north of Highway 401 on the east side of Watson Road.

In addition to the properties listed above, there is moderate potential for impacts due to road salt and spills along the Highway 401 right-of-way.

All other areas are considered to have a low potential for site contamination. These areas are generally classified as open space, residential, or agricultural areas that are not suspected of using chemical compounds harmful to the environment or human health.

4.3.5 Noise

Based on the MTO/MOE Noise Protocol and the new MTO Noise Guide, a Noise Sensitive Area (NSA) is defined as a noise sensitive land use (urban or rural) with an Outdoor Living Area (OLA) associated with the land use. NSAs include:

- Private homes such as single family residences;
- Townhouses;
- Multiple unit buildings, such as, apartments with outdoor living areas for use by all occupants; and
- Hospitals, nursing homes where there are outdoor living areas for the patients/residents.

There are approximately 1,200 NSAs within the Area of Investigation, broken down as follows:

- Approximately 1,100 existing single family homes; and
- Approximately 100 residential trailers.

A noise assessment was undertaken following the MTO Environmental Guide for Noise to assess the potential operational and construction noise impacts resultant from improvements to Highway 401. The findings of the noise assessment are highlighted in **Section 8.10**.

4.3.6 Archaeological Resources

A Stage I archaeological assessment was carried out to identify and assess the known and potential archaeological heritage resources within the Highway 401 study area. The Stage 1 assessment is a background study carried out in accordance with guidelines established by the Ministry of Culture (now the Ministry of Tourism, Culture and Sport). The process includes:

- Examining the Ministry of Culture archaeological site registry to determine the presence of known archaeological sites in and around the project area;
- Reviewing the land use history and the present condition of the study area; and
- The Stage I archaeological assessment also included a field review.

The assessment examines/documents the geomorphological history of the land during the period of possible human occupation, in order to evaluate the potential for buried cultural deposits, and document any other historical, environmental, planning or archaeological data applicable to the subject lands.

The Highway 401 corridor has high potential for the recovery of archaeological remains, although the corridor has been extensively disturbed, including the Highway 401 and Townline Road interchange. There are undisturbed areas within the highway right-of-way from the Wellington County/Halton Region boundary westerly to east of Highway 6 South/Brock Road, as well as within the ramps at the interchanges for Highway 6 South and the Hanlon Expressway.

The findings of the Stage I archaeological Assessment are summarized in **Section 8.12**.

4.3.7 Heritage Resources

A cultural heritage resource assessment was carried out to identify built heritage resources and cultural heritage landscapes within the study area. The assessment identified several principal cultural heritage landscapes and above-ground, built heritage resources older than 40 years located within or immediately beside the Highway 401 existing right-of-way, or close to the interchanges that have been identified for improvements.

Identified cultural heritage landscapes and build heritage resources include:

- Farm Complexes;
- Farmhouse and barn complex located at 2089 Townline Road, lot 1 Concession 2, Township of Puslinch, Wellington County;
- Farmhouse and barn complex located at 4240 Victoria Road South, lot 31, Concession 9, Township of Puslinch, Wellington County;
- Farmhouse and barn located at 7657 Wellington Region Road # 36, lot 31, Concession 9, Township of Puslinch, Wellington County;
- Farmhouse and barn complex located at 4148 Watson Road South, lot 33, Concession 9, Township of Puslinch, Wellington County;
- Roadscape;
- Highway 401 corridor throughout the study area;
- Roadway;
- Waterloo Regional Road #24;
- Highway Commercial;
- Service station located at lot 9/10, Concession 2, Township of Puslinch, Wellington County (accessed from Highway 401 eastbound);
- Service station located at lot 9, Concession 2, Township of Puslinch, Wellington County (accessed from Highway 401 westbound);
- Church and Cemetery;
- Duff's Presbyterian Church and Crown Cemetery, 319 Brock Road South, lot 28, Concessions 7 and 8, Township of Puslinch, Wellington County;
- Ellis Chapel, 6705 Ellis Road, lot 9, Concession 2, Township of Puslinch, Wellington County;
- Utility Right-of-Way;
- Concession 7 Road, Lot 25, Concession 7, Township of Puslinch, Wellington County;
- Bridges (Crossing structures);
- Waterloo Regional Road #24 (Hespeler Road) Underpass;
- Waterloo Regional Road #36 (Franklin Boulevard) Underpass;
- Wellington Road #32 Underpass;
- Wellington Road #35 Underpass;
- Hanlon Expressway Underpass;
- The Township of Puslinch Bridge No. 11 Underpass;
- Brock Road Underpass;
- Wellington Road # 36 Underpass; and
- Puslinch Concession 10 Underpass.

With the exception of the Hanlon Expressway Underpass which dates to 1973, all of the crossing structures listed above relate to the construction of Highway 401 from Halton Regional Road 25 (located at Milton) to Highway 8 in the City of Cambridge (Preston) in the late 1950s. Six of the underpasses are described as continuous deck slab structures, two are prestressed girder structures, and one is a concrete rigid frame structure.

The Ontario Heritage Bridge Guidelines (OHBG) were revised in 2007 to address the conservation of provincially owned road bridges. As part of the revised OHBG a new scoring system was developed to evaluate bridges for potential inclusion on the Heritage Bridge List.

The scoring system is divided into three main areas: Design/Physical Value, Contextual Value, and Historical/Associative Value. Within each category, criteria are individually scored. A bridge that achieves a score of 60 or greater is considered provincially important and worthy of inclusion on the Heritage Bridge List.

The structures in the Study Area have not been assessed previously as part of the Ontario Heritage Bridge Guidelines and are not listed on the Ontario Heritage Bridge List. None of the structures are included on a local inventory of cultural heritage resources, listed on a local municipal heritage register, or designated under the Ontario Heritage Act.

As part of the Preliminary Design and Class Environmental Assessment Study, three separate Cultural Heritage Evaluation Reports (CHERs) were prepared, one for the six continuous deck slab structures and one for each of the two prestressed girder structures; in September and October 2009 (revised February 2010). The concrete rigid frame structure (Puslinch Concession 10 Underpass) did not require a CHER because there are other examples of the bridge type on the Ontario Bridge Management System (OBMS) list.

The CHERs identified the Wellington Road # 36 Underpass and the Brock Road Underpass as worthy of consideration for listing on the Ontario Heritage Bridge List. In 2012 the MTO Heritage Bridge Committee (HBC) reviewed the CHERs for the eight bridge structures and concurred with the CHER conclusion that the Wellington Road #36 Bridge is a candidate for the Ontario Heritage Bridge List. However, the evaluation of the Brock Road Underpass was modified through a reduction of marks under Visual Appeal as a result of the replacement of the original handrail system. The HBC concluded that the Brock Road Underpass is not a candidate for the Ontario Heritage Bridge List.

4.4 Transportation Features

4.4.1 Road Network

The study area is serviced by an extensive network of local, collector, and arterial roads as well as Highway 401. These roads provide linkages within the community and other parts of Ontario and the United States. Highway 401, the Hanlon Expressway, and Highway 6 South are the only roads under the jurisdiction of the province within the study area, the municipalities are responsible for all other roads.

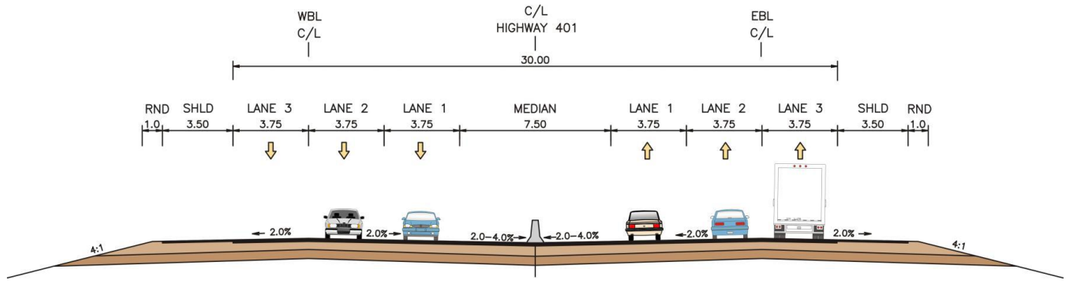
An overview of the key roadways within the study area and Highway 6 are provided below.

Highway 401

Highway 401 is classified as a Class I freeway, consisting of a six lane divided cross section with a design speed of 120 km/h (RFD 120) and a posted speed of 100 km/h. The current Highway 401 right-of-way is approximately 91.5 m (300 ft) in total within the study area.

The existing cross section from west of Hespeler Road, easterly to the Wellington County/Halton Region boundary consists of three 3.75 m westbound lanes, a 7.5 m median, and three 3.75 m eastbound lanes. The outside shoulders are 3.5 m wide, fully paved with 1.0 m rounding. The median shoulder width varies from 3.35 m to 3.45 m fully paved with narrower shoulders under the structures. **Exhibit 4-3** illustrates the typical existing cross section. The speed change lanes at interchanges are 3.5 m wide. The existing cross section meets the design standards for the 120 km/h design speed.

Exhibit 4-3: Highway 401 Typical Cross-Section



Horizontal Alignment

There are nine existing horizontal curves along Highway 401 within the project limits. One has a radius of 900 m, and the remaining eight have radii of 1700 m or over. All horizontal radii exceed the minimum design standard of 650 m for a design speed of 120 km/h.

The median shoulder width at the 900 m radius curve, between Franklin Boulevard and Townline Road, is 3.55 m. This provides an adequate stopping sight distance for a 104 km/h design but does not satisfy a 120 km/h design speed. A 1400 m radius would be required for a design speed of 120 km/h. To incorporate the new radius, the roadway including the median barrier and the median storm sewer would require realignment and approximately 500 m of highway would require reconstruction.

Vertical Alignment

There are 97 vertical curves located along Highway 401 within the project limits. For a 120 km/h design speed, the minimum K value for a crest curve is 120 and the minimum value for a sag curve is 60 where there is no illumination. Within the project limits there are 29 curves that are less than desirable for a 120 km/h design speed, 26 of these are crest curves and 3 are sag curves. One crest curve, V97, has a K value of 45 which provides an equivalent design speed that is less than the posted speed limit of 100 km/h. The curve is located at the former Grand River Electric Railway structure which has now been removed.

4.4.1.1 Interchanges

Generally, the existing interchange ramp alignments require upgrading to current desirable design parameters, and bridges must be lengthened to accommodate the proposed widening.

Hespeler Road

The Hespeler Road interchange is located 1.0 km east of the west study limit and 1.5 km west of Franklin Boulevard. The interchange is a partial Parclo A-4 with two signalized intersections at the W-N/S and E-N/S ramp terminals. There is a two-way mall-access road located at the W-N/S ramp terminal southeast of Highway 401 with a structure crossing the S-E ramp. There is also a one-way direct ramp to Groh Avenue on the north side of the interchange. The existing twin structures at this location can accommodate an eight lane Highway 401 cross section, but will not accommodate 10 lanes.

Franklin Boulevard

The Franklin Boulevard interchange is 2.3 km west of Townline Road and is a partial Parclo A-2. The interchange consists of a W-S ramp and a S-W ramp. The W-S ramp terminates at a signalized intersection at Pinebush Road, the location of a potential roundabout proposed by the Region of Waterloo. The structure is built for a maximum of eight lanes and will not accommodate 10 lanes on Highway 401.

Townline Road

The Townline Road interchange is 9.2 km west of the Hanlon Expressway and was reconstructed in 2004. The existing Townline Road underpass will accommodate an ultimate ten lane Highway 401 cross section. The Townline Road interchange has been upgraded to a Parclo A-4 and there are provisions for double left turn lanes from the Highway 401 E–N/S ramp to Townline Road. There are signalized intersections located at the W-N/S and E-N/S ramp terminals.

Hanlon Expressway

Located 4.4 km west of the Highway 6 South/Brock Road interchange, the Hanlon Expressway interchange is a partial Parclo A-2. Significant improvements are proposed for this location including direct ramps from and to the east as well as a potential direct ramp from the west to the north. There are considerable economic and environmental constraints in the area of the proposed work. The existing structure can accommodate eight lanes on Highway 401 but cannot accommodate a ten lane cross section.

Highway 6 South/Brock Road

The Highway 6 South/Brock Road interchange is currently a Parclo A-2 with signalized intersections at the W-N/S ramp terminal/S-E ramp entrance and the N/S-W ramp entrance/E-S ramp terminal. The function of this interchange changes dramatically with the EA approved Highway 6 South Improvements. The current structure can accommodate an eight lane cross section but cannot accommodate a ten lane cross section.

4.4.1.2 Crossing Roads

Five grade separations are present within the project limits (all are underpasses, i.e. Highway 401 passes beneath the crossing road). These crossings are located at:

- Wellington Road 32;
- Wellington Road 35;
- Puslinch Concession Road 7;
- Wellington Road 36; and
- Watson Road.

None of the above structures will accommodate a Highway 401 ten lane cross section. In order to construct the ultimate ten lane cross section all grade separation structures within the project limits will require replacement.

4.4.2 Public Transit

The following provides an overview of public transit services within the existing Highway 401 corridor and in the vicinity of the study area.

GO Transit/Metrolinx

Existing GO Bus Route 25 (Waterloo/Mississauga) provides service between the University of Waterloo and the Square One GO terminal/Milton GO station. A portion of the route includes the Highway 401 corridor in the study area.

Two GO Transit facilities are present within the study area:

- Aberfoyle GO Park & Ride (located north of Highway 401 at Brock Road); and
- Cambridge Smart Centre (located south of Highway 401 at Hespeler Road).

GO Transit/Metrolinx have completed an environmental assessment recommending expansion of service to Guelph and Kitchener. Ridership projections indicate that peak period service would carry an estimated 3,500 passengers in 2016 and by 2031 (assuming all day, two way service) the ridership is expected to increase to 12,200 passengers each day.

VIA Rail

VIA Rail currently operates 6 trains through the study area (3 trains in each direction on the London – Toronto corridor). VIA Rail is proposing to operate 3 additional trains in each direction between Toronto and London, for a total of 12 trains daily. No timeline for improvements or proposed ridership numbers are available.

Grand River Transit

Provides service throughout the cities of Cambridge, Kitchener and Waterloo, including bus service across Highway 401 at Hespeler Road and along Highway 401 west of the Hespeler Road interchange.

Rapid transit initiatives in the Region of Waterloo include bus by-pass shoulders for bus rapid transit along Highway 401 west of the Hespeler Road interchange.

4.5 Emergency Services

The following emergency services were contacted by the Project Team throughout the course of the study:

- Region of Waterloo Emergency Medical Services
- Guelph – Wellington Emergency Medical Services
- Waterloo Regional Police Service
- Ontario Provincial Police – County of Wellington Detachment
- City of Cambridge Fire Department
- Township of Puslinch Fire Department

4.6 Carpool Parking

MTO carpool lots are located in the southeast quadrants of the Townline Road interchange and the Highway 6 South/Brock Road interchange. The Aberfoyle Go Transit Park N' Ride lot is located on Brock Road north of Highway 401.

4.7 Illumination and Traffic Signals

Partial conventional illumination exists at the interchanges throughout the study area with the exception of the Hespeler Road interchange which has high mast illumination.

Traffic signals exist at all interchange ramp terminals.

4.8 Drainage

A total of 38 transverse culverts are located within the study limits. Five of the existing culverts convey major watercourses under the highway, including:

- McCrimmon Creek;
- Mill Creek;
- A Tributary to Bronte Creek;
- The Mountsberg Reservoir Tributary; and
- Bronte Kilbride Creek.

The overall drainage pattern of the major watercourses within the Grand River Watershed occurs from north to south as the runoff crosses under Highway 401 towards Lake Erie. A similar pattern exists within the Bronte Creek Subwatershed as the major watercourses flow from north to south towards Lake Ontario. However, there are many culverts within the study limits that convey local drainage and flow from south to north. The direction of flow is not clearly defined for three catchment areas; these culverts are considered to be "equalization culverts", which allow water to pass between wetland areas on either side of the highway with no defined outlets.

The land surrounding the highway within the study area is primarily comprised of agricultural lands with some commercial and industrial areas. The predominant soil types within the study area are Dumfries Loam, a stony till deposit, and Burford loam, a lacustrine deposited soil. These soil types fall within the hydrologic soil group AB, according to Report No. 30 of the Ontario Soil Survey (1964).

4.9 Service Centres

There are two service centres located within the limits of this project. They are located east of Townline Road interchange on each side of the highway.

These service centres are currently closed for redevelopment, and it is anticipated that they will be re-opened in the Fall of 2012/Winter 2013.

4.10 Utilities

The following utilities (buried and overhead) exist within the project limits:

- Hydro One High Tension Lines;
- Ontario Hydro;
- Bell Canada;
- City of Cambridge Watermains;
- Rogers Cable;
- Cambridge and North Dumfries Hydro Overhead Cable;
- Union Gas;
- Fibretech Overhead Cable; and
- Atria Networks Fibre.

5.0 ALTERNATIVES AND EVALUATION

This section summarizes the process followed for the analysis and evaluation of alternatives for the improvements to Highway 401. Alternatives were reviewed to address the transportation needs for Highway 401, which include:

- Widening of Highway 401 to ten lanes (five lanes in each direction: four general purpose lanes and one HOV lane); and
- Improvements to the existing interchanges to address operational concerns and to improve design to current standards. These interchanges include:
    - Hespeler Road (Highway 24);
    - Townline Road;
    - Franklin Boulevard;
    - Townline Road;
    - Hanlon Expressway; and
    - Highway 6 South/Brock Road.

The analysis and evaluation process for the improvements to Highway 401 has been separated into two components:

- Generation and Assessment of Planning Alternatives; and
- Generation and Assessment of Preliminary Design Alternatives:
    - Highway 401 Widening Alternatives; and
    - Interchange Alternatives.

The following sections describe the identified alternatives, and the analysis and evaluation process, in general terms.

5.1 Planning Alternatives

The MTO Class EA requires that "planning alternatives" be considered to ensure that there is reasonable and adequate justification to proceed with the improvements and that the need for the project is clearly demonstrated. The alternatives are assessed against their ability to reasonably address the identified transportation needs and opportunities, which are discussed in **Section 3.**

The planning alternatives associated with the identified transportation needs are:

- Do Nothing;
- Reduce Travel Demand on Highway 401 (including transit improvements);
- Improve and Expand Highway 401; and
- Construct a New Provincial Roadway.

The assessments and conclusions for each planning alternative are summarized in **Exhibit 5-1**.

Exhibit 5-1: Assessment of Planning Alternatives

Planning Alternative	Assessment	Conclusion
Do Nothing	• Traffic operations on Highway 401 will continue to deteriorate leading to increased traffic congestion and future safety concerns, given the existing 6 lanes will not accommodate future capacity and operation needs. • Does not address the need to rehab/replace the existing structures in the future • Does not address the deteriorating pavement in the future.	The "Do Nothing" alternative does not address the identified transportation needs, but is **carried forward for comparison purposes**.
Reduce Travel Demand on Highway 401	GO Transit/Metrolinx: • GO Transit/Metrolinx have completed an environmental assessment recommending expansion of service to Guelph and Kitchener. Ridership projections indicate that peak period service would carry an estimated 3,500 passengers in 2016 and by 2031 (assuming all day, two way service) the ridership is expected to increase to 12,200 passengers each day. VIA Rail: • VIA Rail currently operates 6 trains through the study area (3 trains in each direction on the Sarnia – London – Toronto corridor). VIA Rail is proposing to operate 3 additional trains in each direction between Toronto and London, for a total of 12 trains daily. No timeline for improvements or proposed ridership numbers are available. VIA Rail also currently operates 8 trains on the Windsor – Toronto corridor (4 trains in each direction). • Ongoing high speed rail study. Freight Rail: • CP Rail and CN Rail both operate key lines that link Windsor and the international border crossing with the Greater Toronto Area (GTA). Expansion of freight rail system may reduce some truck trips on Highway 401. Carpool Parking Lots: • Existing carpool parking lots currently exist at Townline Road and Highway 6 South, which promotes carpooling and reduces single-driver vehicles. High Occupancy Lanes (HOV): • Adding HOV lanes on Highway 401 would promote carpooling and reduce single-driver vehicles. Improving and expanding the above modes or strategies would alleviate future traffic congestion to a certain degree, however, they are not expected to: • Fully accommodate future capacity needs on Highway 401 due to the high volume and wide variety of commercial trips ranging from inter-city and inter-regional delivery, to inter-provincial and international travel. • Address the need to replace the existing structures in the future and reconstruct the pavement on the highway.	Future traffic forecasts on Highway 401 consider these alternative modes or strategies and the most recent land use allocations from the Province's Places to Grow initiative, and these forecasts indicate the need to expand Highway 401 to accommodate future capacity needs. Reducing travel demand on Highway 401 will not fully accommodate future capacity needs and will not address future structural and pavement needs – **Carry forward as part of the "Improve and Expand Highway 401"**
Improve and Expand Highway 401	This alternative will address the identified transportation needs by providing: • An opportunity to accommodate future capacity and operational needs. • Improvements to the geometry of the highway and interchange configurations as part of the construction project. • Improvements within planning horizon (can address future needs). • Improvements to pavements and structures.	This alternative addresses the identified transportation needs **- Carry Forward for Further Review**
Construct a New Provincial Roadway	This alternative is currently being considered as part of the GTA West EA Study to the East of the project limits, however, a new provincial highway outside of the Highway 401 corridor will not address the future capacity, structural and pavement needs on this section of Highway 401.	

5.2 Preferred Planning Alternatives

Based on the assessment described in **Exhibit 5-1**, the alternative 'Improve and Expand Highway 401' is the only alternative that addresses the identified transportation problems and opportunities. This alternative was therefore selected as the preferred planning alternative and carried forward for further study.

For evaluation purposes, Highway 401 within the study limits has been divided into the following four sections based on their different characteristics:

- Section 1: West of Hespeler Road to Townline Road;
- Section 2: Townline Road to the Hanlon Expressway;
- Section 3: Hanlon Expressway to Highway 6 South/Brock Road;
- Section 4: Highway 6 South/Brock Road to the Wellington County/Halton Region boundary.

The following sections describe the generation and assessment of the preliminary design alternatives for the Highway 401 widening and the interchange alternatives.

HIGHWAY 401
Widening Alternatives

5.3 Generation and Assessment of Preliminary Design Alternatives – Highway 401 Widening

The previous section described the alternative methods of addressing the identified capacity, operational and geometric needs within the study area, and identified improving and expanding Highway 401 as the preferred planning alternative (with reducing travel demand on Highway 401 as a component of the alternative). This section describes the alternative preliminary design concepts for the range of improvements to Highway 401. These alternatives have been developed at a preliminary design level of detail to provide an optimal, cost effective design while minimizing potential social, cultural and natural environmental impacts.

The process for identifying and evaluating these preliminary design alternatives is as follows:

- Identify Highway 401 widening alternatives; and
- Undertake a detailed analysis and evaluation process of the widening alternatives leading to the identification of the preferred alternative for Highway 401.

5.3.1 Highway 401 Widening Alternatives

Based on the objective of addressing the needs for future highway widening, the following alternatives have been identified:

- Do Nothing (maintained for comparison purposes).
- Section 1: West of Hespeler Road to Townline Road:
    - Widening Alternative 1A: 8-Lane;
    - Widening Alternative 1B: 10-Lane; and
    - Widening Alternative 1C: 10-Lane with High Occupancy Vehicle (HOV) Lanes.
- Section 2: Townline Road to the Hanlon Expressway:
    - Widening Alternative 2A: 8-Lane;
    - Widening Alternative 2B: 10-Lane; and
    - Widening Alternative 2C: 10-Lane with High Occupancy Vehicle (HOV) Lanes.
- Section 3: Hanlon Expressway to Highway 6 South/Brock Road:
    - Widening Alternative 3A: 12-Lane Core/Collector with Rural Outer Separations (EA Approved – WP 65-76-05);
    - Widening Alternative 3B: 12-Lane Core/Collector with Urban/Barrier Outer Separations; and
    - Widening Alternative 3C: 10-Lane HOV with Continuous Auxiliary Lanes between the Hanlon Expressway and Highway 6 South.
- Section 4: Highway 6 South/Brock Road to the Wellington County/Halton Region boundary:
    - Widening Alternative 4A: 8-Lane;
    - Widening Alternative 4B: 10-Lane; and
    - Widening Alternative 4C: 10-Lane with High Occupancy Vehicle (HOV) Lanes.

Widening alternatives for all sections are shown in **Exhibits 5-2, 5-4, 5-6**, and **5-8**.

5.3.2 Analysis and Evaluation of the Highway 401 Widening Alternatives

The Highway 401 widening alternatives have been subjected to an analysis and evaluation process, leading to the identification of the preferred widening alternative. The factors and criteria used by the Project Team to evaluate the widening alternatives were:

- Transportation:
  - Accommodation of Existing/Future Transportation Demand and Existing/Future Traffic Operations;
  - Safety;
  - Geometrics;
  - Access Management; and
  - Impacts to Municipal Road Network.
- Natural Environment:
  - Impacts to Fisheries and Habitat (including Species at Risk);
  - Impacts to Vegetation (including Species at Risk);
  - Impacts to Wildlife and Habitat (including Species at Risk);
  - Impacts to Designated areas (i.e. Environmentally Sensitive Areas, Provincially Significant Wetlands, Areas of Natural and Scientific Interest);
  - Impacts to Surface Water; and
  - Impacts to Groundwater.
- Socio-Economic Environment:
  - Property Acquisition/Displacement;
  - Impacts to Residences;
  - Impacts to Businesses;
  - Impacts on Future Land Uses and Operations;
  - Impacts to Existing Utilities;
  - Potential Noise Impacts;
  - Potential Air Quality Impacts;
  - Site Contamination Impacts; and
  - Community and Recreational Facilities (i.e. Trails, Bike Lanes, Parkland etc.).
- Cultural Environment:
  - Impacts to Cultural Heritage Landscapes/Built Heritage Resources; and
  - Archeological Impacts.
- Constructability:
  - Flexibility for Staged Construction.
- Cost
  - Construction Cost, including Utility Relocation; and
  - Property Cost.

The analysis and evaluation of the Highway 401 widening alternatives is provided in **Exhibits 5-3, 5-5, 5-7**, and **5-9**. The analysis is based on a qualitative comparative analysis of the highway widening alternatives for each of the factors/indicators.

5.3.3 Preferred Highway 401 Widening Alternatives

<u>Section 1: West of Hespeler Road to Townline Road</u>

Based on the analysis and evaluation, Alternative 1C (10-Lane with High Occupancy Vehicle (HOV) Lanes) is preferred for the following reasons:

- Additional lanes will increase capacity and improve operational and safety performance.
- HOV lanes increase the number of persons through a section of highway under congested conditions.
- Improved traffic operations for commuters and businesses.

<u>Section 2: Townline Road to the Hanlon Expressway</u>

Based on the analysis and evaluation, Alternative 2C (10-Lane with High Occupancy Vehicle (HOV) Lanes) is preferred for the following reasons:

- Additional lanes will increase capacity and improve operational and safety performance.
- HOV lanes increase the number of persons through a section of highway under congested conditions.
- Improved traffic operations for commuters and businesses.

<u>Section 3: Hanlon Expressway to Highway 6 South/Brock Road</u>

Based on the analysis and evaluation, Alternative 3C (10-Lane HOV with Continuous Auxiliary Lanes between the Hanlon Expressway and Highway 6 South) is preferred for the following reasons:

- Additional lanes will increase capacity and improve operational and safety performance.
- HOV lanes increase the number of persons through a section of highway under congested conditions.
- Improved traffic operations for commuters and businesses.
- No additional property required for mainline widening.
- Minimizes impact to natural environment.

Section 4: Highway 6 South/Brock Road to Wellington County/Halton Region Boundary

Based on the analysis and evaluation, Alternative 4C (10-Lane with High Occupancy Vehicle (HOV) Lanes) is preferred for the following reasons:

- Additional lanes will increase capacity and improve operational and safety performance.
- HOV lanes increase the number of persons through a section of highway under congested conditions.
- Improved traffic operations for commuters and businesses.

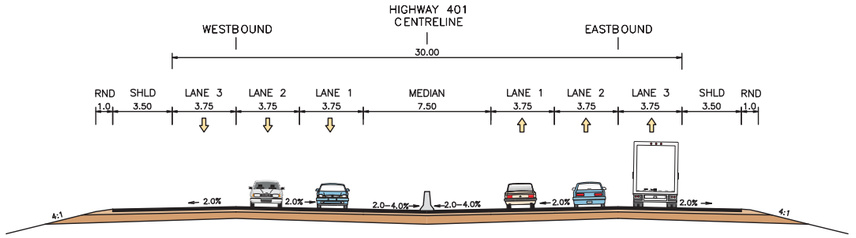
Benefits of HOV Lanes

The preferred plans for the widening of Highway 401 in all four sections include the provision of HOV lanes. HOV lanes benefit not only those who share the ride, but all drivers in the following ways:

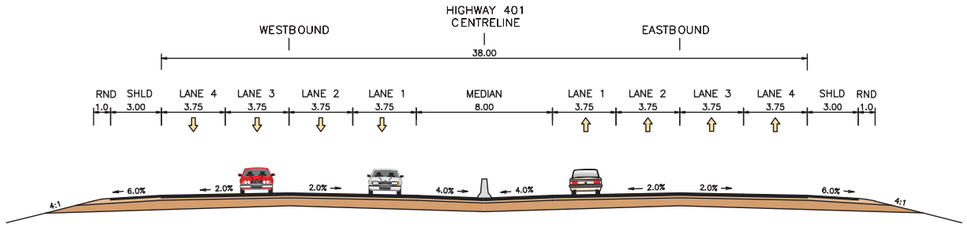
- Managing congestion: Moving people in fewer vehicles.
- Better use of infrastructure: A lane full of buses and carpools can move many more people than a general traffic lane.
- Added capacity: Existing carpools and buses move into the new HOV lanes, freeing up space in the general purpose lanes for other vehicles, including trucks.
- Air Quality Benefits: Moving more people in fewer vehicles can lead to reduced vehicle emissions and improved air quality.

This page intentionally left blank

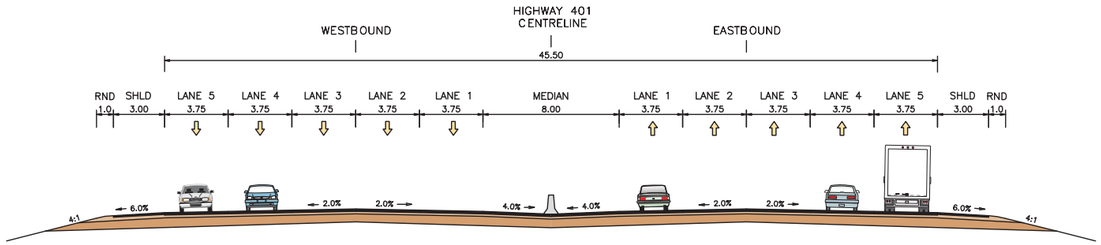
Do Nothing



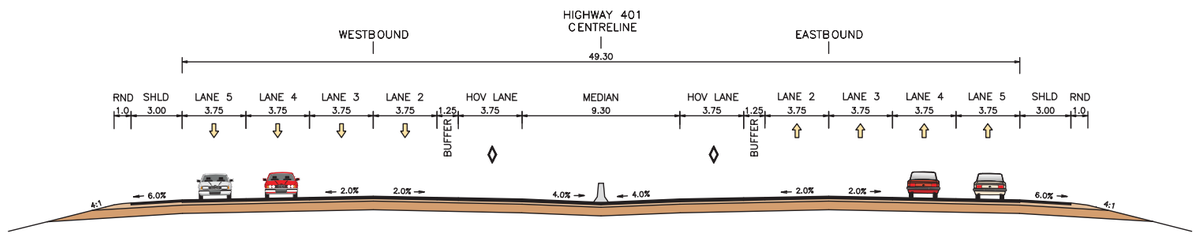
Widening Alternative 1A: 8-Lane



Widening Alternative 1B: 10-Lane



Widening Alternative 1C: 10-Lane with High Occupancy Vehicle (HOV) Lanes



PREFERRED ALTERNATIVE

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Highway 401 Widening Alternatives
- Section 1

EXHIBIT
5-2

SECTION 1: WIDENING ALTERNATIVES

SUMMARY EVALUATION

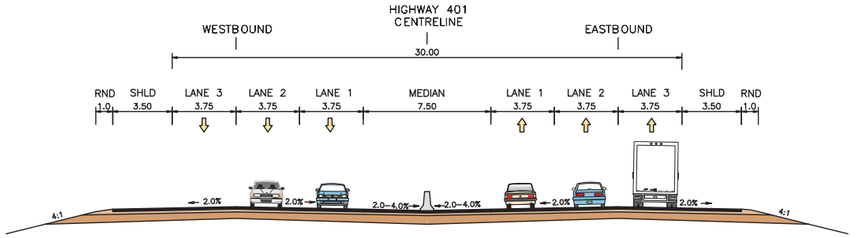
Factor Area	Do Nothing (Comparison Purposes Only)	Widening Alternative 1A: 8-Lane	Widening Alternative 1B: 10-Lane	Widening Alternative 1C: 10-Lane with High Occupancy Vehicle (HOV) Lanes
Transportation				
	× Will not be sufficient to accommodate forecast travel demands	× Will not be sufficient to accommodate forecast travel demands ✓ Additional lanes will increase capacity for use as an interim stage	✓ Additional lanes will increase capacity and improve operations	✓ Additional lanes will increase capacity and improve operations ✓ HOV lanes increase the number of persons through a section of highway under congested conditions ✓ HOV lanes make carpooling and transit more effective and reliable, particularly during peak travel periods
Natural Environment				
	✓ No change from existing condition	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs predominantly within existing right-of-way	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs predominantly within existing right-of-way	✓ Minimal potential for impacts to the natural environment × Widening occurs predominantly within existing right-of-way, however marginally larger footprint compared to Alternative 1B ✓ Reduced vehicle emissions and improved air quality as more people are moved in fewer vehicles
Socio-Economic Environment				
	× Increased congestion impacts the movement of commuters and commercial goods	✓ Minimal property required × Improved traffic operations for commuters and businesses, but does not accommodate long term needs	✓ Approximately 2.12 ha of property required ✓ Improved traffic operations for commuters and businesses	× Approximately 2.38 ha of property required ✓ Improved traffic operations for commuters and businesses ✓ Increased productivity as commuters are less stressed and have improved reliability and travel times
Cultural Environment				
	✓ No change from existing condition	✓ Minimal potential for archaeological impact outside of existing right-of-way	✓ Reduced potential of archaeological impact outside of existing right-of-way compared to Alternative 1C	× Minor increased potential of archaeological impact outside of existing right-of-way compared to Alternative 1B
Constructability	N/A			
	N/A	× Increased complexity may require overbuilding to maintain 3 lanes of traffic ✓ May be used as part of interim construction staging	✓ No significant difference in construction staging between Alternatives 1B and 1C	✓ No significant difference in construction staging between Alternatives 1B and 1C
Cost	N/A			
	N/A	✓ Lowest construction cost ✓ Minimal property cost	✓ Lower construction cost (Approx. $115 M) compared to Alternative 1C	× Marginally higher construction cost (Approx. $125 M) & property requirements compared to Alternative 1B ✓ Better use of infrastructure since a lane full of buses and carpools will move more people than a general traffic lane
Summary				**PREFERRED ALTERNATIVE**

MOST PREFERRED → LEAST PREFERRED

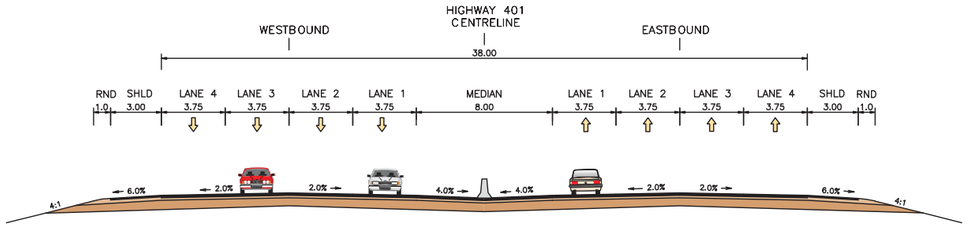
Widening Alternative 1C: 10-Lane with High Occupancy Vehicle (HOV) Lanes is preferred for the following reasons:

- Additional lanes will increase capacity and improve operations
- HOV lanes increase the number of persons through a section of highway under congested conditions
- Improved traffic operations for commuters and businesses

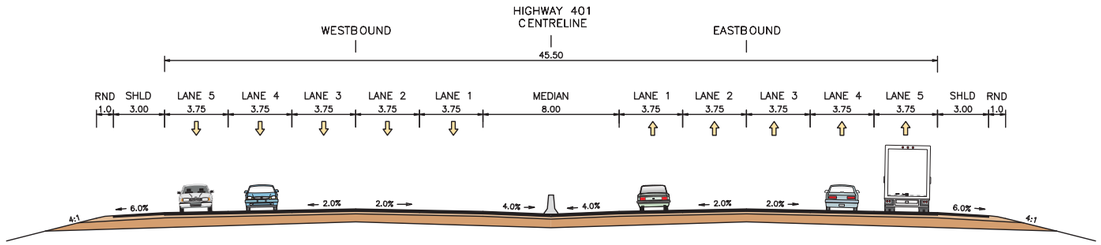
Do Nothing



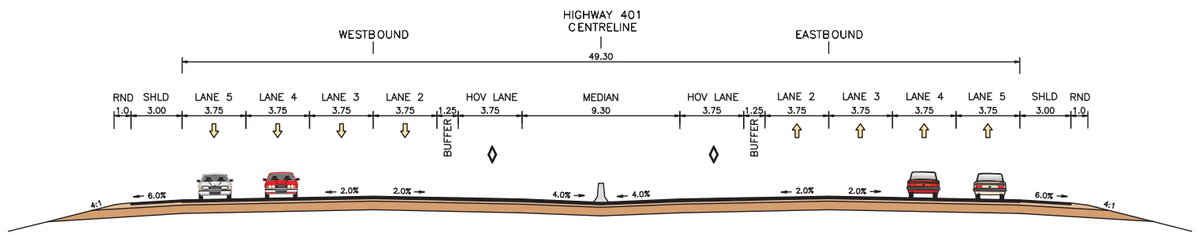
Widening Alternative 2A: 8-Lane



Widening Alternative 2B: 10-Lane



Widening Alternative 2C: 10-Lane with High Occupancy Vehicle (HOV) Lanes



PREFERRED ALTERNATIVE

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Highway 401 Widening Alternatives
- Section 2

EXHIBIT
5-4

SECTION 2: WIDENING ALTERNATIVES

SUMMARY EVALUATION

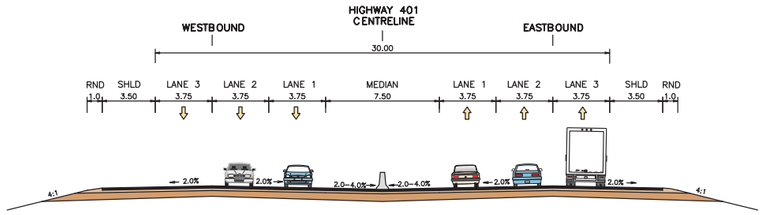
Factor Area	Do Nothing (Comparison Purposes Only)	Widening Alternative 2A: 8-Lane	Widening Alternative 2B: 10-Lane	Widening Alternative 2C: 10-Lane with High Occupancy Vehicle (HOV) Lanes
Transportation				
	× Will not be sufficient to accommodate forecast travel demands	× Will not be sufficient to accommodate forecast travel demands ✓ Additional lanes will increase capacity for use as an interim stage	✓ Additional lanes will increase capacity and improve operations	✓ Additional lanes will increase capacity and improve operations ✓ HOV lanes increase the number of persons through a section of highway under congested conditions ✓ HOV lanes make carpooling and transit more effective and reliable, particularly during peak travel periods
Natural Environment				
	✓ No change from existing condition	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs predominantly within existing right-of-way	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs predominantly within existing right-of-way	× Slightly greater potential for minor impacts to the natural environment × Widening occurs predominantly within existing right-of-way, however marginally larger footprint compared to Alternative 2B ✓ Reduced vehicle emissions and improved air quality as more people are moved in fewer vehicles
Socio-Economic Environment				
	× Increased congestion impacts the movement of commuters and commercial goods	✓ Minimal property required × Improved traffic operations for commuters and businesses, but does not accommodate long term needs	✓ Approximately 0.7 ha of property required ✓ Improved traffic operations for commuters and businesses	✓ Approximately 0.8 ha of property required ✓ Improved traffic operations for commuters and businesses ✓ Increased productivity as commuters are less stressed and have improved reliability and travel times
Cultural Environment				
	✓ No change from existing condition	× Requires replacement of Wellington Road 32 and Wellington Road 35 underpasses ✓ Minimal potential of archaeological impact outside of existing right-of-way compared to Alternatives 2B and 2C	× Requires replacement of Wellington Road 32 and Wellington Road 35 underpasses ✓ Reduced potential of archaeological impact outside of existing right-of-way compared to Alternative 2C	× Requires replacement of Wellington Road 32 and Wellington Road 35 underpasses × Minor increased potential of archaeological impact outside of existing right-of-way compared to Alternative 2B
Constructability				
	N/A	× Increased complexity may require overbuilding to maintain 3 lanes of traffic ✓ May be used as part of interim construction staging	✓ No significant difference in construction staging between Alternatives 2B and 2C	✓ No significant difference in construction staging between Alternatives 2B and 2C
Cost				
	N/A	✓ Lowest construction cost ✓ Minimal property cost	✓ Lower construction cost (Approx. $162 M) compared to Alternative 2C	× Marginally higher construction cost (Approx. $176 M) compared to Alternative 2B ✓ Better use of infrastructure since a lane full of buses and carpools will move more people than a general traffic lane
Summary				**PREFERRED ALTERNATIVE**

MOST PREFERRED → LEAST PREFERRED

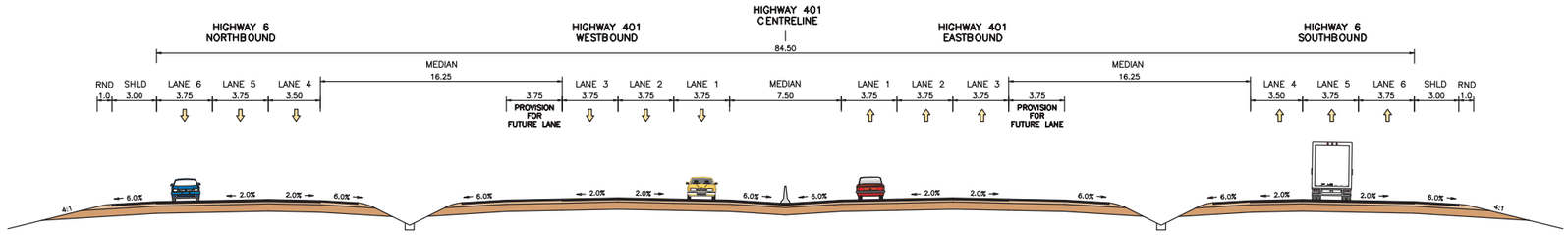
Widening Alternative 2C: 10-Lane with High Occupancy Vehicle (HOV) Lanes is preferred for the following reasons:

- Additional lanes will increase capacity and improve operational and safety performance
- HOV lanes increase the number of persons through a section of highway under congested conditions
- Improved traffic operations for commuters and businesses

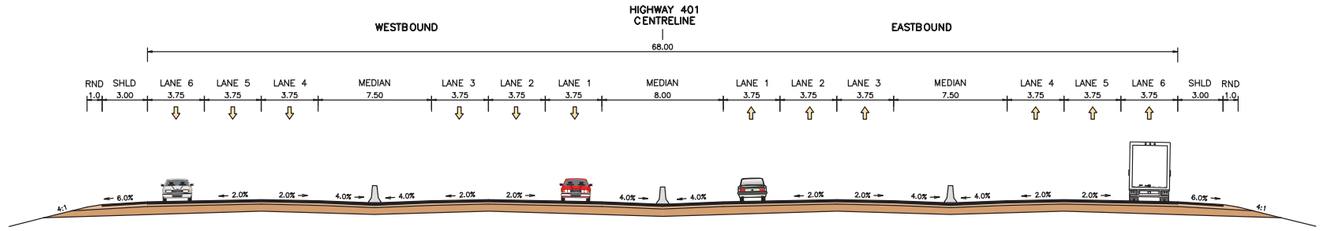
Do Nothing



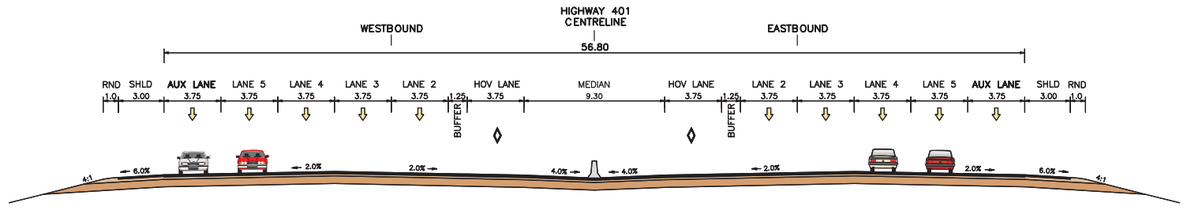
Widening Alternative 3A: 12-Lane Core / Collector with Rural Outer Separations (EA Approved – WP 65-76-06)



Widening Alternative 3B: 12-Lane Core / Collector with Urban / Barrier Outer Separations



Widening Alternative 3C: 10-Lane HOV with Continuous Auxiliary Lanes between Hanlon Expressway and Highway 6 South/Brock Road



PREFERRED ALTERNATIVE

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Highway 401 Widening Alternatives
- Section 3

EXHIBIT
5-6

SECTION 3: WIDENING ALTERNATIVES

SUMMARY EVALUATION

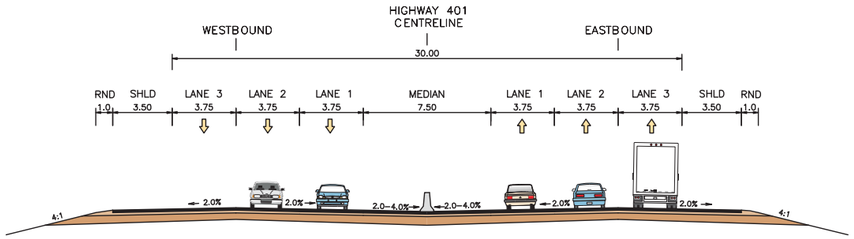
Factor Area	Do Nothing (Comparison Purposes Only)	Widening Alternative 3A: 12-Lane Core / Collector with Rural Outer Separations (EA Approved – WP 65-76-06)	Widening Alternative 3B: 12-Lane Core / Collector with Urban / Barrier Outer Separations	Widening Alternative 3C: 10-Lane HOV with Continuous Auxiliary Lanes between Hanlon Expressway and Highway 6 South/Brock Road
Transportation				
	× Will not be sufficient to accommodate forecast travel demands	✓ Additional lanes will increase capacity and improve operations × Rural median between core and collector lanes is not desirable	✓ Additional lanes will increase capacity and improve operations ✓ Barrier type median between core and collector lanes is desirable	✓ Additional lanes will increase capacity and improve operations ✓ HOV lanes increase the number of persons through a section of highway under congested conditions ✓ HOV lanes make carpooling and transit more effective and reliable, particularly during peak travel periods
Natural Environment				
	✓ No change from existing condition	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs predominantly within existing right-of-way	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs predominantly within existing right-of-way	✓ Least potential for impact to natural environment compared to Alternatives 3A and 3B ✓ Reduced vehicle emissions and improved air quality as more people are moved in fewer vehicles
Socio-Economic Environment				
	× Increased congestion impacts the movement of commuters and commercial goods	✓ Approximately 2.3 ha of property required ✓ Improved traffic operations for commuters and businesses	✓ Approximately 2.1 ha of property required ✓ Improved traffic operations for commuters and businesses	✓ No additional property required for mainline widening ✓ Improved traffic operations for commuters and businesses ✓ Increased productivity as commuters are less stressed and have improved reliability and travel times
Cultural Environment				
	✓ No change from existing condition	✓ Minimal potential of archaeological impact outside of existing right-of-way	✓ Minimal potential of archaeological impact outside of existing right-of-way	✓ No change to existing right-of-way
Constructability	N/A			
	N/A	× Increased complexity may require overbuilding to maintain 3 lanes of traffic	✓ Wider paved cross-section due to urban/barrier outer separations provides more overall area for construction staging	✓ Wider paved cross-section provides more overall area for construction staging
Cost	N/A			
	N/A	✓ Comparable construction cost (Approx. $221 M) and property cost to Alternative 3B	✓ Comparable construction cost (Approx. $221 M) and property cost to Alternative 3A	× Highest construction cost (Approx. $241 M) ✓ No property cost associated with mainline widening ✓ Better use of infrastructure since a lane full of buses and carpools will move more people than a general traffic lane
Summary				**PREFERRED ALTERNATIVE**

MOST PREFERRED → LEAST PREFERRED

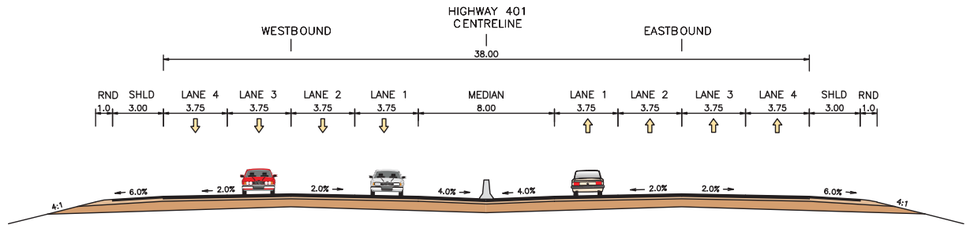
Widening Alternative 3: 10-Lane with High Occupancy Vehicle (HOV) Lanes and Continuous Auxiliary Lanes between Highway 6 North and Highway 6 South is preferred for the following reasons:

- Additional lanes will increase capacity and improve operational and safety performance
- HOV lanes increase the number of persons through a section of highway under congested conditions
- Improved traffic operations for commuters and businesses
- No additional property required for mainline widening
- Minimizes impact to natural environment

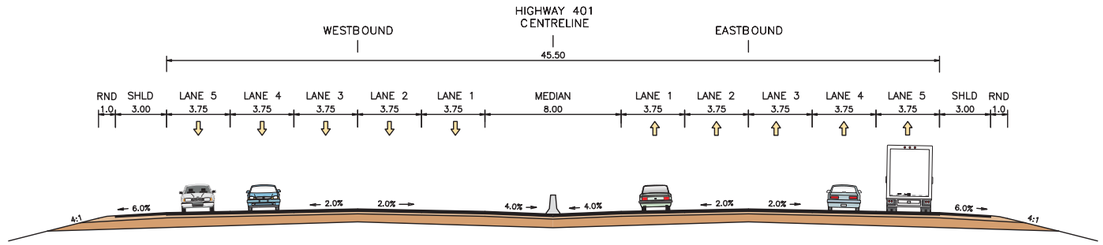
Do Nothing



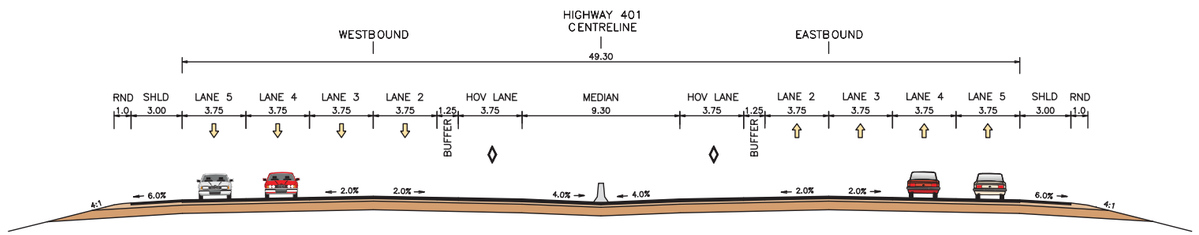
Widening Alternative 4A: 8-Lane



Widening Alternative 4B: 10-Lane



Widening Alternative 4C: 10-Lane with High Occupancy Vehicle (HOV) Lanes



PREFERRED ALTERNATIVE

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Highway 401 Widening Alternatives
- Section 4

EXHIBIT
5-8

SECTION 4: WIDENING ALTERNATIVES

SUMMARY EVALUATION

Factor Area	Do Nothing (Comparison Purposes Only)	Widening Alternative 4A: 8-Lane	Widening Alternative 4B: 10-Lane	Widening Alternative 4C; 10-Lane with High Occupancy Vehicle (HOV) Lanes
Transportation				
	× Will not be sufficient to accommodate forecast travel demands	× Will not be sufficient to accommodate forecast travel demands ✓ Additional lanes will increase capacity for use as an interim stage	✓ Additional lanes will increase capacity and improve operations	✓ Additional lanes will increase capacity and improve operations ✓ HOV lanes increase the number of persons through a section of highway under congested conditions ✓ HOV lanes make carpooling and transit more effective and reliable, particularly during peak travel periods
Natural Environment				
	✓ No change from existing condition	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs within existing right-of-way	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs within existing right-of-way	✓ Minimal potential for impacts to the natural environment ✓ Widening occurs within existing right-of-way ✓ Reduced vehicle emissions and improved air quality as more people are moved in fewer vehicles
Socio-Economic Environment				
	× Increased congestion impacts the movement of commuters and commercial goods	✓ No additional property required × Improved traffic operations for commuters and businesses, but does not accommodate long term needs	✓ No additional property required ✓ Improved traffic operations for commuters and businesses	✓ No additional property required ✓ Improved traffic operations for commuters and businesses ✓ Increased productivity as commuters are less stressed and have improved reliability and trave times
Cultural Environment				
	✓ No change from existing condition	× Requires replacement of Wellington Road 36 and Watson Road underpasses × Wellington Road 36 underpass considered provincially significant, conservation options to be considered ✓ Minimal potential for archaeological impact outside of existing right-of-way	× Requires replacement of Wellington Road 36 and Watson Road underpasses × Wellington Road 36 underpass considered provincially significant, conservation options to be considered ✓ Minimal potential for archaeological impact outside of existing right-of-way	× Requires replacement of Wellington Road 36 and Watson Road underpasses × Wellington Road 36 underpass considered provincially significant, conservation options to be considered ✓ Minimal potential for archaeological impact outside of existing right-of-way
Constructability				
	N/A	× Increased complexity may require overbuilding to maintain 3 lanes of traffic ✓ May be used as part of interim construction staging	✓ No significant difference in construction staging between Alternatives 4B and 4C	✓ No significant difference in construction staging between Alternatives 4B and 4C
Cost				
	N/A	✓ Lowest construction cost (Approx. $70 M) ✓ No property cost	✓ Lower construction cost (Approx. $146 M) compared to Alternative 4C ✓ No property cost	× Marginally higher construction cost (Approx. $158 M) compared to Alternative 4B ✓ No property cost ✓ Better use of infrastructure since a lane full of buses and carpools will move more people than a general traffic lane
Summary				**PREFERRED ALTERNATIVE**

MOST PREFERRED → LEAST PREFERRED

Widening Alternative 4C: 10-Lane with High Occupancy Vehicle (HOV) Lanes and Continuous Auxiliary Lanes between Highway 6 North and Highway 6 South is preferred for the following reasons:

- Additional lanes will increase capacity and improve operational and safety performance
- HOV lanes increase the number of persons through a section of highway under congested conditions
- Improved traffic operations for commuters and businesses

HIGHWAY 401
INTERCHANGE ALTERNATIVES

5.4 Generation and Assessment of Preliminary Design Alternatives – Interchange and Crossing Structure Alternatives

This section discusses and summarizes the generation and assessment of the preliminary interchange and crossing structure alternatives.

Interchange Alternatives

Interchange alternatives have been developed for improvements to the interchanges at:

- Hespeler Road (Highway 24);
- Franklin Boulevard;
- Townline Road;
- Hanlon Expressway; and
- Highway 6 South/Brock Road.

The range of alternatives has been developed based on the preferred widening alternative.

Crossing Structure Alternatives

Crossing Structure alternatives have been developed for improvements to:

- Wellington Road 36 underpass structure;
- Puslinch Concession Road 7 underpass structure;
- Watson Road underpass structure;
- Wellington Road 35 underpass structure; and
- Wellington Road 32 underpass structure.

The range of alternatives has been developed based on the preferred widening alternative.

With the exception of Puslinch Township Concession 7, all other crossing structures are proposed to be replaced on their existing alignments. The crossing structure at Puslinch Township Concession 7 received EA Approval for realignment to the west as part of the Highway 6 (New) Freelton to Guelph, WP 65-76-05.

Interchanges and Crossing Structures – Alternatives and Evaluation

The interchange and crossing structure alternatives have been subjected to an analysis and evaluation process leading to the identification of the preferred interchange and crossing structure alternatives. The factors and criteria used by the Project Team to evaluate the interchange alternatives were the same as those used to evaluate the widening alternatives (**Section 5.3.2**)

Interchange and crossing structure alternatives, the evaluation of interchange and crossing structure alternatives and the preferred plans are grouped by the respective interchange in the following sections.

5.4.1 Hespeler Road (Highway 24) Interchange - Alternatives and Evaluation

Based on the objective of addressing the needs for future highway widening, the following alternatives have been identified:

- Alternative #H1: (Do Nothing) EA Approved WP 4-00-00;
- Alternative #H2: Reconstruction on Existing Centreline;
- Alternative #H3: Partial Shift to the East; and
- Alternative #H4: Partial Shift to the West.

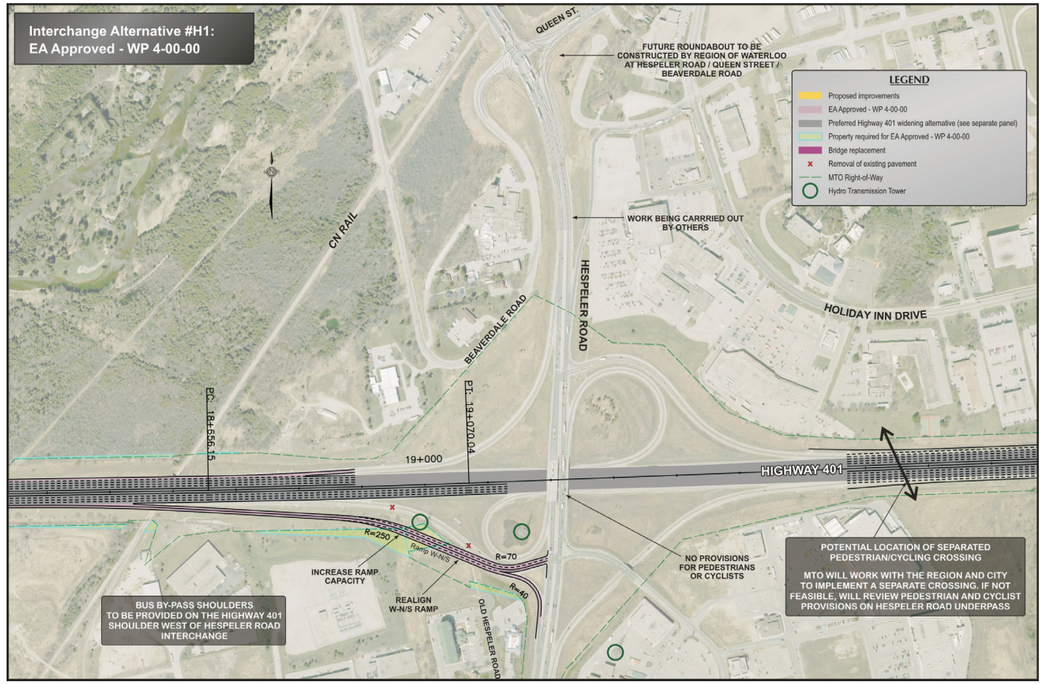
These alternatives are shown in **Exhibit 5-10**.

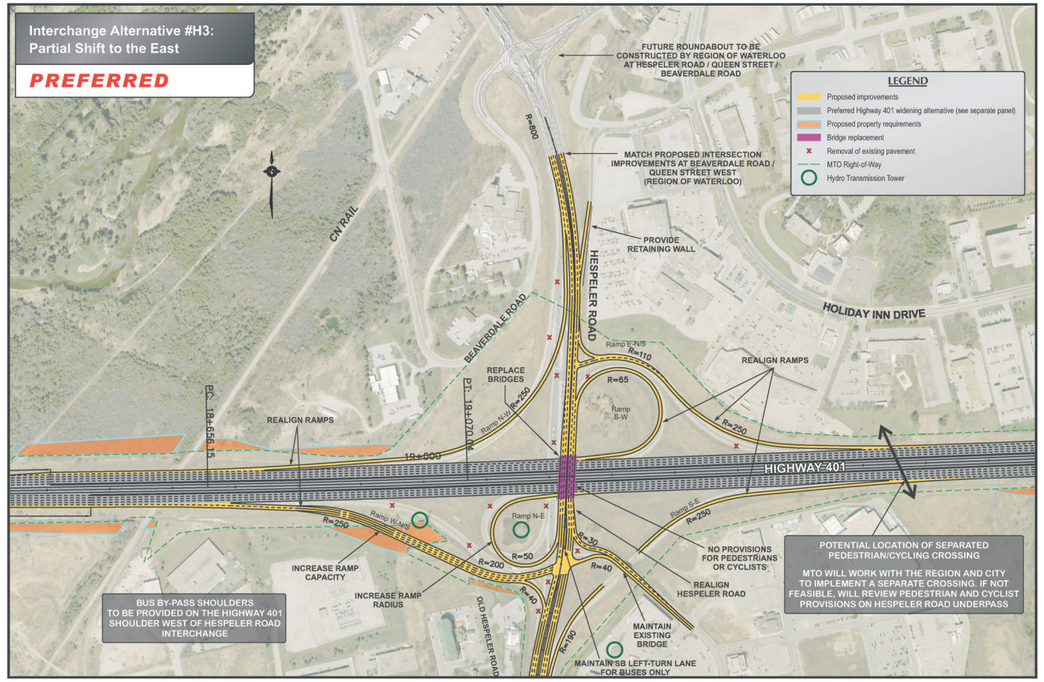
Based on the analysis and evaluation of the Hespeler Road interchange as shown in **Exhibit 5-11**, Alternative #H3 is preferred for the following reasons:

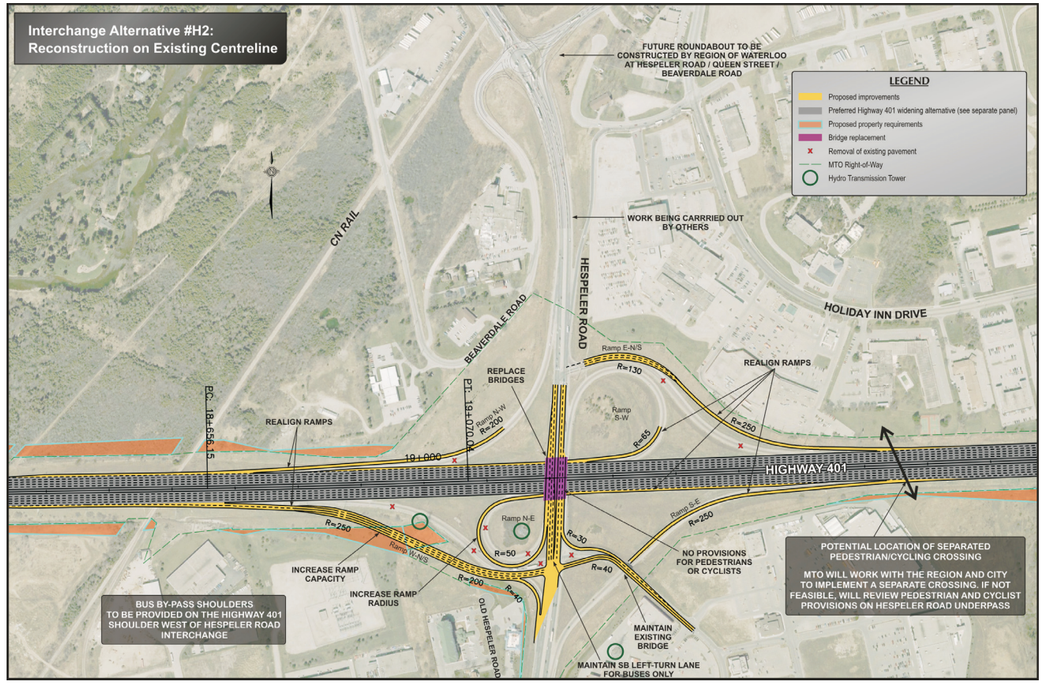
- All ramps meet or exceed acceptable standards;
- Avoids impact to Hespeler Road business frontage;
- Avoids major utility relocations;
- Does not require lane closures on existing structure during staged construction; and
- Comparable construction and property cost to other replacement alternatives.

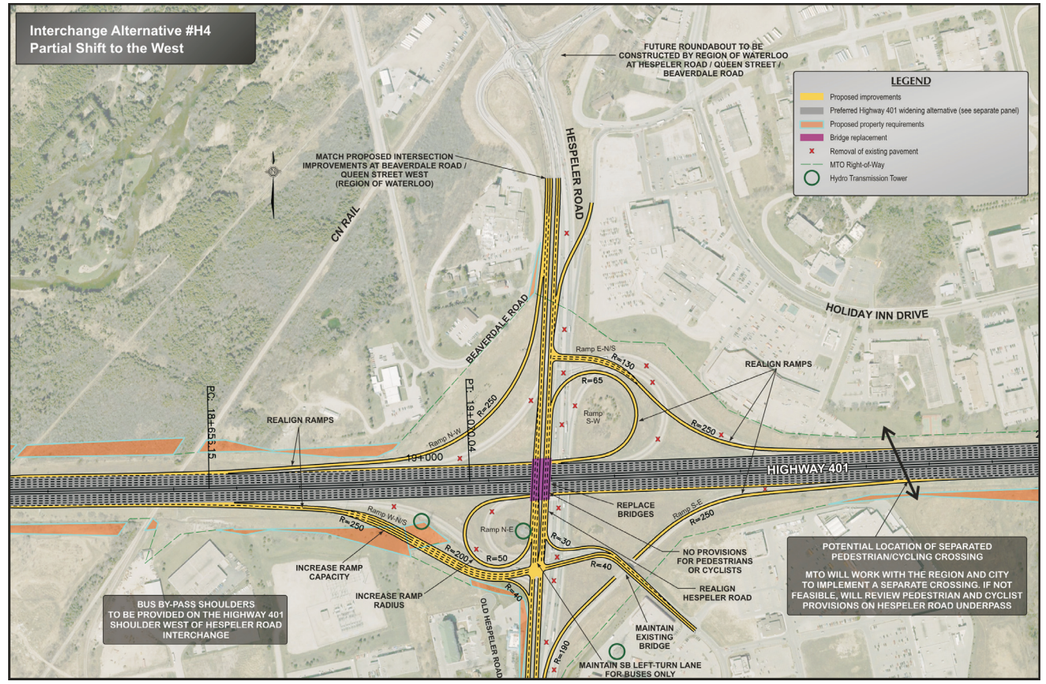
The preferred plan is shown later in **Exhibit 7-1**.

This page intentionally left blank









GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Hespeler Road
Interchange Alternatives

EXHIBIT
5-10

HESPELER ROAD INTERCHANGE

SUMMARY EVALUATION

Factor Area	Alternative #H1: (Do Nothing) EA Approved WP 4-00-00	Alternative #H2: Reconstruction on Existing Centreline	Alternative #H3: Partial Shift to the East	Alternative #H4: Partial Shift to the West
Transportation				
	× Does not accommodates forecast traffic volumes on Highway 401 under Hespeler Road × Ramp improvements limited to W-N/S ramp	✓ Accommodates forecast traffic volumes ✓ All ramps meet or exceed acceptable standards	✓ Accommodates forecast traffic volumes ✓ Increased separation between E-N/S ramp terminal and access connection to Holiday Inn Drive ✓ All ramps meet or exceed acceptable standards	✓ Accommodates forecast traffic volumes ✓ All ramps meet or exceed acceptable standards
Natural Environment				
	✓ Least potential impact to the natural environment	✓ Minor potential impact to the natural environment	✓ Minor potential impact to the natural environment	✓ Minor potential impact to the natural environment
Socio-Economic Environment				
	✓ Least amount of property requirement (approx. 0.6 ha) × May require relocation of hydro transmission tower × Increased congestion impacts the movement of commuters and commercial goods	✓ #H2, #H3 and #H4 have similar property requirements (approx. 1. 4 ha) × Requires property from Hespeler Road business frontage	✓ #H2, #H3 and #H4 have similar property requirements (approx. 1.26 ha) ✓ Avoids impact to Hespeler Road business frontage	✓ #H2, #H3 and #H4 have similar property requirements (approx. 1.3 ha) × Requires property from Hespeler Road business frontage × May require relocation of hydro transmission tower
Cultural Environment				
	✓ No impacts to cultural environment	✓ Bridge not provincially significant ✓ Impacted lands previously disturbed, minimal archaeological potential	✓ Bridge not provincially significant ✓ Impacted lands previously disturbed, minimal archaeological potential	✓ Bridge not provincially significant ✓ Impacted lands previously disturbed, minimal archaeological potential
Constructability				
	N/A	× More complicated construction staging × Requires two lane closure on bridge during construction of new structure	✓ Does not require lane closures on existing bridge during construction	✓ Does not require lane closures on existing bridge during construction
Cost				
	N/A	✓ Comparable construction cost (Approx. $29 M) and property cost to #H3 and #H4	✓ Comparable construction cost (Approx. $30.6 M) and property cost to #H2 and #H4	✓ Comparable construction cost (Approx. $31.9 M) and property cost to #H2 and #H3
Summary			**PREFERRED ALTERNATIVE**	

MOST PREFERRED → LEAST PREFERRED

Alternative #H3: Partial Shift to the East is preferred for the following reasons:

- All ramps meet or exceed acceptable standards
- Avoids impact to Hespeler Road business frontage
- Avoids major utility relocations
- Does not require lane closures on existing structure during staged construction
- Comparable construction and property cost to other replacement alternatives

5.4.2 Franklin Boulevard Interchange - Alternatives and Evaluation

Based on the objective of addressing the needs for future highway widening, the following alternatives have been identified:

- Do Nothing (Comparison Purposes Only);
- Alternative #F1: Replace Structure on Existing Alignment;
- Alternative #F2: Realignment to the West;
- Alternative #F3: Realignment to the East; and
- Alternative #F4: Relocation of West to South Ramp.

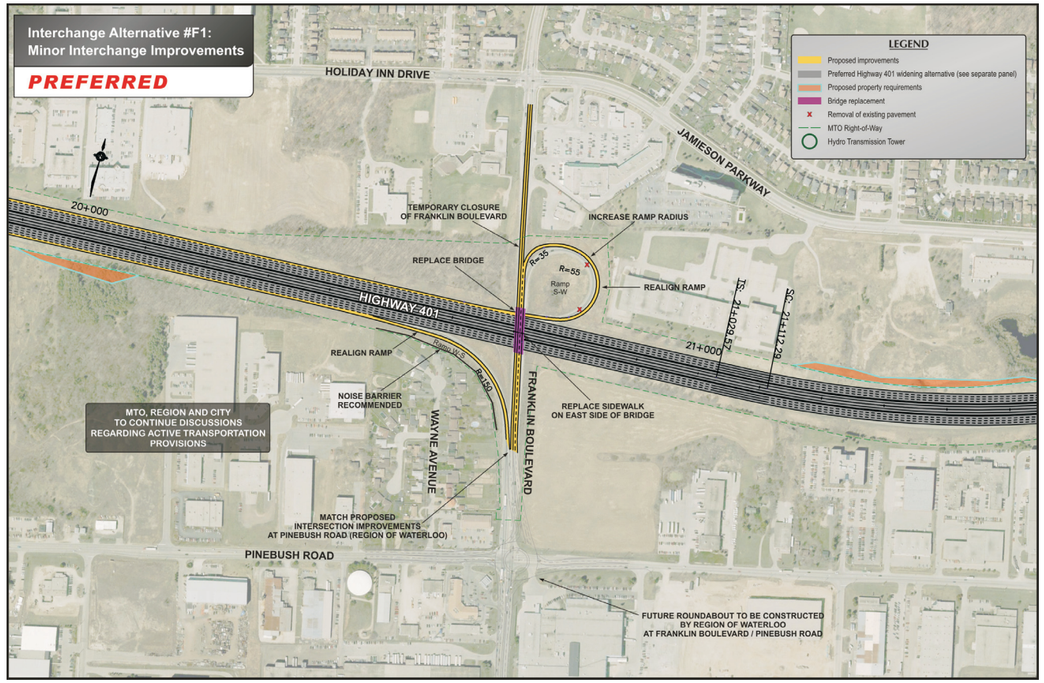
These alternatives are shown in **Exhibit 5-12**.

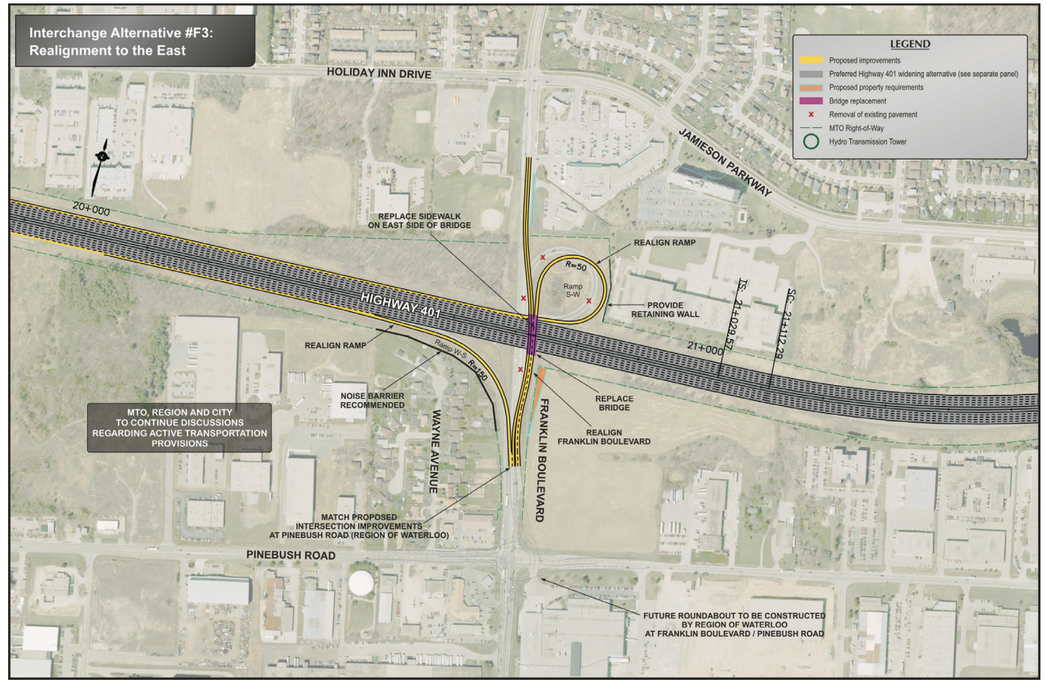
Based on the analysis and evaluation as shown in **Exhibit 5-13**, Alternative #F1 is preferred for the following reasons:

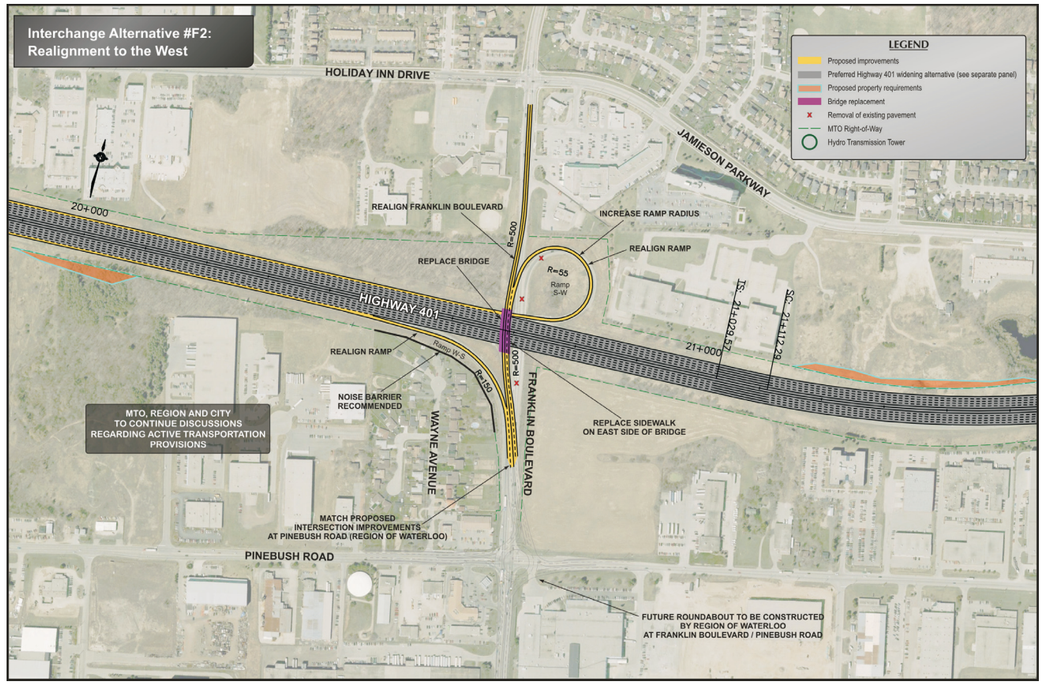
- Maintains existing Franklin Boulevard alignment;
- Minimizes potential for impacts to natural environment; and
- Minimizes construction footprint.

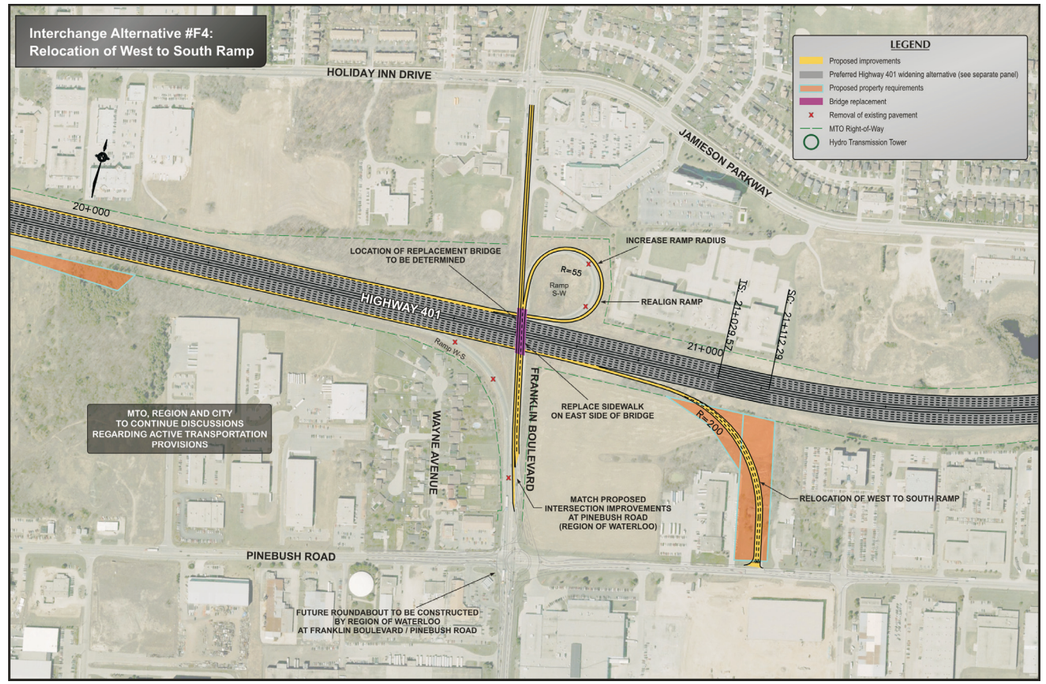
The preferred plan is shown later in **Exhibit 7-1**.

This page intentionally left blank









GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Franklin Boulevard
Interchange Alternatives

EXHIBIT
5-12

FRANKLIN BOULEVARD INTERCHANGE

SUMMARY EVALUATION

Factor Area	Do Nothing (Comparison Purposes Only)	Alternative #F1: Replace Bridge on Existing Alignment	Alternative #F2: Realignment to the West	Alternative #F3: Realignment to the East	Alternative #F4: Relocation of West to South Ramp
Transportation					
	× Does not accommodates forecast traffic volumes on Highway 401 under Franklin Boulevard × Ramps require minor realignment to accommodate Highway 401 improvements	✓ Accommodates forecast traffic volumes ✓ Franklin Boulevard remains on tangent	✓ Accommodates forecast traffic volumes × Curve introduced to Franklin Boulevard	✓ Accommodates forecast traffic volumes × Curve introduced to Franklin Boulevard	✓ Accommodates forecast traffic volumes × Relocation of W-S ramp terminal to Pinebush Road may diminish traffic operations along Pinebush Road × Unconventional ramp configuration may be unfamiliar to drivers
Natural Environment					
	✓ No change from existing condition	✓ Least potential for impacts to natural environment	✓ Similar low potential for impacts to natural environment as #F1, however has a larger area of construction	✓ Similar low potential for impacts to natural environment as #F1, however has a larger area of construction	× Additional impacts to natural environment related to relocation of W-S ramp × Largest area of construction
Socio-Economic Environment					
	✓ No change from existing condition × Increased congestion impacts the movement of commuters and commercial goods	✓ Avoids property requirements ✓ Maintains existing Franklin Boulevard alignment	✓ Avoids property requirements × Shifts Franklin Boulevard traffic closer to residences on Wayne Avenue	✓ Minor property requirements in northeast and southeast quadrants (0.12 ha) ✓ Shifts Franklin Boulevard traffic away from residences on Wayne Avenue	× Greatest amount of property required (1.18 ha) × Increased traffic volumes on Pinebush Road effects residences east of Franklin Boulevard ✓ Relocates W-S ramp traffic away from residences on Wayne Avenue
Cultural Environment					
	✓ No change from existing condition	✓ Bridge not provincially significant ✓ Impacted lands previously disturbed, minimal archaeological potential	✓ Bridge not provincially significant ✓ Impacted lands previously disturbed, minimal archaeological potential	✓ Bridge not provincially significant ✓ Impacted lands previously disturbed, minimal archaeological potential	✓ Bridge not provincially significant ✓ Impacted lands previously disturbed, minimal archaeological potential
Constructability	N/A				
	N/A	× Requires closure or staged construction of Franklin Boulevard bridge and S-W ramp during construction	✓ Realignment allows traffic to be maintained on existing bridge during construction	✓ Realignment allows traffic to be maintained on existing bridge during construction × Requires closure of S-W ramp during construction	✓ Realignment allows traffic to be maintained on existing bridge during construction
Cost	N/A				
	N/A	✓ Lowest construction cost (Approx. $8 M) and no property cost	✓ Comparable construction cost (Approx. $10.5 M) to #F3 and no property cost	✓ Comparable construction cost (Approx. $11 M) to #F2 and lower property cost than #F4	× Highest construction cost (Approx. $12 M) and property cost
Summary	N/A	**PREFERRED ALTERNATIVE**			

MOST PREFERRED → LEAST PREFERRED

Alternative #F1: Replace Bridge on Existing Alignment is preferred for the following reasons:

- Maintains existing Franklin Boulevard alignment
- Minimizes potential for impacts to natural environment
- Minimizes construction footprint

Construction staging scenarios were reviewed for the preferred replacement alternative and are discussed below.

FRANKLIN BOULEVARD INTERCHANGE – CONSTRUCTION STAGING

To accommodate replacement of the Franklin Boulevard underpass on the existing alignment, two construction staging scenarios were reviewed, Full Closure and Partial Closure. Key points are noted below.

1. Full Closure

- Full closure of Franklin Boulevard and the S-W ramp
- W-S ramp remains open throughout construction
- Adjacent interchanges can accommodate diverted traffic
- Construction completed in one construction season
- Inconvenience to road users for one construction season

2. Partial Closure

- Two-stage construction:
- Stage 1 involves single lane closures which result in northbound and southbound traffic alternating right of way on a single lane
- Stage 2 involves a single southbound lane and a single northbound lane with access to the S-W ramp
- W-S and S-W ramps remain open throughout construction
- Construction completed in two construction seasons
- Increased cost due to construction staging
- Inconvenience to road users for two construction seasons

Based on the above, **Full Closure is the preferred construction staging alternative**.

Emergency response times may be increased during the closure of the Franklin Boulevard underpass. Mitigation measures will be developed in consultation with emergency service providers in the detail design phase.

5.4.3 Townline Road Interchange - Alternatives and Evaluation

Based on the objective of addressing the needs for future highway widening, the following alternatives have been identified:

- Do Nothing (Comparison Purposes Only); and
- Alternative #T1: Minor Interchange Improvements.

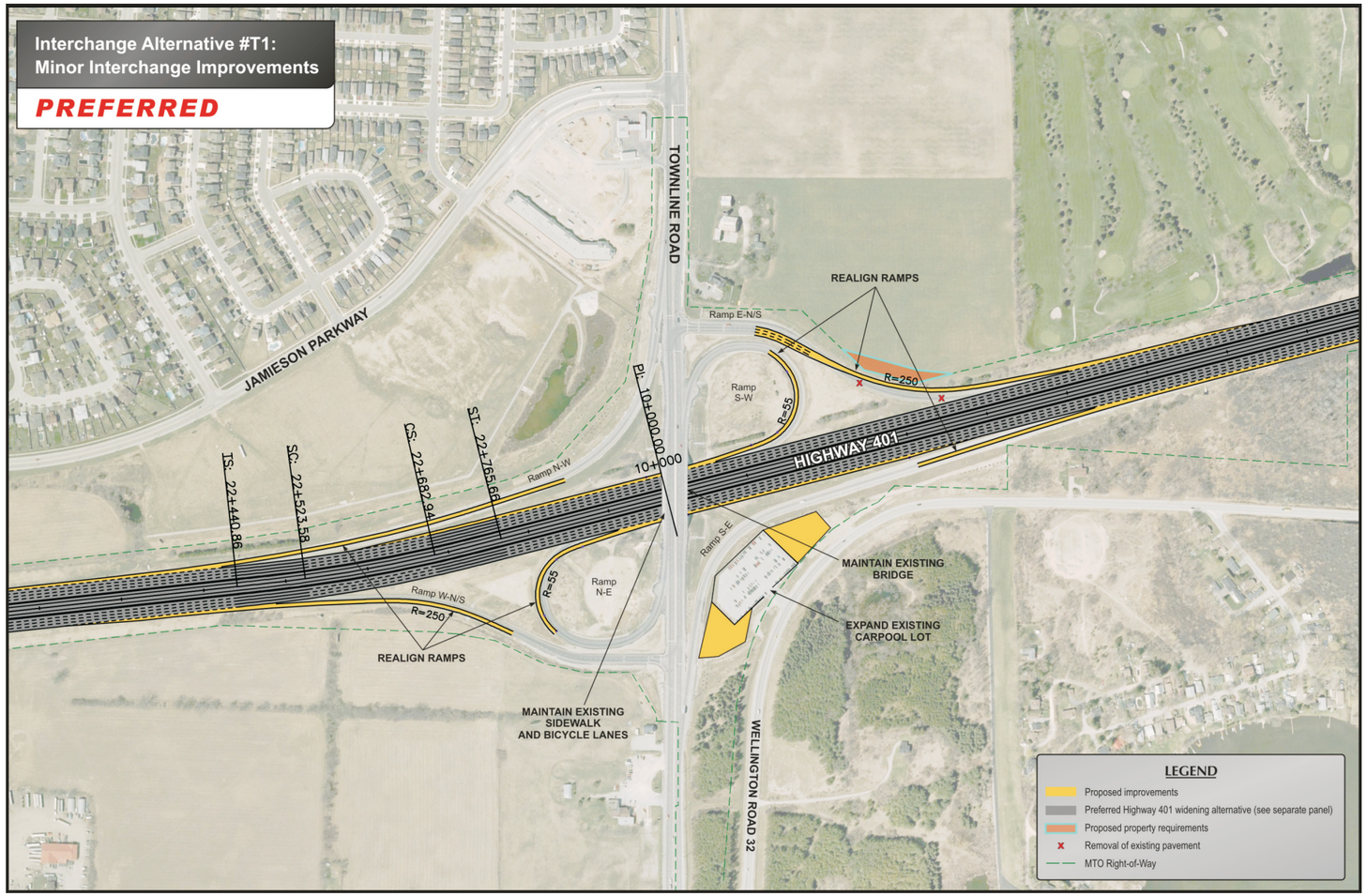
These alternatives are shown in **Exhibit 5-14**.

Based on the analysis and evaluation as shown in **Exhibit 5-14**, Alternative #T1 is preferred for the following reasons:

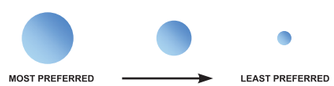
- Ramp realignments required to accommodate proposed Highway 401 widening;
- Improves E-N/S ramp radius to improve operational performance of ramp;
- Minimizes impact to the natural environment;
- Minimizes property requirements; and
- Expands existing carpool parking lot.

The preferred plan is shown later in **Exhibit 7-1**.

This page intentionally left blank



TOWNLINE ROAD INTERCHANGE SUMMARY EVALUATION		
Factor Area	**Do Nothing (Comparison Purposes Only)**	**Alternative #T1: Minor Interchange Improvements**
Transportation		
	✓ Accommodates forecast traffic volumes × Ramps require minor realignment to accommodate Highway 401 improvements	✓ Accommodates forecast traffic volumes ✓ Existing carpool parking lot expanded within existing MTO property ✓ E-N/S ramp radius improved to increase operational performance of ramp
Natural Environment		
	✓ No change from existing condition	✓ Minimal impact to natural environment
Socio-Economic Environment		
	✓ No change from existing condition	× Minor property requirements (Approx. 0.2 ha)
Cultural Environment		
	✓ No change from existing condition	✓ No significant impacts
Constructability	N/A	
	N/A	✓ No construction staging required ✓ Minor impacts on all ramps
Cost	N/A	
	N/A	✓ Construction cost approx. $5.1 M ✓ Minor property cost
Summary	N/A	 **PREFERRED ALTERNATIVE**



Alternative #T1 is preferred for the following reasons:

- Ramp realignments required to accommodate proposed Highway 401 widening
- Improves E-N/S ramp radius to improve operational performance of ramp
- Has minimal impact to the natural environment
- Has minimal property requirements
- Expands existing carpool parking lot

5.4.4 Hanlon Expressway Interchange - Alternatives and Evaluation

Based on the objective of addressing the needs for future highway widening, the following alternatives have been identified:

- Alternative #H6N1: Option 1 (Do Nothing) EA Approved WP 65-76-05;
- Alternative #H6N1: Option 2 (Modified EA Approved) WP 65-76-05; and
- Alternative #H6N2: Freeway-to-Freeway Separate Hanlon – Core/Collector EB Exit.

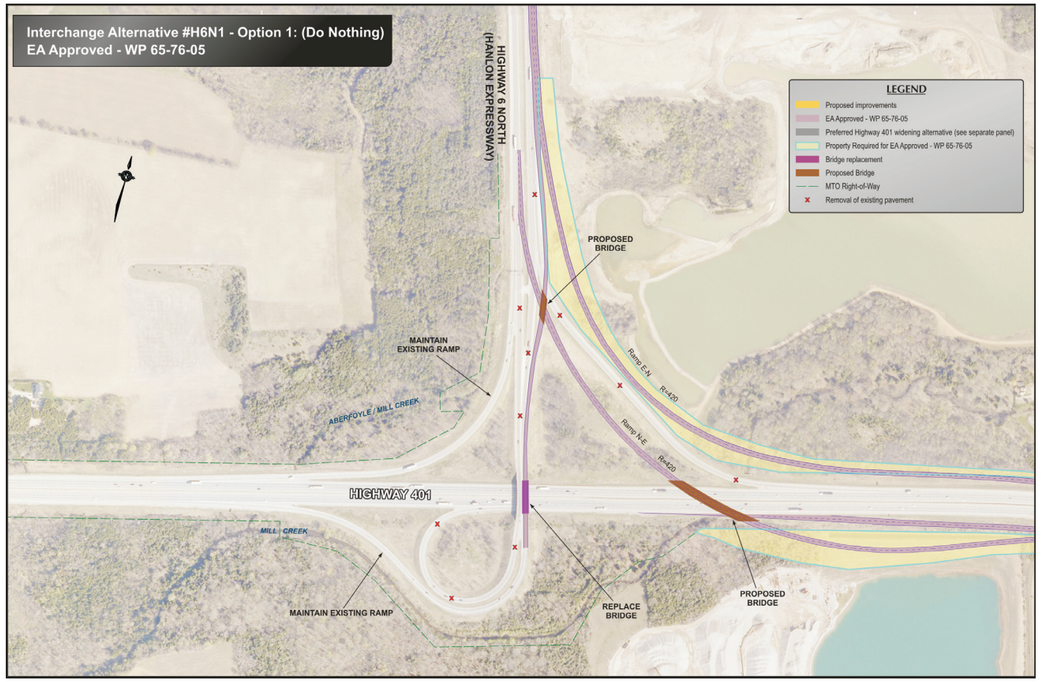
These alternatives are shown in **Exhibit 5-15**.

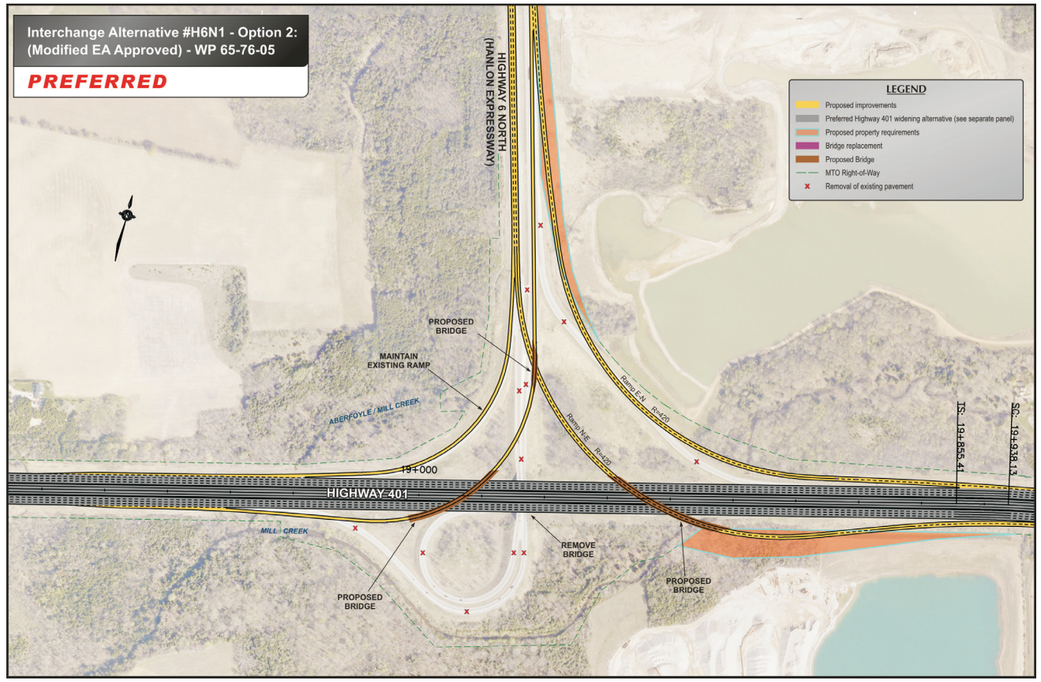
Based on the analysis and evaluation as shown in **Exhibit 5-16**, Alternative #H6N1 – Option 2 is preferred for the following reasons:

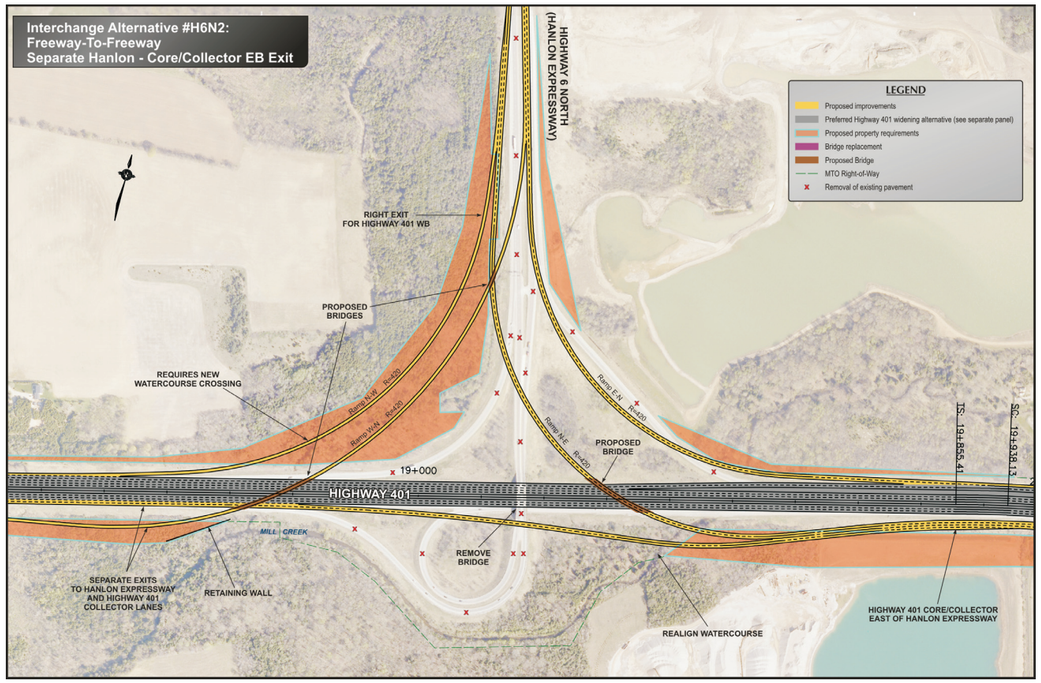
- Avoids sensitive natural environmental features;
- Less property required for similar transportation performance, when compared to Alternative H6N2;
- Allows for re-naturalization of areas south of new W-N ramp (currently occupied by existing W-N and N-E ramps; and
- Ramps may be built individually to maintain traffic during construction.

The preferred plan is shown later in **Exhibit 7-1**.

This page intentionally left blank







GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Hanlon Expressway
Interchange Alternatives

EXHIBIT
5-15

HANLON EXPRESSWAY INTERCHANGE

SUMMARY EVALUATION

Factor Area	Alternative #H6N1 - Option 1: (Do Nothing) EA Approved WP 65-76-05	Alternative #H6N1- Option 2: (Modified EA Approved) WP 65-76-05	Alternative #H6N2: Freeway-to-Freeway Separate Hanlon - Core/Collector EB Exit
Transportation			
	✓ Accommodates forecast traffic volumes × Does not provide for direct movement at all ramps × Ramp radii are less than desirable for N-W and W-N ramps	✓ Accommodates forecast traffic volumes ✓ All ramps provide for direct movement	✓ Accommodates forecast traffic volumes ✓ All ramps provide for direct movement ✓ Greatest ramp radii allows for free flow, freeway to freeway ramps for all movements
Natural Environment			
	✓ Avoids sensitive natural environmental features ✓ Smaller footprint than other alternatives	✓ Avoids sensitive natural environmental features ✓ Allows for re-naturalization of areas south of new W-N ramp (currently occupied by existing W-N and N-E ramps)	× Greatest impact to natural environmental features
Socio-Economic Environment			
	✓ Minimizes socio-economic impacts × Greater property requirement (Approx. 6.95 ha) than #H6N1-Option 2	✓ Minimizes socio-economic impacts ✓ Minimizes property requirement (Approx. 4.37 ha)	× Requires greatest amount of property (Approx. 13.85 ha)
Cultural Environment			
	✓ Less potential for archaeological impacts than #H6N2	✓ Less potential for archaeological impacts than #H6N2	× Greater potential for archaeological impacts
Constructability			
	✓ Ramps may be built individually to maintain traffic during construction	✓ Ramps may be built individually to maintain traffic during construction	× More complicated construction staging
Cost			
	✓ Lowest construction cost (Approx. $34.4 M) ✓ Lower property cost	✓ Lower construction cost (Approx. $39 M) than #H6N2 ✓ Lowest property cost	× Highest construction cost (Approx. $42.2 M) × Highest property cost
Summary		**PREFERRED ALTERNATIVE**	

MOST PREFERRED → LEAST PREFERRED

Alternative #H6N1 – Option 2: (Modified EA Approved) is preferred for the following reasons:

- All ramps provide for direct movement
- Improves ramp geometrics
- Avoids sensitive natural environmental features
- Less property required for similar transportation performance, when compared to Alternative H6N2
- Allows for re-naturalization of areas south of new W-N ramp (currently occupied by existing W-N and N-E ramps)
- Ramps may be built individually to maintain traffic during construction

5.4.5 Highway 6 South/Brock Road Interchange - Alternatives and Evaluation

Based on the objective of addressing the needs for future highway widening, the following alternatives have been identified:

- Alternative #H6S1: (Do Nothing) EA Approved WP 65-76-05;
- Alternative #H6S2: Westerly Shift of Highway 6 South/Brock Road;
- Alternative #H6S3: Easterly Shift of Highway 6 South/Brock Road; and
- Alternative #H6S4: Realign Highway 6 South/Brock Road (4-legged Roundabout with W-N/S and N/S-E Ramps).

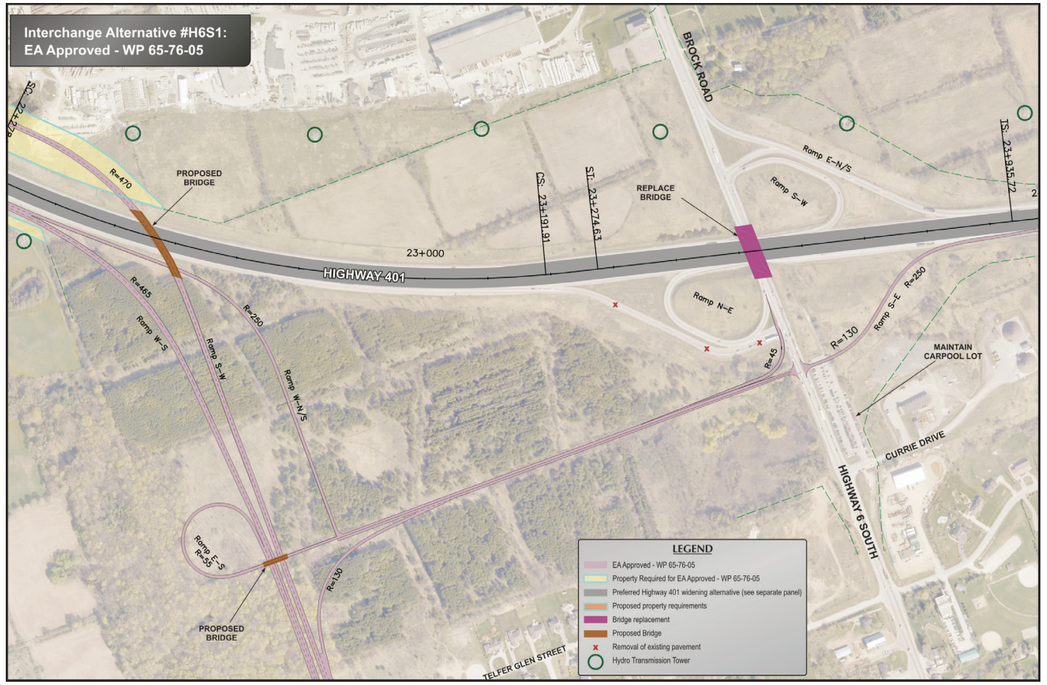
These alternatives are shown in **Exhibit 5-17**.

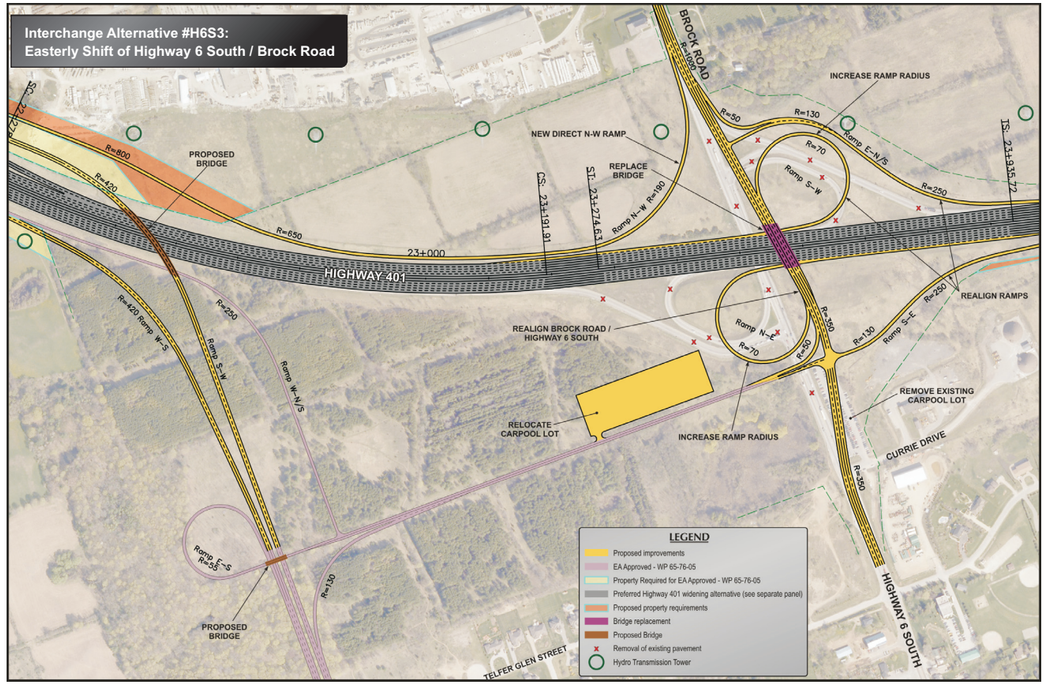
Based on the analysis and evaluation as shown in **Exhibit 5-18**, Alternative #H6s4 is preferred for the following reasons:

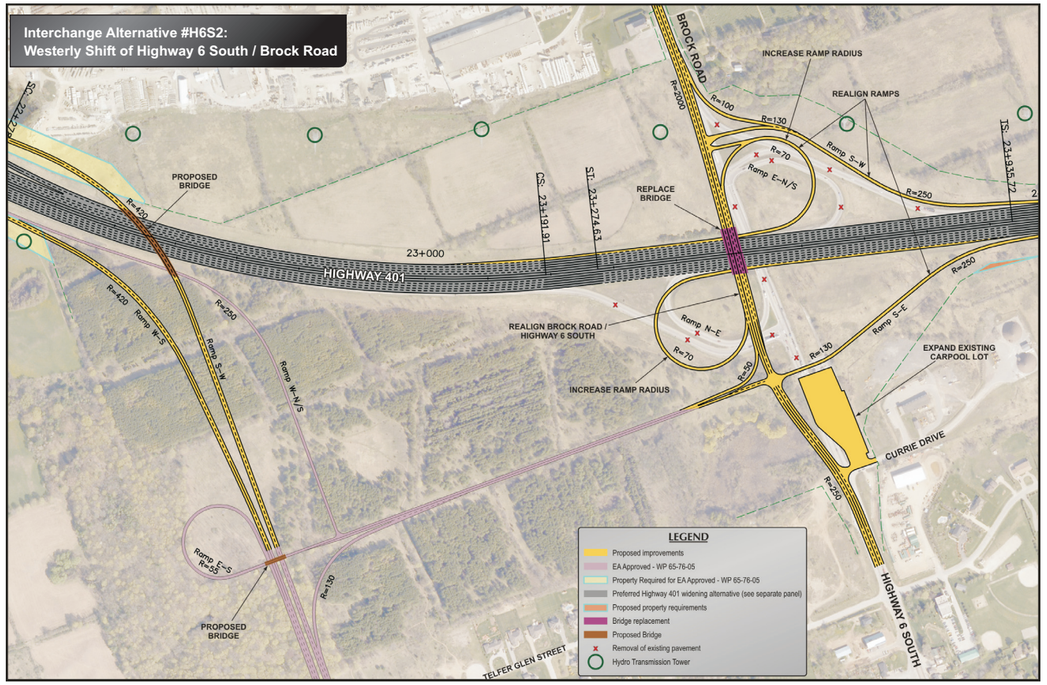
- Realignment encourages motorists to use Morriston By-pass;
- Roundabout reduces number of intersection conflict points;
- Combines two ramp terminals at roundabout, and moves N/S-W ramp to by-pass, thus simplifying and improving overall interchange operations; and
- Realignment of Highway 6 South/Brock Road accommodates structure replacement/traffic staging.

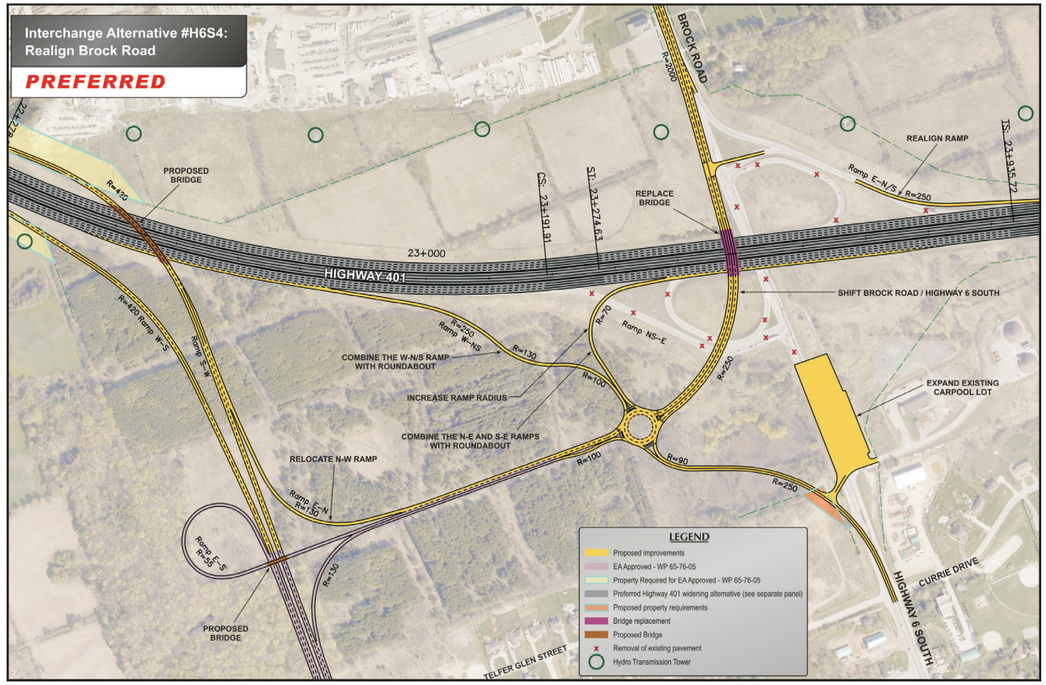
The preferred plan is shown later in **Exhibit 7-1**.

This page intentionally left blank









GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Highway 6 South / Brock Road
Interchange Alternatives

EXHIBIT
5-17

BROCK ROAD INTERCHANGE

SUMMARY EVALUATION

Factor Area	Alternative #H6S1: (Do Nothing) EA Approved WP 65-76-05	Alternative #H6S2: Westerly Shift of Highway 6 South / Brock Road	Alternative #H6S3: Easterly Shift of Highway 6 South / Brock Road	Alternative #H6S4: Realign Brock Road (4-legged Roundabout / Ramp Terminal)
Transportation				
	× Does not address traffic operational concerns at existing interchange × W-N/S ramp connection is a left exit and does not meet driver expectations × T-intersection at W-N/S ramp terminal not conventional and may result in traffic conflict	× W-N/S ramp connection is a left exit and does not meet driver expectations × T-intersection at W-N/S ramp terminal not conventional and may result in traffic conflict	✓ New N-W ramp improves traffic operations at the existing WB ramp intersection × W-N/S ramp connection is a left exit and does not meet driver expectations × T-intersection at W-N/S ramp terminal not conventional and may result in traffic conflict	✓ Realignment encourages motorists to use Morriston By-pass ✓ Roundabout reduces number of intersection conflict points ✓ Combines two ramp terminals at roundabout, and moves N/S-W ramp to by-pass, thus simplifying and improving overall interchange operations
Natural Environment				
	✓ All alternatives have similar minor impacts to the natural environment ✓ Least amount of impact due to smaller construction footprint	✓ Less incremental impact to natural environment than Alternative H6S4	✓ Less incremental impact to natural environment than Alternative H6S4	× Incrementally more impacts than other alternatives due to larger construction footprint
Socio-Economic Environment				
	✓ Least amount of property required (0.68 ha EA Approved) ✓ No direct impact to residences × No expansion to existing carpool parking lot	× Requires 1.03 ha of property (0.68 ha EA Approved) ✓ No direct impact to residences ✓ Existing carpool lot expanded	× Greatest amount of property required (1.06 ha (0.68 ha EA Approved)) × Requires additional property from business operation due to proposed N-W ramp location ✓ No direct impact to residences × May require relocation of up to 3 hydro transmission towers ✓ Existing carpool lot relocated and expanded	✓ Comparable property requirements to Alternatives H6S2 and H6S3 (0.9 ha (0.68 ha EA Approved)) ✓ No direct impact to residences ✓ Existing carpool lot expanded
Cultural Environment				
	× Impacted lands at woodlot west of connector road require Stage 2 Archaeological Assessment	× Impacted lands at woodlot west of connector road require Stage 2 Archaeological Assessment	× Impacted lands at woodlot west of connector road, and northwest of interchange, require Stage 2 Archaeological Assessment	× Impacted lands at woodlot west of connector road require Stage 2 Archaeological Assessment
Constructability				
	✓ Minor impacts to existing interchange during construction	✓ Realignment of Highway 6 South/Brock Road accommodates bridge replacement/traffic staging × Increased ramp staging impacts compared to Alternative H6S3	✓ Realignment of Highway 6 South/Brock Road accommodates bridge replacement/traffic staging ✓ Reduced ramp staging impacts compared to other alternatives (except H6S1)	✓ Realignment of Highway 6 South / Brock Road accommodates bridge replacement/traffic staging × Increased ramp staging impacts compared to Alternative H6S3
Cost				
	✓ Lowest construction cost (Approx. $12.8 M) and property cost	✓ Comparable construction cost (Approx. $49.8 M) to Alternative H6S4, however slightly more property cost	× Highest construction cost (Approx. $54.9 M) and property cost	✓ Comparable construction cost (Approx. $50.2 M) and slightly less property cost to Alternative H6S2
Summary				**PREFERRED ALTERNATIVE**

MOST PREFERRED → LEAST PREFERRED

Alternative #H6S4: Realign Brock Road with a 4-legged Roundabout/Ramp Terminal is preferred for the following reasons:

- Realignment encourages motorists to use Morriston By-pass
- Roundabout reduces number of intersection conflict points
- Combines two ramp terminals at roundabout, and moves N/S-W ramp to by-pass, thus simplifying and improving overall interchange operations
- Realignment of Highway 6 South/Brock Road accommodates bridge replacement/traffic staging

5.4.6 Wellington Road 36 Underpass - Alternatives and Evaluation

Based on the objective of addressing the needs for future highway widening, the following alternatives have been identified:

- Alternative #WR36-1: Replace Structure on Existing Alignment; and
- Alternative #WR36-2: Replace Structure on New Alignment.

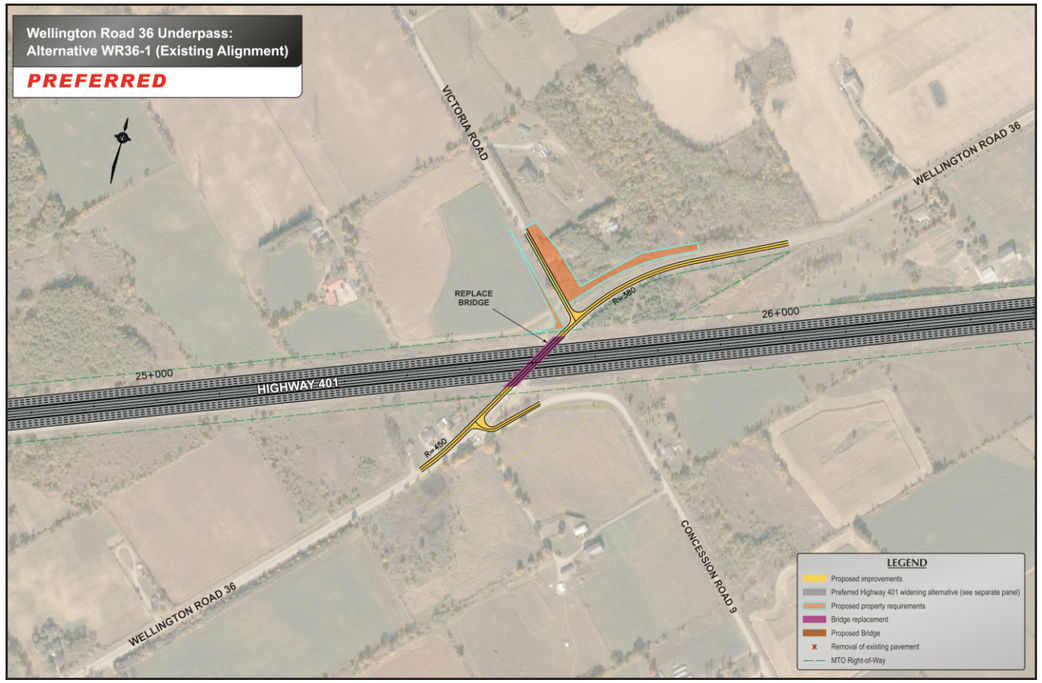
These alternatives are shown in **Exhibit 5-19**.

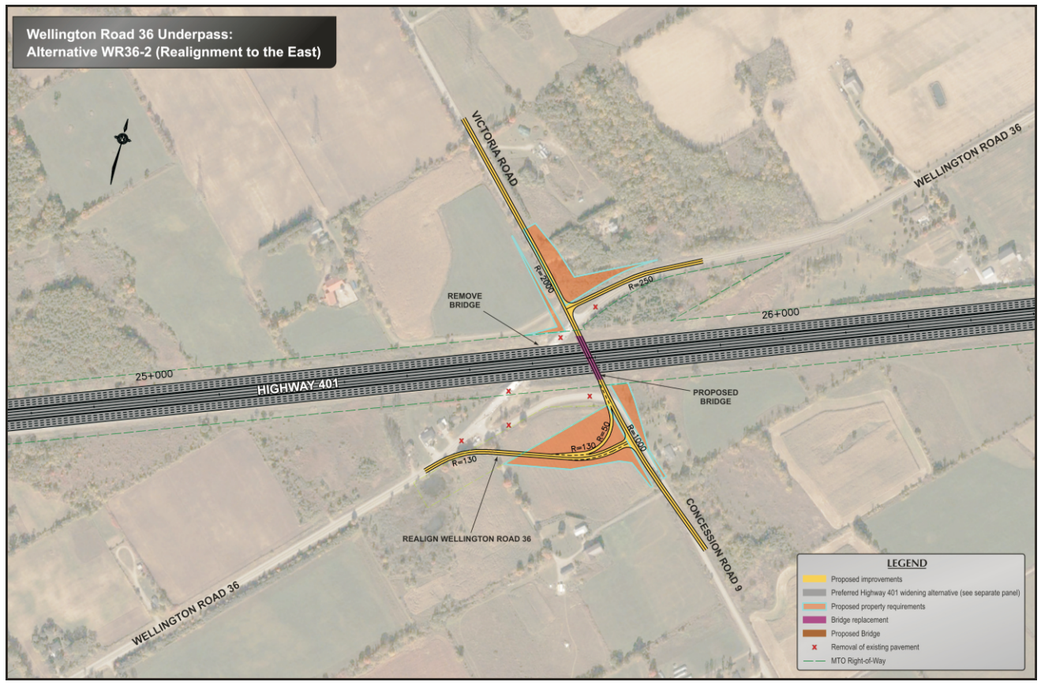
Based on the analysis and evaluation as shown in **Exhibit 5-19**, Alternative #WR36-1 is preferred for the following reasons:

- Uses existing road alignments and maintains existing visibility/sign distance conditions;
- Requires less property;
- Minimizes effects of entrance grading;
- Potential for completion in one construction season; and
- Minimizes non-structural related costs.

The preferred plan is shown later in **Exhibit 7-1**.

This page intentionally left blank





Wellington Road 36 Underpass SUMMARY EVALUATION		
Factor Area	**Alternative WR36-1**	**Alternative WR36-2**
Transportation		
	✓ Accommodates existing traffic operations ✓ Uses existing road alignments ✓ Maintains existing visibility /sight distanceconditions	✓ Accommodates existing traffic operations × Significant road realignment × Poor visibility/sight distance conditions on structure and at adjacent intersections
Natural Environment		
	× Grading impacts to wooded area north of Highway 401	✓ Reduced impacts to wooded area north of Highway 401 × New road alignment affects productive agricultural land
Socio-Economic Environment		
	✓ Requires significantly less property (approximately 0.77 ha) ✓ Minimizes effects of entrance grading	× Requires greater amount of property to accommodate road realignment × Entrance grading effects on several residences × Affects agricultural operations
Cultural Environment		
	× Requires replacement of the Wellington Road 36 underpass × Wellington Road 36 underpass considered provincially significant, conservation options to be assessed at detail design stage ✓ Minimalpotential for archaeological impact outside of existing right-of-way	× Requires replacement of the Wellington Road 36 underpass × Wellington Road 36 underpass considered provincially significant, conservation options to be assessed at detail design stage ✓ Minimal potential for archaeological impact outside of existing right-of-way
Constructability		
	✓ Single construction season if Wellington Road 36 closed for duration of construction × Two construction seasons if Wellington Road 36 remains open during construction	× Two seasons - first season to build new bridge and rough grading; second season to complete roadwork and remove old bridge and embankments ✓ Allows existing Wellington Road 36 to remain open throughout construction
Cost		
	× Increased bridge cost due to longer spans and use of steel girders ✓ Reduced cost associated with use of existing alignment, minor property requirements, and minor increase in grade compared to Alternative WR36-2	✓ Reduced bridge cost due to shorter spans and use of concrete girders × Higher cost associated with increased property requirements, new embankments, and new road alignments compared to Alternative WR36-1
Summary	**PREFERRED ALTERNATIVE**	

MOST PREFERRED → LEAST PREFERRED

Wellington Road 36 Underpass Alternative WR36-1 (Existing Alignment) is preferred for the following reasons:

- Uses existing road alignments and maintains existing visibility/sight distance conditions
- Requires less property
- Minimizes effects of entrance grading
- Potential for completion in one construction season

6.0 CONSULTATION

Consultation is an integral component of the Environmental Assessment (EA) process and provides opportunity for communication between the community and the Project Team to identify potentially significant environmental issues early in the decision making process and throughout the study.

The Project Team consulted with members of the public, property owners, Provincial and Federal Government Agencies, Municipalities, First Nations and Métis Groups, as well as other interested stakeholders.

The following section provides details of the consultation that was undertaken during the study process. A summary of the study schedule and consultation process is shown in **Exhibit 6-1**.

6.1 External Agency Participation

Review agencies, interest groups, utility companies, and emergency services were notified at the beginning of the study by letter on July 10, 2009 informing them of the study commencement and requesting their initial comments. Individuals and groups that expressed an interest in the project were kept informed throughout the project.

The agencies that expressed an interest in this project were notified of Public Information Centre (PIC) #1 (December 1st and 3rd 2009), and PIC #2 (December 6th and 8th, 2011). See **Sections 6.3.1** and **6.3.2** for summary of Public Information Centres.

The agencies that were contacted include the following:

Provincial & Federal Government Agencies

- Canadian Environmental Assessment Agency – Ontario Region
- Indian and Northern Affairs Canada (now Aboriginal Affairs and Northern Development Canada)
- Environment Canada
- Fisheries and Oceans Canada
- Transport Canada
- Ministry of Aboriginal Affairs
- Ontario Ministry of Agriculture, Food, and Rural Affairs
- Ministry of Culture (now Ministry of Tourism, Culture and Sport)
- Ministry of Citizenship and Immigration
- Ontario Provincial Police
- Ministry of Energy and Infrastructure
- Ministry of Municipal Affairs and Housing
- Ministry of Natural Resources
- Ministry of the Environment
- Ontario Realty Corporation (now Ontario Infrastructure and Lands Corporation)

Municipalities

- County of Wellington
- Regional Municipality of Waterloo
- Township of Puslinch
- City of Cambridge

Emergency Services

- Region of Waterloo Emergency Medical Services
- Guelph – Wellington Emergency Medical Service
- Waterloo Regional Police Service
- Ontario Provincial Police – County of Wellington Detachment
- Ontario Provincial Police – Cambridge Detachment
- City of Cambridge Fire Department
- Township of Puslinch Fire Department

Utilities

- Energy Plus (Cambridge and North Dumfries Hydro Inc.)
- Regional Municipality of Waterloo Transportation and Environmental Services Department
- City of Cambridge Transportation and Public Works
- Wellington County Engineering Services Department
- Union Gas Limited
- Hydro One
- Bell Canada
- Enbridge Gas Distribution Inc.
- Rogers
- Atria Networks
- TransCanada PipeLines Limited

Other Agencies / Stakeholders

- CN Rail
- Goderich-Exeter Railway
- Conservation Halton
- Grand River Conservation Authority
- Friends of the Greenbelt Foundation
- Cambridge Chamber of Commerce
- Guelph Chamber of Commerce
- Ontario Trucking Association
- Ontario Cycling Association
- Ontario Heritage Trust
- Puslinch Historical Society

- Wellington County Historical Society
- Ecological and Environmental Advisory Committee (Region of Waterloo)
- Heritage Planning Advisory Committee (Region of Waterloo)
- Waterloo Region District School Board
- Upper Grand District School Board
- Conseil Scolaire de District du Centre-Sud-Ouest
- Conseil Scolaire de District Catholique Centre-Sud
- Six Nations of the Grand River Territory
- Mississaugas of the New Credit First Nation
- Association of Iroquois and Allied Indians

A summary of External Agency Participation is provided in **Exhibit 6-2**. Relevant correspondence is on file with MTO**.**

The Project Team met with staff from the Region of Waterloo, City of Cambridge, County of Wellington, and Township of Puslinch on several occasions throughout the study. The Project Team also presented the study to the City of Cambridge Council, the Township of Puslinch Council, and the Region of Waterloo Planning and Works Committee at key study milestones. Notes of meetings with the municipalities are on file with MTO.

The Project Team met with Hydro One Networks Inc. and The Ontario Power Authority (OPA) Team to discuss the OPA's study of the long-term electrical infrastructure needs for the Kitchener-Waterloo-Cambridge-Guelph (KWCG) Area. Both the MTO and OPA studies include the section of the Highway 401 corridor from West of Hespeler Road to Highway 6 South/Brock Road. A meeting was held Friday January 20, 2012 to explore potential opportunities for collaboration between the two Project Teams. Notes from the meeting between the Project Team, Hydro One Networks Inc. and the Ontario Power Authority are on file with MTO.

WE ARE HERE

STUDY COMMENCEMENT → DATA COLLECTION / NEEDS ASSESSMENT → ALTERNATIVES ASSESSMENT → IDENTIFY PREFERRED PLAN → FINALIZE PRELIMINARY DESIGN → COMPLETE AND FILE TRANSPORTATION ENVIRONMENTAL STUDY REPORT FOR PUBLIC REVIEW

INITIAL STUDY NOTIFICATION
(June 2009)
- ***Public***
- ***Property Owners***
- ***External Agencies***

PUBLIC INFORMATION CENTRE #1
(December 2009)

PUBLIC INFORMATION CENTRE #2
(December 2011)

STUDY COMPLETION NOTIFICATION (Fall 2012)
- ***Public***
- ***Property Owners***
- ***External Agencies***

ONGOING OPPORTUNITIES FOR PUBLIC INPUT

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Summary of Study Schedule / Consultation Process

EXHIBIT
6-1

Exhibit 6-2: External Agency Participation

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Federal Government Agencies		
Transport Canada – Ontario Region (PHE) Environment and Engineering Contact: Haya Finan, Environmental Officer	In an email received July 14, 2009, Transport Canada noted that: • Transport Canada is responsible for the administration of the Navigable Waters Protection Act, which prohibits the construction or placement of any "works" in navigable waters without first obtaining approval. If any of the related project elements or activities may cross or affect a potentially navigable waterway, it is requested that an application be prepared and submitted in accordance with the requirements as outlined in the NWPA Application Guide. • Certain approvals under the Navigable Waters Protection Act or Railway Safety Act trigger the requirement for a federal environmental assessment under the Canadian Environmental Assessment Act. Therefore incorporating CEAA requirements into the provincial environmental assessment should be considered.	In a letter dated November 18, 2009 the following was noted: • Study is the early stages of preliminary design; • Potential construction of placement of "works" in navigable awater to be determined; • Navigable waters to be determined.
Canadian Environmental Assessment Agency, Ontario Region Contact: Dave Bell, Project Manager	In a letter dated July 14, 2009, CEAA advised that: • A federal environmental assessment (EA) may be required when a federal authority: - Is the proponent of the project; - Provides financial assistance to the proponent; - Sells, leases or otherwise disposes of federal lands; or - Issues a permit, licence or any other approval as prescribed in the *Law List Regulations*. • CEAA can help determine whether or not the Canadian Environmental Assessment Act (the Act) applies; • For projects that are subject to the Act, CEAA will act as the federal environmental assessment coordinator and facilitate the involvement of the federal authorities in a co-ordinated assessment aimed at meeting all agencies' needs simultaneously. • CEAA must have a Project Description that can be distributed to various federal authorities to determine their interest in the project, including: - The nature of the project and its location; - Federal decisions which may be made in relation to the project; - Whether federal funding is being contemplated or federal lands are required. • If project notification was sent to CEAA to determine if the Act applies, a Project Description will be required.	Comments noted.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Indian and Northern Affairs Canada Ontario Region, Environmental Services Unit Contact: Daniel Johnson, Environmental Officer	In letters dated July 15, 2009 and August 25, 2009, INAC advised that: • All unsolicited correspondence concerning environmental assessment requests and notifications that are taking place within Ontario should be directed to: Environment Unit Re: Environmental Assessment Coordination Indian and Northern Affairs Canada 25 St. Clair Ave. East, 8th Floor, Toronto, ON M4T 1M2 EACoordination_ON@inac-ainc.gc.ca	Comments noted.
Indian and Northern Affairs Canada Ontario Region, Environment Unit Contact: April Desmoulin	In letters dated July 15, 2009 and August 25, 2009, INAC advised that: • INAC will not be providing a review of the proposed project; however it is important to contact all potentially interested First Nation communities directly to invite them to participate in the review; • INAC noted the following sources to assist in identifying First Nations and other Aboriginal groups within the vicinity of a project, including websites for the: - The Chiefs of Ontario - The Metis Nation of Ontario - The Ontario Federation of Indian Friendship Centres • For enquiries regarding land claims within the project area, contact: - Lynn Bernard, Director General of the Comprehensive Claims Branch; - Ralph Brant, Director General of Specific Claims Branch; and - Franklin Roy, Director General of Litigation Management and Resolution Branch.	Comments noted. • The Project Team contacted the following First Nations and other Aboriginal groups as port of this study including: - Association of Iroquios and Allied Indians; - Six Nations of the Grand River Territory; and - Mississaugas of the New Credit First Nation.
Provincial Government Agencies		
Ontario Growth Secretariat Growth Policy and Planning Analysis Contact: Janet Lo, Acting Manager	Fax-back received July 31, 2009, indicating: • Ontario Growth Secretariat wishes to participate/would like to be kept informed of the status of the project, as it within the boundaries of the Growth Plan for the Greater Golden Horseshoe; • Advise that there are relevant policies in the Growth Plan that the Project Team may wish to consider as part of the EA Study.	• Mailing list updated. • Ontario Growth Secretariat was kept informed throughout the study process. In a letter dated November 18, 2009 it was noted that the policies provided in Growth Plan for the Greater Golden Horseshoe will be considered as part of the study. The Ontario Growth Secretariat was encouraged to attend the first round of Public Information Centres and their views and comments to the Project Team.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Ontario Realty Corporation – Professional Services Contact: Lisa Myslicki, Environmental Coordinator	In a letter received by email on August 7, 2009, the ORC noted: • ORC –managed property is directly in the study area; • Lands managed by Hydro One, on behalf of ORC, are also in the study area; • The project may have the potential to impact property and/or activities of tenants present on ORC-managed lands; • General impacts – negative environmental impacts associated with the project design and construction should be avoided and/or appropriately mitigated in accordance with applicable regulations, best practices and MNR and MOE standards; • Impacts to land holdings – negative impacts to land holdings such as the taking of developable parcels of ORC managed land or fragmentation of utility or transportation corridors should be avoided. If takings are suggested as part of any alternative, these should be mapped and quantified within the EA report documentation; • Heritage Management Process and Class EA Process – should proposed activities impact cultural heritage features on ORC managed lands, a request to examine cultural heritage issues could be required. The ORC Heritage Management Process should be used for identifying and conserving heritage properties in the provincial portfolio; • Potential triggers related to MEI's Class EA – the ORC is required to follow the Ministry of Energy and Infrastructure (MEI) Class EA Process for Realty Activities Not Related to Electricity Projects. The MEI Class EA applies to a wide range of realty and planning activities including leasing or letting, planning approvals, disposition, granting of easements, demolition and property maintenance/repair. If the MEI Class EA is triggered, and deferral to another ministry's or agency's Class EA or individual EA is requested, the alternative EA will be subject to a critical review prior to approval for any signoff of a deferral by the proponent. The alternative EA needs to fulfill the minimum criteria of the MEI Class EA; and • Overall, the purchase of MEI-owned/ORC-managed lands or disposal of rights and responsibilities for ORC-managed lands triggers the application of the MEI Class EA. If applicable, contact should be made with the ORC Sales and Marketing Group as well as Professional Services.	In a letter dated November 18, 2009 the following was noted: • ORC and Hydro One-managed lands are located within the study area; • ORC requirements as per the Ministry of Energy and Infrastructure Class Environmental Assessment Process for Realty Activities Not Related to Electricity Projects (MEI Class EA) will be addressed; • Preliminary widening and interchange improvement alternatives will be assessed and evaluated based on a number of different criteria including natural, social, and cultural environment; • The analysis and evaluation of the alternatives will be presented at the second round of Public Information Centres; • ORC is invited to attend the first round of PICs to provide their views and comments; and • Contact will be maintained with ORC throughout the study process.
Ontario Realty Corporation – Professional Services Contact: Lisa Myslicki, Environmental Coordinator	In a letter dated November 27, 2009, the ORC noted: *Identification of undertaking(s) and trigger to MEI Class EA:* • Generally, for EA projects, the ORC is consulted regarding the applicability of the MEA/IEA Class EA processes and requirements when a proponent's proposed undertaking may directly or indirectly affect lands or facilities owned by MEI and managed by ORC. This would ensure that the correct undertaking described in the MEI Class EA is clearly identified and addressed. • Ensure to include any lands that have been, or are subject to, an easement that include Hydro One towers and transmission lines on Bill 58 lands. MEI/ORC's realty undertaking should be clearly identified, and be made separate from undertakings conducted by Hydro One. • The proponent is requested to identify how the EA meets MEI/ORC's minimum EA requirements	Comments noted. Impacts to ORC managed lands are not anticipated.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	by referring to the seven point analysis, as described in Section 4.2, Step B1 of the MEI Class EA. *Identifying the associated EA Category and ability to defer to an alternative EA:* • Note that different undertakings in combination with the type of land to be impacted, determines the ORC EA Class. *Consultation with ORC Stakeholders:* • MEI/ORC/Agency is required to circulate major stakeholders prior to land transfer, dispositions or easements, depending on the type of land to be impacted and it is possible under the MEI Class EA Process to defer to an alternative EA, if the client ministry or agency's EA circulates the appropriate stakeholder. One major stakeholder to contact is the MNR. *Phase 1 Environmental Site Assessment and Stage I/II Archaeological Assessments/Cultural Heritage Assessments:* • Depending on the type of realty activity to be completed, there is the potential, based on the MEI Class EA Process, that a Phase I/II Environmental Site Assessment (ESA), Stage I/II Archaeological Assessment or Cultural Heritage Assessment may be required. *Ability to defer:* • The ability to defer to an alternative EA is determined if the EA meets MEI's Class EA seven point analysis. The identification of the MEI realty undertaking and sufficient consultation must be adequately documented. • If the proposed undertaking has a potential to cause impacts to MEI-owned property, it also has the potential to cause net negative environmental effects. ORC comments are intended to ensure that outstanding issues of environmental, socio-economic and cultural heritage concerns related to property, as well as complying with all regulations, will be appropriately addressed prior to the commencement of this undertaking. • ORC may also be required to circulate First Nations regarding the undertaking. Should First Nations consultation be required it is recommended that ORC be contacted for further details	
Ministry of Natural Resources – Guelph District Contact: April Nix Planning Intern	In a letter dated December 21, 2009, MNR Guelph District noted the following: • MNR has known observations for Common Nighthawk (Special Concern) and Blanding's Turtle (Threatened) within the study area. There is potential for occurrences of Milksnake (Special Concern) and Eastern Ribbonsnake (Special Concern). Given the potential for negative impacts to species-at-risk, the implications under the ESA need to be considered; • MNR staff recommend that appropriate surveys for the above species be completed; • Noted that the habitat of species identified as Special Concern is generally considered by the Ministry as significant wildlife habitat; • Should there be occurrences of any species at risk within the study area, prior to or during construction, MNR staff at the Guelph Office should be contacted immediately; • MNR staff note that wetland boundaries in Township of Puslinch have very recently been	• Comments noted. • Natural environmental field investigations carried out as part of the study. • Project Team to maintain contact with MNR staff as necessary.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	updated. The mapping available for deer wintering areas within the study area have also recently been updated. Mapping updates within the Township are available and can be obtained through Land Information Ontario, and should be built into the EA process; • MNR staff have recently been made aware of a potential northern pike spawning area within the Highway 401 right-of-way adjacent to Irish Creek (Puslinch Lake Creek). The area is not included within existing MNR mapping for fisheries, specifically spawning areas. It should be understood that there are also other areas with potential for fish habitat within the study area that are also as of yet unmapped and may warrant further study or review to assess and mitigate potential impacts for the proposed undertaking; and • Recommend that all work areas are delineated within the work plan, as it is developed, and are clearly surveyed on site, and that silt fencing is erected. Other methods for sediment and erosion control should also be implemented to partition the work area from adjacent natural heritage features and prevent work site storm water from entering any water courses directly.	
Ministry of Municipal Affairs and Housing – Municipal Services Office – Western Contact: Dwayne Evans, M.A., MCIP, RPP Planner	In a letter dated July 30, 2009, MMAH noted the following: • The MMAH office provides access to provincial services related to land use planning and development issues covered under the Planning Act. Section 2 of the Planning Act speaks to matters of provincial interest. This section directs decision-making bodies to be consistent with the policy statements and conform with provincial plans issued under Section 3 of the Planning Act; • Current policy on land use planning matters for Ontario, and specific to the Region of Waterloo and the County of Wellington, is the Provincial Policy Statement 2005 (PPS) and the Growth Plan. The PPS speaks to issues such as the promotion of efficient, cost-effective development and land use patterns, and matters dealing with public health and safety. The Growth Plan provides policy direction for growth management in the Greater Golden Horseshoe. The Region of Waterloo and the County of Wellington fall within the Growth Plan Area; • Relevant policies in the PPS and the Growth Plan are to be applied to each situation. Where there is a conflict between the Growth Plan and the PPS, the Growth Plan prevails unless the conflict is between policies relating to the natural environment or human health. In these situations, the policies provide more protection to the natural environment or human health prevail; • MMAH's review indicates that no planning approvals are being sought at this time. However, the project may have implications with respect to those matters covered by the PPS and the Growth Plan. The policies should be considered as part of the review of the undertaking; • EA Studies that examine transportation systems should ensure systems be provided which are safe, energy efficient, facilitate the movement of people and goods, are appropriate to address projected needs, are using existing and planned infrastructure efficiently, transportation and land use considerations shall be integrated at all stages of the planning process, and are maintaining connectivity within and among transportation systems and modes where possible, improving connections which cross jurisdictional boundaries; and	• Comments noted. • Traffic forecasts used take into account the Growth Plan initiatives regarding population and economic grown areas. • The study process has ensured that the resulting preferred plan will facilitate the safe movement of people and goods; is appropriate to address projected needs using existing and planned infrastructure; will maintain connectivity among transportation systems and modes; and will improve connections across jurisdictional boundaries.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	• Should ensure that the Region of Waterloo, County of Wellington, and Local Official Plan policies regarding transportation are integrated into the assumptions regarding the preferred solution recommended under this evaluation process. A second letter dated November 30, 2009, noted the same information as summarized above.	
Municipalities		
County of Wellington Engineering Services Contact: Gordon Ough, P.Eng., County Engineer	In a letter received by fax August 10, 2009, the County noted: • Interest in improvements to the Highway 6 South/Brock Road interchange being fully explored; • North of the interchange, concerned about drivers exiting Highway 401 and not moderating their speed; • Encourage MTO to examine how to reduce speed with possible consideration of the use of illumination, signage, implementation of an urban section, etc.; and • Encourage MTO, possibly in partnership with the County and as part of this project, to investigate and test measures to address the issue.	In a letter dated November 18, 2009 the following was noted: • The Project Team will maintain contact with the County and forward all notices to appropriate individuals throughout the study process; • The County has encouraged MTO to examine methods of reducing vehicle speed north of the interchange at Highway 6 South/Brock Road, however this is outside of the Ministry's jurisdiction; • Traffic operations and safety are being reviewed within the study limits, and potential interchange alternatives will be assessed and evaluated based on a number of factors, including safety criteria. Improvements including traffic calming measures in the immediate vicinity of the interchange area will be examined as part of this study; • Active transportation improvements or other requested municipal improvements to the crossing road in addition of the replacement of existing infrastructure are municipal initiatives and would be subject to a cost sharing agreement for additional engineering, construction, and property costs; • If the municipality would like improvements considered for any of the road plans they are requested to advise the Project Team early in the study process; and • The County of Wellington is encouraged to attend one of the PICs to provide views and comments.
	In an email received August 20, 2009, the County noted: • Aldo Salis of the County of Wellington Planning Department advised that the Township of Puslinch does not have an Official Plan, but is incorporated into the County's Official Plan; and • The Official Plan is available on the County's website, and Schedule A7 Puslinch and the Greenland System policies should be reviewed.	In an email August 20, 2009 the following was noted: • The Township of Puslinch would like to meet with the Project Team and has suggested the County of Wellington also attend.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	In a phone conversation between G. Moore (Ecoplans) and G. Ough on September 28, 2009, the following was noted: • The Project Team will meet with County staff in early November to present the study and alternatives; • The meeting will be coordinated with Township of Puslinch staff; • The County suggested that a presentation to Council occur at a Township Council meeting, as opposed to County Council, as the issues, if any, will likely focus on the Township. County Councillors could be invited to attend the meeting; and • The County inquired about the use of traffic calming measures on Brock Road in Aberfoyle. Ecoplans noted that the use of traffic calming measures could be reviewed at the interchange, however Brock Road north of Highway 401 is not under MTO jurisdiction.	
County of Wellington	Prior to PIC 2, the Project Team met with County of Wellington staff on November 15, 2011, to provide an update on the status of the study, and review the alternatives considered, analysis and evaluation undertaken, and the preferred plan.	
Region of Waterloo, Planning, Housing and Community Services Contact: Paula Sawicki, P. Eng. Manager, Strategic Transportation Planning	In an email received August 11, 2009, the Region noted: • The Region would like to participate in the Highway 401 Corridor Study. Highway 401 is a key corridor for moving goods and people in the Region's transportation network in several ways. A few issues the Region would like to request be considered during the study are as follows: - The lack of facilities for pedestrian to cross over Highway 401 in the City of Cambridge between Hespeler Road and Franklin Boulevard have been a public and staff concern for several years. Currently, the Region and the City with MTO participation are undertaking a feasibility study to consider the best location for a new pedestrian bridge. The study will be completed shortly and the results should be used as background information for the MTO EA; - Goods movement in the Highway 401 corridor is often hampered by automobiles (often single-occupant), so reducing automobile use in the corridor makes sense in today's struggling economy; - Improved rail passenger service in the corridor (Via and GO) should be considered as an alternative. Rail passenger service is a viable alternative that can reduce auto demand on Highway 401 and improve goods movement; - This study appears to duplicate some of the corridor under consideration in the GTA West EA that is currently underway. Since part of the solution to the GTA West Corridor study is actually widening Highway 401, the travel forecasting for the 401 study will be affected by the GTA West corridor solutions. How do these two studies connect and how will they be coordinated? Also, the GTA West Corridor Study ends at Guelph currently, how will the extra travel demand from this new corridor be accounted for in the 401 study?;	In a letter dated November 18, 2009 the following was noted: • Contact with the Region of Waterloo will be maintained throughout the study process; • Active transportation improvements or other requested municipal improvements to the crossing roads in addition to the replacement of existing infrastructure are municipal initiatives and would be subject to a cost sharing agreement. If the municipality would like improvements considered for any of the road plans they are requested to advise the Project Team early in the study process; • The MTO is supportive of transit based initiatives which will improve the movement of people and goods in the highway corridor. Future traffic forecasts indicate that despite planned long-term GO Transit expansions to the Region of Waterloo along the Georgetown and Milton GO Train corridors, there remains a need for increased capacity on Highway 401 to accommodate traffic volumes; • The Project Team has met with the GTA West Project Team and consultation is ongoing to ensure compatibility between the two projects; • Although the Cambridge to Brantford Corridor will impact traffic forecasts along the Highway 401 corridor, the study has just received EA approval and the traffic impacts will not be known until later in the study process. The Greater Golden Horseshow

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	- The City of Cambridge to Brantford Corridor study area ends at the Highway 401 within the limits of the new 401 study. How will this extra corridor connection be accounted for in the forecasting? All of these corridors affect each other and lead to the need for a higher level strategic plan for the whole area that was mentioned during the development of Places to Grow (never completed). This strategic plan could then consider transit as a complete system as opposed to only on a corridor basis; - Currently, there is very little transit service in this corridor for work trips or leisure trips. Before the road is widened we should consider a transit solution that involves transit priority such as bus-bypass shoulders, HOV lanes, peak hour transit only lanes, or improved rail and bus service; and - The Region of Waterloo's Rapid transit EA is continuing and the solution to connect Kitchener to Cambridge has been approved as a Bus-Rapid transit route. This route will be partially on the Highway 401 within the study area of this project and as such, bus-bypass shoulders need to be incorporated into any solution from Hespeler Road west. The Region is just beginning the next phase of the Rapid Transit EA and will be looking at more detailed routes over the next 6 months.	model (used for the Niagara to GTA and GTA West Corridor EA studies) will provide the MTO with a basis for assessing the Cambridge to Brantford Corridor study traffic impacts on the Highway 401; • HOV lanes are being considered as an alternative for the improvements to Highway 401 within the study area. Bus by-pass shoulders are a municipal initiative and their inclusion would require cost-sharing with MTO for any additional engineering, construction, and property costs; • The Highway 401 Project Team is aware of the Region of Waterloo's Rapid Transit EA and approved Bud-Rapid transit route, and the Ministry has recommended that the Region meet with MTO to discuss these initiatives directly as they relate to the study; and The Region of Waterloo is encouraged to attend the first round of PICs to provide input and comments.
Region of Waterloo	Prior to PIC 2, the Project Team met with Region of Waterloo staff on November 15, 2011, to provide an update on the status of the study, and review the alternatives considered, analysis and evaluation undertaken, and the preferred plan.	
Region of Waterloo, Planning, Housing and Community Services Contact: Geoffrey Keyworth P.Eng, MCIP, RPP, Senior Transportation Planning Engineer	Email received Jan. 3, 2012 • Requested to be added to the mailing list; • Requested contact information for MTO Project Manager; and • Indicated that The Region of Waterloo would submit comments after Jan. 31, 2012.	• Updated mailing list. • Provided contact details for Roger Ward. In an email response January 9, 2012, it was noted that comments will be accepted at any time during the study.
	Email received Jan. 12, 2012: • Inquired about forecast traffic volumes in the study area considering that the preferred plan is to widen Highway 401 to 10 lanes; and • Asked the Project Team if they had a graphic display of the existing and projected Annual Average Daily Traffic in the study area. Email received Jan. 13, 2012: • Provided draft report to Council for Project Team review.	In email response on January 16, 2012, the Project Team agreed with the findings of the draft report to Regional Council.
Region of Waterloo Office of the Regional Clerk	Letter received from Mike Grivicic, Council/Committee Support Speciality – Feb 13, 2012: • Endorsement of the protection of the Highway 401 Corridor to accommodate eight lanes and two HOV lanes; • Encouraged the consideration of increased passenger rail service;	• Comments noted. • Go Transit/Metrolinx is considering new/increased services to the Region of Waterloo. • MTO continues to work the City of Cambridge and Region of

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Contact: Questions: Geoffrey Keyworth, Transportation Planning Engineer, Written Responses: Kris Gletcher, Director, Council & Administrative Services/Regional Clerk	• Advised of ongoing commitment to work with MTO and the City of Cambridge to identify appropriate pedestrian and cyclist crossing provisions for the Hespeler Road and Franklin Boulevard Interchanges, and cost sharing agreement to implement these measures as soon as possible; and • Encouraged MTO to consider modifications to the Townline Road Interchange and carpool lot to accommodate Inter-regional bus operators.	Waterloo regarding active transportation provisions.
City of Cambridge Planning Services – Planning Operations Contact: Jim Kirchin,, Director of Planning Operations	Fax-back received July 27, 2009, indicating: • Planning Operations Department wish to participate in the project; and • Add to study mailing list and forward relevant information.	• Updated mailing list. • City of Cambridge Planning Services - Planning Operations will receive future notices and study information.
City of Cambridge Transportation and Public Works Department Contact: Cathy Robertson, P.Eng., Director of Engineering Services	Fax-back received July 15, 2009, indicating that the Transportation and Public Works Department wish to participate in the project.	• City of Cambridge will be kept informed throughout the study process.
	In a phone conversation between G. Moore (Ecoplans) and C. Robertson on August 13, 2009, the following was noted: • The City would like to meet to discuss the project, and suggested that the meeting occur with the Region of Waterloo and the City at the same time as both municipalities would likely have similar issues and questions; • Ecoplans noted that they had contacted the Region to schedule a meeting; and • Ms. Robertson will be the main contact from the City and will coordinate who should attend the meeting (i.e. representatives from the City Transportation Planning and Planning Operations groups).	• A meeting was held between the Project Team and the Region of Waterloo/City of Cambridge to discuss the study on November 19, 2009.
City of Cambridge Cambridge Environmental Advisory Committee Contact: c/o April Souwand (Staff Liaison) City of Cambridge, Planning Services Dept.	Fax-back received July 14, 2009, indicating : • The Cambridge Environmental Advisory Committee wish to participate; and • Forward any information about upcoming PICs to the staff liaison.	• Cambridge Environmental Advisory Committee will be kept informed throughout the study process.
City of Cambridge Community Services Department Contact: Alex Koch, Co-ordinator of Design and Development	Fax-back and letter received August 7, 2009, advising: • The Community Services Department wishes to participate in the Project and would like to be informed of future notices of any public meetings and of any public documents with respect to the study for review and input; • Would appreciate the opportunity to be circulated with and review more detailed plans to provide detailed comments at a future date; • Will only provide comments from the Community Services Department and not other City	In a letter dated November 18, 2009, the following was noted: • Contact will be maintained with the City of Cambridge throughout the study process; • The items of concern raised in the letter dated August 7, 2009, related to Riverside Park are outside of the project limits; • The Project Team is aware of the Pedestrian and Cyclist Bridge Feasibility Study undertaken by the City and has a staff member

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	Departments; • The City has a boardwalk/trail on the east side of the Speed River, under the Highway 401 bridge – future plans should allow for its continuation; • Would like future Highway 401 interchanges and/or structure improvements /replacements to consider provisions for pedestrians and cyclists within the City boundary; • The City is currently undertaking a Highway 401 Pedestrian and Cyclist Bridge Feasibility Study between Franklin Blvd. and Hespeler Rd. – the MTO study should take any Feasibility Study findings/recommendations into consideration; • The City's largest and most used park, Riverside Park, abuts Highway 401 and future plans should be aware of and take into account the following with respect to any potential issues and impacts to the park: - Potential for storm water drainage impacts - Highway 401 noise levels at adjacent sports fields - Stress to trees, as well as salt spray damage - Concern with any park property loss related to future highway plans - General safety concerns with any increase in traffic volumes and/or widening which may bring the road closer to the park and which may increase the potential of high speed vehicle accidents entering the park - Spill over lighting – vehicle lights on the highway impacting the park, and lit sports fields impacting vehicles - The City leases an office building to the Kin Canada Association of Kinsmen and Kinettes, which is situated in the park near Highway 401 – request that they be circulated the Notice of Study Commencement.	on the Project Team. The progress of the study will continue to be monitored; • Active transportation improvements or other requested municipal improvements to the crossing roads in addition to the replacement of existing infrastructure are municipal initiatives and would be subject to a cost sharing agreement. If the municipality would like improvements considered for any of the road plans they are requested to advise the Project Team early in the study process; and • The City of Cambridge is encouraged to attend one of the PICs and provide their views and comments.
City of Cambridge	Prior to PIC 2, the Project Team met with City of Cambridge staff on November 15, 2011, to provide an update on the status of the study, and review the alternatives considered, analysis and evaluation undertaken, and the preferred plan.	
Township of Puslinch Contact: Brenda Law, CAO/Clerk – Treasurer	Fax-back received July 15, 2009, noting: • Township of Puslinch wish to participate; and • The Township does not have any particular concerns at the present time, other than any impacts the study may have with respect to the lands and roads within the Township.	• In a letter dated November 18, 2009, the Township of Puslinch was encouraged to attend one of the PICs and provide their views and comments to be considered as the study progresses.
	In a phone conversation between G. Moore (Ecoplans) and B. Law on August 13, 2009, the following was noted: • The Township would like to meet to discuss the project, and it was suggested that the meeting occur with both the County and the Township; • The Project Team would like to provide an opportunity for municipal staff to provide input; • The need to proceed with a presentation to Council would be determined after meeting with staff,	• A meeting was held between the Project Team and the County of Wellington/Township of Puslinch to discuss the study on November 9, 2009.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	with any presentation to Council occurring closer to the PICs; • The Township noted that Project Team for the Highway 24 Corridor Study only presented to County Council; and • Ms. Law advised that she will be the main contact and she will coordinate who should attend from the Township (i.e. Public Works and the Fire Chief).	
	In a letter dated December 18, 2009, the following was noted: • The Township council reviewed ad discussed the proposed improvements to Highway 401 at their meeting December 16, 2009; • The council is concerned about the possible loss of sidewalks and would like upgraded facilities for cyclist and accessibility needs; and • The Township will submit recommendations to the MTO that will take into account the need to continue pedestrian access across Wellington Road 36 and Victoria Road South.	• MTO takes the safety of pedestrians and cyclists very seriously. At the proposed bridge replacements and/or rehabilitations, MTO will reinstate the existing pedestrian and cycling facilities on the structures. It is noted that pedestrian and cycling facilities (i.e. sidewalks, designated cycling lanes) do not currently exist at the overpass at Wellington Road #36 and Victoria Road South. • MTO will work with the Township of Puslinch to determine their requirements for bicycle and pedestrian access at these locations so that these can be incorporated into the reconstruction plans for the interchanges and bridges. • Constructing and funding new sidewalks and bicycles lanes approaching the bridges and widening any new bridges for sidewalks and bicycle lanes or building a separate bridge for pedestrians/cyclists on roads under Township jurisdiction would be a Township responsibility.
	Letter received August 19, 2011, requesting the following information: • How the data from the Travel Pattern Survey will be used; • How many surveys were distributed; and • Survey return rate.	In a letter dated August 31, 2011, the following was noted: • The MTO conducted a Travel Pattern Survey in the vicinity of Highway 401 and Highway 6, to obtain origin-destination information that will be combined with data from the Ministry's Greater Golden Horseshow travel demand model and used to determine: - the optimal alignment for the proposed replacement of the existing Highway 6 South/Brock Road Interchange structure; - The lane configurations on Highway 401 between the Hanlon Expressway and the proposed Highway 6 Interchange. • Approximately 7000 surveys were distributed to motorists, and the return rate was approximately 16%. A copy of the survey results can be provided to the Township once completed.
Township of Puslinch	Prior to PIC 2, the Project Team met with Region of Waterloo staff on November 15, 2011, to provide an update on the status of the study, and review the alternatives considered, analysis and evaluation undertaken, and the preferred plan.	

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Elected Officials		
Susan Fielding, Councillor Township of Puslinch	In a comment sheet provided at PIC #1, December 3, 2009, Councillor Fielding indicated: • Projects on municipal arterial/local roads should proceed prior to construction activities on Highway 401; and • Highway 6 Realignment, from Freelton north to Guelph – it is imperative that this be done first, as congestion on Highway 6 is bad and will be worse if Highway 401 is impacted due to construction activities.	• Comments noted. • The Highway 6 (New) improvements are being prioritized among all Provincial/Regional projects. It is not possible to provide construction timing at this point.
Wayne Stokley, Councillor, Township of Puslinch	Email comments re: PIC #2, December 28, 2011: • Noted that pedestrian walkways and bicycle paths should be added to the plans for Highway 401 crossing structures to connect with potential future off road trails (currently being studied by The Active Transportation Committee). It was suggested that facilities to accommodate active transportation would increase safety and allow Puslinch residents to reclaim their rural heritage. • Indicated that construction of the Highway 401 improvements would be cost effective if completed in conjunction with the Highway 6 by-pass of Morriston.	• Updated mailing list • MTO is supportive of active transportation measures and takes the safety of pedestrians and cyclists very seriously. At the proposed bridge replacements within the Highway 401 study area, MTO will reinstate the existing pedestrian/bicycle provisions on structures. MTO is working with the municipalities to determine their future requirements for bicycle/pedestrian facilities. • Constructing and funding new sidewalks and bicycles lanes approaching the bridge, widening any new bridges for sidewalk and bicycle lanes, or building a separate bridge for pedestrians and cyclists, is a municipal responsibility. • The preferred Highway 401 improvement plan between the Hanlon Expressway and Highway 6 South/Brock Road includes the EA approved alignment and modifications to the Hanlon Expressway and Highway 6 South/Brock Road interchanges. Any changes to the Highway 6 EA approved configuration that are impacted or require revision by a widened Highway 401 would require EA approval as part of this current study. Both the Highway 6 (New) and Highway 401 studies will be prioritized among all Provincial and Regional projects, therefore it is not possible to provide a construction timing at this point.
First Nations		
Association of Iroquois and Allied Indians Contact: Grand Chief Randall Phillips	In a faxed letter to MTO dated July 22, 2009, the Association of Iroquois and Allied Indians provided comments, including: • The AIAI organization is not mandated to consult on behalf of member nations; • Involvement as a representative for the First Nations occurs when invited by one of the member First Nations to do so; • Consultation should always occur with the First Nation(s) specifically impacted; • The AIAI and Member Nations are usually open to participating in sustainable planning processes. However, current federal and provincial practices in this policy area are left to the	• Comments noted. • No First Nations communities within or adjacent to the study area. • The following First Nations communities have been contacted: - Association of Iroquois and Allied Indians; - Six Nations of the Grand River Territory; and - Mississaugas of the New Credit First Nation.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	goodwill of proponents, in terms of collaborating with First Nations, and in identifying potential First Nation issues and incorporating these into the overall planning processes; and • Based on archaeological finds, it may be necessary to consult with other First Nations that have not been presently identified by the Ministry of the Environment or the Ontario Aboriginal Affairs Secretariat. First Nations that currently reside in the Province of Quebec may also have an interest in projects located in Ontario.	
Conservation Authorities		
Conservation Halton Contact: Kellie McCormack, Environmental Planner	Fax-back received July 24, 2009, noting: • Conservation Halton wish to participate; • Key interests relate to: - Natural Hazards; - Natural Heritage; - Stormwater Management; and - Fisheries etc.	In a letter dated November 18, 2009, the following was noted: • As part of the study MRC and Ecoplans are undertaking a number of environmental field investigations to identify existing environmental conditions and determine potential environmental impacts and proposed mitigation measures; • Ecoplans staff have contacted Conservation Halton, the Grand River Conservation Authority and the Ministry of Natural Resources to obtain necessary background information; • Preliminary widening and interchange improvement alternatives will be assessed and evaluated based on a number of different criteria including the natural environment, social environment, and cultural environment; and • The existing environmental conditions and alternatives under consideration will be presented at the first round of PICs. Conservation Halton is encouraged to attend and provide their views and comments.
	Email received Dec. 2, 2011: • Noted that Conservation Halton would be unable to attend PIC #2. • Request for a copy of PIC #2 displays and handout. • Inquired about whether a TAC was formed for the project (if so, Conservation Halton would like to participate).	Email response Dec. 2, 2011: • Provided the project website address where all of the PIC #2 materials are available. • Confirmed that a TAC will not be formed as part of this project.
	Telephone conversation with MRC Jan 12, 2012: • Indicated that Conservation Halton would provide written comments on issues applicable to their watershed area. Key points would likely be about appropriate mitigation measures. • Noted that Conservation Halton supports the preferred plan for the Wellington 36 underpass which maintains the existing alignment. • Indicated that the wetlands/woodlots in the vicinity of Brock Rd/Hwy 6 South may be part of the GRCA area.	In a letter dated September 17, 2012, the following was noted: • In addition to the impacts associated with the factors noted by Conservation Halton, Alternative WR36-2 is not preferred due to the significant length of new road alignment, amount of impacted agricultural lands, and the poor visibility/sight distance conditions on the structure and at adjacent intersections. Opportunities to avoid and/or mitigate impacts to the tributary to Bronte Creek, and other watercourses/ drainage features will be examined as part of the future detail design phase.
	Letter dated February 21, 2012 with PIC#2 comments:	

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
	• Recommended that Natural Environment, Socio-Economic Environment, and Construction impacts be considered for alternative WR36-2 in the ESR with regard to Bronte Creek; • Recommended the rationale behind the variety of median widths in the various alternative be documented; • Inquired about why wider medians are required for HOV lanes; • Noted that there is an opportunity to improve habitat connectivity as part of the Watson Road replacement, and recommended that this opportunity be examined in the forthcoming ESR; • Noted that Mountsberg Creek (Badenoch Creek), located in the study area contains an active population of Brook Trout, a species considered to be highly sensitive to disturbance. Recommended that they culvert that conveys the Moutnsberg Creek under Highway 401 be replaced with an open bottom culvert that will facilitate fish passage and allow for groundwater-surface water interactions. The width of the new culvert should be enlarged over the existing crossing to permit more light and encourage fish passage; • Recommended the replacement of culverts rather than extensions of existing culverts, and open bottom structures that span a minimum of the bankfull channel width or watercourse; • Suggested a desktop analysis of existing fish community, thermal surface water regimes and benthic invertebrate monitoring would be of benefit to the ESR. Contact information for Andrea Dunn, Monitoring Ecologist was provided; and • Recommended surface water temperature monitoring in affected creeks to determine the thermal status and that the stormwater infrastructure be designed to meet thermal targets.	• A median width of 9.3 m is desirable to provide adequate shoulder width to accommodate OPP enforcement activities. • Opportunities to improve wildlife habitat connectivity as part of the Watson Road structure replacement are not being examined. Other than very tolerant species, wildlife passage through existing culverts is not expected nor encouraged given the length of culverts. • Based on collision analysis, the location of animal related collisions is distributed evenly across the entire study area. Collisions appear to be correlated more to poor visibility than to specific adjacent features. • Reptile exclusionary fencing is being considered on the west and east side of Mountsberg Creek (culvert 34). This may reduce road mortalities associated with the Badenoch-Moffat Wetland PSW Complex. Limited opportunities to provide improved wildlife connectivity may be feasible at the Mountsberg Creek crossing. • The Project Team is examining the possibility of replacing the existing triple-cell culvert at Mountsberg Creek with a single-span bridge in order to accommodate hydraulic requirements. The structure would span the bankfull width. Should a single-span bridge be recommended, it would provide the additional benefits of groundwater-surface water interactions, increase the "openness ratio" for light passage, as well as wildlife crossing opportunities. • Opportunities to replace existing culverts instead of extending them are being considered based on their current structural condition and their ability to meet hydraulic requirements. Opportunities to provide environmental benefits using open bottom structures that span a minimum of the bankfull width will be considered and evaluated in detail design. • Desktop Analysis, fish surveys and spawning surveys (trout streams) were completed between 2009 and 2010 by Ecoplans. This information will fill in any data gaps in the information provided by CH and MNR to the Project Team. • Benthic invertebrate monitoring samples are not being proposed. Opportunities to undertake these during the future detail design phase may be considered. • At this time, surface water temperature monitoring is not being considered since the proposed stormwater management strategy may consist solely of grassed swales. This will be reviewed in the detail design phase

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Conservation Halton Contact: Kim Peters, Environmental Planner	Letter received by mail and email January 26, 2010, providing additional information to assist in the study process as a follow-up to PIC #1. Information provided regarding: • Ontario Regulation 162/06; • Natural Heritage; • Fish Habitat; and • Stormwater Management/Drainage.	• Comments noted. • CH staff provided opportunity to review EA alternatives. • The preferred Highway 401 widening alterative will not impact access to Mountsberg CA and Reservoir. • The preferred Highway 401 widening alternative is not anticipated to require property for Conservation Halton.
Grand River Conservation Authority Contact: Liz Yerex, Resource Planner	Fax-back received July 15, 2009, indicating: • GRCA wish to participate; • GRCA has background information available regarding wetlands/floodplains; and • Key issues relate to natural heritage and natural hazards.	In a letter dated November 18, 2009, the following was noted: • As part of the study MRC and Ecoplans are undertaking a number of environmental field investigations to identify existing environmental conditions and determine potential environmental impacts and proposed mitigation measures; • Ecoplans staff have contacted Conservation Halton, the Grand River Conservation Authority and the Ministry of Natural Resources to obtain necessary background information; • Preliminary widening and interchange improvement alternatives will be assessed and evaluated based on a number of different criteria including the natural environment, social environment, and cultural environment; and • The existing environmental conditions and alternatives under consideration will be presented for review at the first round of PICs, and the GRCA is encouraged to attend and provide their views and comments.
Emergency Services		
Cambridge Fire Department Contact: Bill Chesney, Deputy of Administration	Fax-back received July 20, 2009, indicating: • Cambridge Fire Department wish to participate; and • Key interests relate to traffic flow and access.	• Comments noted. • Cambridge Fire Department will be kept informed throughout the study process.
Ontario Provincial Police – Highway Safety Division, Cambridge Detachment Contact: John Mraud, S/Sgt – Detachment Commander	Fax-back received July 15, 2009, indicating: • Cambridge OPP do not wish to participate; • Request that the final results of the EA be forwarded to the Detachment; and • Should police assistance be required, please advise.	• Removed from contact list. • Notice of completion will be forwarded to the Detachment.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Utilities		
Cambridge and North Dumfries Hydro Inc., Engineering Department Contact: Ron Sinclair, P.Eng., Director of Engineering	Fax-back received July 21, 2009, indicating: • Cambridge and North Dumfries Hydro Inc. do not wish to participate; and • Would like to receive the notifications of PICs and the future TESR.	• Comments noted on contact list. • Cambridge and North Dumfries will be notified of PICs and TESR filing.
Enbridge Gas Distribution Inc. P.O. Box 650 Scarborough, ON M1K 5E3 Contact: Bill Coldicott, Manager - Land Services Jim Arnott, Manager – Drafting Administration	Email and letter received August 20, 2009, indicating: • Study limits are outside of the Enbridge Gas service area.	• Comments noted. • Removed from Contact List.
Township of Puslinch Contact: Brenda Law, CAO/Clerk – Treasurer	Email received August 20, 2009 advising: • Hydro One easement and right-of-way along Highway 401; • Union Gas and Bell Canada lines also present; and • Union Gas is currently expanding pipe service at Highway 401 and Wellington Road 35.	• Comments noted.
Union Gas Ltd. Contact: Kevin Schimus, Construction Projects Coordinator – Construction and Growth, Waterloo-Brantford District	Email received August 27, 2009 advising of Union Gas crossings at the following locations within the project limits (for information and pre-engineering purposes): • Highway 401 Crossing - Hespeler Rd (NPS 8 Steel inside steel casing - 60 PSI Distribution gasmain installed 1959). • Highway 401 Crossing – Franklin Blvd (NPS 6 Steel - 60 PSI Distribution gasmain installed 1971). • Highway 401 Crossing - Wellington Rd 35 (NPS 12 Steel - 700 PSI Transmission gasmain installed 2009). • Highway 401 Crossing – Approximately 450m East of Wellington Rd 35 (NPS 10 Steel inside steel casing - 700 PSI Transmission gasmain installed 1957). • Highway 401 Crossing – Wellington Rd 46 (NPS 6 Steel inside steel casing – 60 PSI Distribution gasmain installed in 1989). • Please note all these gas mains are major feeder lines.	• Comments and information noted. • Union Gas to be kept informed at key milestones as the study progresses.

AGENCY / PARTICIPANT	COMMENTS RECEIVED	ACTION TAKEN / RESPONSE
Atria Networks Contact: Todd Kramp Construction Coordinator	Email received September 11, 2009 advising that Atria Networks Fibre is located at the following locations that cross Highway 401: • Highway 6 South; • On Wellington Road 36 and crosses Highway 401 at Victoria Road; • Townline Road; • East of the on-ramp at Hespeler Road; and • The above plants are all located on the local utility hydro poles.	• Comments noted. • Atria Networks to be kept informed at key milestones as the study progresses.
Canadian National Railway Contact: John MacTaggart, P.Eng. Senior Engineering Services Officer, Regional Engineering/Engineering Services	Letter received December 2, 2009 noting the following: • CN Railway may have interest in the project and requests to be kept informed regarding any potential impacts to the CN Railway; • Advised that Goderich Exeter Railway (GEXR) operates and maintains the rail line within the Guelph Subdivision, which is within the project area; • Direct any correspondence regarding the project to both CNR and GEXR advising if there will be any potential impacts to either Railway; and • Note that an agreement must be entered into with the affected Railway in order to proceed with the installation of any utility crossing located on railway property.	• Comments and information noted. • CNR to be kept informed at key milestones as the study progresses.
Hydro One Networks Inc. Ontario Power Authority (OPS) Contact: John Sabiston P. Eng. (Hydro One) Manager, Transmission Planning Systems Development Charlene de Boer, (OPA) Planner, Power Systems Planning	Written Comment Provided at PIC #2 (Cambridge) Dec. 6th, 2011: • Indicated that Hydro One and OPA are conducting a study to determine the long-term electrical needs of the Kitchener/Waterloo/Cambridge/Guelph area. • Noted that one alternative is to develop a new transmission line parallel to Highway 401. • Requested a meeting with the Project Team to discuss opportunities for co-operation and possible joint transportation – electric power transmission corridor. Meeting minutes were emailed to the Project Team Jan. 26, 2012.	• Mailing list updated. • A meeting was held Jan. 20, 2012 to discuss potential opportunities for collaboration between the Project Teams for the OPA study and Highway 401 Improvements. • The preferred plan for the Hespeler Road interchange was emailed to Hydro One January 23, 2012.
School Boards		
Wellington Catholic District School Board Contact: Dan Duszczyszyn, Superintendent of Corporate Affairs	Fax-back received July 17, 2009, indicating that the Wellington Catholic District School Board does not wish to participate.	Removed from contact list.

6.2 First Nations Engagement

First Nation communities, as well as related organizations and government agencies, were contacted by the Project Team at key milestones throughout the study process.

The First Nations, and related organizations and government agencies that were contacted during the study include:

- Association of Iroquois and Allied Indians;
- Six Nations of the Grand River Territory;
- Mississaugas of the New Credit First Nation;
- Ministry of Aboriginal Affairs, Aboriginal and Ministry Relationships Branch; and
- Aboriginal Affairs and Northern Development (formerly INAC), Environmental Unit.

Association of Iroquois and Allied Indians, Six Nations of the Grand River Territory, and Mississaugas of the New Credit First Nation were contacted by letter from MTO near the start of the study and prior to both rounds of PICs. MTO will send a third letter to each of these First Nation communities to inform of the completion of the study, provide a summary of the improvements and impacts, and to offer a copy of the Stage 1 Archaeological Study or other reports if desired. MTO also indicated that they would be willing to meet and/or further discuss the study with the First Nation communities.

Newspapers notices advertising Study Commencement and each round of PICs were published in the Tekawennake and Turtle Island News as discussed in the following section.

During the study, comments were received from Aboriginal Affairs and Northern Development Canada (formerly INAC) as well as the Association of Iroquois and Allied Indians. Their comments and the actions taken/responses provided by the Project Team are summarized previously in **Exhibit 6-2**.

MTO will continue to engage the First Nation communities in subsequent design stages of the study.

6.3 Consultation with Property Owners and the Public

Consultation with adjacent property owners and the public is highlighted in **Exhibit 6-3** and described in this section.

The Notice of Study Commencement was published at the beginning of the study in the following newspapers:

- Cambridge Times – Tuesday July 14, and Friday July 17, 2009;
- Waterloo Region Record – Tuesday July 14, and Saturday July 18, 2009;
- Guelph Mercury – Tuesday July 14, and Saturday July 16, 2009;
- Milton Canadian Champion – Friday July 17, and Wednesday July 22, 2009;
- Turtle Island News – Wednesday July 15, and Wednesday July 22, 2209; and
- Tekawennake – Wednesday July 15, and Wednesday July 22, 2009.

The principles of consultation requiring notification at the beginning of the study and notification to those stakeholders most directly affected are achieved through this notification method. A copy of the Ontario Government Notice is on file with MTO.

A study mailing list was created and updated throughout the study. This list includes:

- Property owners in vicinity to the Highway 401 corridor, from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region boundary; and
- Individuals or interest groups who contacted the Project Team throughout the study, including those who attended the Public Information Centres (PICs).

Two rounds of Public Information Centres (PICs) were held during the study to ensure that the consultation plan provided timely, user-friendly opportunities for input by the public. PICs are informal meetings where area residents and other interested parties are provided the opportunity to review planning and design plans and discuss the project with the project team. PICs are part of the overall consultation program for this project and designed to involve stakeholders early and throughout the study to identify public concerns and assist in the selection of the preferred plan. The PIC also addresses the overall consultation principles identified in Chapter 5 of the Class Environmental Assessment for Provincial Transportation Facilities. The PICs that were held are discussed in greater detail in the following subsections.

6.3.1 Public Information Centre #1

The first round of Public Information Centres (PICs) was held:

- Tuesday, December 1, 2009, at the Speed River Community Hall (Knights of Columbus), located at 333 Speedsville Road in Cambridge; and
- Thursday, December 3, 2009, at the Puslinch Community Centre, located at 29 Brock Road South in Aberfoyle.

Two sessions were held at each PIC:

- A preview session for external agencies, municipalities, and First Nations was held from 3:00 p.m. to 4:00 p.m; and
- Local property owners and the general public were invited to attend from 4:00 p.m. to 8:00 p.m.

MTO representatives along with their consultant were available to answer questions and discuss any aspect of the study. The purpose of the PIC was to provide an opportunity for interested stakeholders, including municipal and external agency representatives, First Nations, local residents, business owners and the public, to review and provide input on:

- The study need, process, and justification;
- The background of the study;
- The environmental constraints and sensitivities in the study area;
- The planning alternatives considered;
- The preliminary design alternatives for the Highway 401 widening;
- The preliminary design alternatives for interchange improvements;
- The criteria that will be used to evaluate the preliminary design alternatives;
- The key environmental considerations; and
- The anticipated next steps in the study.

The "Notice of Public Information Centre #1 (Ontario Government Notice)" was advertised in the following newspapers:

- Waterloo Region Record – Tuesday November 17, 2009 and Saturday November 28, 2009;
- Cambridge Times – Tuesday November 17, 2009 and Saturday November 28, 2009;
- Guelph Mercury – Tuesday November 17, 2009 and Saturday November 28, 2009;
- Milton Champion – Wednesday November 18, 2009 and Friday November 27, 2009;
- Turtle Island News – Wednesday November 18, 2009 and Wednesday November 25, 2009; and
- Tekawennake – Wednesday November 18, 2009 and Wednesday November 25, 2009.

The Ontario Government Notice and the PIC #1 Summary Report are on file with MTO.

A PIC notification letter was distributed to all representatives on the External Agencies List (see **Section 6.1**) to invite them to the preview session arranged for the hour prior to the public session at the PIC. The notification letters were mailed on Wednesday November 18, 2009.

A flyer, which was the same as the newspaper notice, was sent on Wednesday November 18, 2009 by first class mail to each property owner, business, and/or member of the general public on the study mailing list. At the time of this distribution, approximately 475 individual addresses were included on the study mailing list as described in the previous section.

A total of 92 people) signed the register between the two PICs (34 people at Cambridge, and 58 people at Aberfoyle; actual attendance was slightly higher. This total includes those who attended the preview session for external agencies from 3:00 p.m. to 4:00 p.m., and the public sessions from 4:00 p.m. to 8:00 p.m.

Overall there was much support for moving forward with the improvements, and some members of the public stressed the need to start and complete construction as soon as possible. An extensive amount of relevant and valuable information about the study area, preferences for widening and interchange alternatives, and other related concerns were received through discussions with those who attended the PICs.

In total, 28 comment sheets, letters, faxes and emails related to this study had been received as of January 8, 2010.

A detailed summary of the comments received is included in the PIC #1 Summary Report, which is on file with MTO.

The following provides a summary of the most common verbal and written comments received:

<u>Pedestrian and Cycling Facilities</u>

- Inquiries about possible improvements to pedestrian and cyclist access across Highway 401; and
- Suggestion that new bridge structures should have pedestrian and cyclist lanes, especially on the rural roads.

<u>Traffic Operations and Safety at Franklin Boulevard</u>

- Suggestion that the ramps at the Franklin Boulevard interchange be closed to ensure pedestrian and cyclist access and safety across Highway 401. Note that many motorists north of the interchange already use the Townline Road interchange to access Highway 401;
- Support for the buttonhook interchange ramp alternative (#F4) at the Franklin Boulevard interchange that separates the exiting Highway 401 traffic from the Franklin Boulevard traffic; and
- Suggestion that the buttonhook alternative could be used in conjunction with a separate pedestrian/cyclist crossing structure along the west side of the structure, which would not have to cross any ramps.

<u>Impacts to the Natural Environment</u>

- Concerns about impacts to wetlands/agricultural lands that may result from potential new Highway 24 connection to Highway 401 in the Township of Puslinch;
- Concerns about highway noise; including specific concern from residents about noise southwest of the Wellington Road 36 crossing structure;
- Concern about impacts to wildlife;
- Concern that the rural area through which Highway 401 runs is of great environmental sensitivity, being located on moraines which supply the drinking water for large populations in the K-W-C area;
- Concerns about the flooding and overflow from Reids Lake into the highway right-of-way; and
- Noted opportunities for landscaping/tree planting along Highway 401.

<u>Relationship to Other Studies</u>

- GO Transit and other transit initiatives should be implemented prior to highway widening;
- Questions about timelines/coordination of adjacent highway projects, including the Hanlon Expressway improvements and the Highway 6 (New) Bypass;
- Many residents wish to see the Highway 6 Bypass constructed as soon as possible. It was noted that traffic through Morriston is heavily congested and the bypass is needed to alleviate the congestion. There were concerns that the Highway 401 study may further delay the Highway 6 Bypass; and
- Concern about how the Highway 401 Class EA will affect the much larger GTA-West Corridor Individual EA.

<u>Traffic Operations and Safety</u>

- Concerns about restricted sight distances from Highway 401 horizontal curves;
- Suggestion to implement HOV lanes prior to addition of general lanes;
- Support for the widening in general; and
- Concern that widening Highway 401 will further encourage use of highways in place of city streets or public transit.

Other Comments and Inquiries

- Inquires about cost;
- Inquires about property impacts from the highway widening;
- Inquires about the timing of construction. Some would like to see the construction start soon;
- Concerns about the relocation of the carpool parking lot (Highway 6 South/Brock Road Interchange Alternative #H6S3) and environmental impacts and visual intrusion to the residents on Telfer Glen Road in Morriston; and
- Highway 401 Westbound Service Centre – need for larger truck parking area; more protection of Pioneer Ellis Chapel (a heritage/archaeological site located adjacent to the service centre).

6.3.2 Public Information Centre 2

The second round of Public Information Centres (PICs) was held:

- Tuesday, December 6, 2011, at Hespeler Memorial Arena (Beehive Hall), located at 640 Ellis Road West in Cambridge; and
- Thursday, December 8, 2011, at the Puslinch Community Centre, located at 29 Brock Road South in Aberfoyle.

Two sessions were held at each PIC:

- A preview session for external agencies, municipalities, and First Nations was held from 3:00 p.m. to 4:00 pm; and
- Local property owners and the general public were invited to attend from 4:00 p.m. to 8:00 p.m.

MTO representatives along with their consultant were available to answer questions and discuss any aspect of the study. The purpose of the PIC was to provide an opportunity for interested stakeholders, including municipal and external agency representatives, First Nations, local residents, business owners and the public, to review and provide input on:

- Study Need and Justification;
- Existing Conditions;
- Highway 401/Highway 6 Travel Pattern Survey;
- Preferred Widening Alternatives;
- Preferred Interchange Alternatives;
- Potential Environmental Effects and Proposed Mitigation;
- Illumination/Noise/Proposed HOV Lanes; and
- Pedestrian and cycling facilities.

The "Notice of Public Information Centre #2 (Ontario Government Notice)" was advertised in the following newspapers:

- Waterloo Region Record – Tuesday, November 22, 2011 and Saturday, December 3, 2011;
- Cambridge Times – Tuesday, November 22, 2011 and Friday, December 2, 2011;
- Guelph Mercury – Tuesday, November 22, 2011 and Saturday, December 3, 2011;
- Milton Champion – Tuesday, November 22, 2011 and Thursday, December 1, 2011;
- Turtle Island News – Wednesday, November 23, 2011 and Wednesday, November 30, 2011; and
- Tekawennake – Wednesday, November 23, 2011 and Wednesday, November 30, 2011.

The Ontario Government Notice and the PIC #2 Summary Report are on file with MTO.

A PIC notification letter was distributed to all representatives on the External Agencies List (see **Section 6.1**) to invite them to the preview session arranged for the hour prior to the public session at the PIC. The notification letters were mailed on Tuesday November 22, 2011.

A flyer, which was the same as the newspaper notice, was sent on Wednesday November 22, 2011 by first class mail to each property owner, business, and/or member of the general public on the study mailing list. At the time of this distribution, approximately 550 individual addresses were included on the study mailing list.

Individuals and businesses whose properties may be impacted by the preferred alternative were also mailed a letter indicating that the preferred alternative may require partial acquisition of their property. These letters identified the impacted property and included a plan to illustrate the portion of the property that may be required.

A total of 110 people signed the register between the two PICs (53 people at Cambridge, and 57 people at Aberfoyle); actual attendance was slightly higher. This total includes those who attended the preview sessions for external agencies from 3:00 p.m. to 4:00 p.m., and the public sessions from 4:00 p.m. to 8:00 p.m.

Overall, there was much support for moving forward with the improvements, and similar to PIC #1, some members of the public stressed the need to start and complete construction as soon as possible. An extensive amount of relevant and valuable information about the study area and comments regarding the preferred widening and interchange alternatives and other related concerns were received through discussions with those who attended the PICs.

In total, 39 comment sheets, letters, faxes and emails related to this study were received in response to PIC #2.

A detailed summary of the verbal and written comments are provided in the PIC #2 Summary Report, which is on file with MTO.

The following provides a summary of the most common verbal and written comments received:

Pedestrian and Cycling Facilities

- Requests for more bicycle and pedestrian paths;
- Concerns about the location of a potential pedestrian overpass shown on the PIC display boards. Several individuals indicated that the City of Cambridge and Region of Waterloo's Highway 401 Pedestrian and Cycling Bridge Feasibility Study recommended a bridge adjacent to Franklin Boulevard, whereas the potential pedestrian overpass presented at the PIC was situated closer to Hespeler Road;
- Suggestion that a pedestrian/cycling overpass should be a high priority and built immediately (prior to improvements to Highway 401); and
- Request for provisions for pedestrians at Brock Road and the Aberfoyle GO Park and Ride.

Traffic Operations and Safety at Franklin Boulevard

- Request for a full interchange at Franklin Boulevard, and specifically, a N-E ramp for motorists wanting to go eastbound on Highway 401;
- Expression of understanding that the button hook alternative at the Franklin Boulevard interchange will not operate satisfactorily at the Franklin Boulevard/Pinebush intersection; and
- Request to build eastbound on-ramp at Franklin Boulevard.

Impacts to the Natural Environment

- Concerns about increased noise as a result of highway expansion and suggestion that noise from Highway 401 is stressful to livestock and bees at adjacent property;
- Inquiries about the use of noise mitigation. Suggestions for the use of sound barriers to minimize noise impacts on nearby residents; concern that noise mitigation is not proposed in rural areas since it is not economically feasible;
- Concerns about groundwater impacts at adjacent water wells;
- Drainage concerns at existing highway culverts (concern that culverts are being blocked by sand from the highway). Concern about flooding of fields as a result of highway expansion;
- Inquiries about impacts to wetlands;
- Question about effects on the Paris Moraine Aquifer, concern that there have been no changes to proposed alternatives since this issue was raised at PIC # 1;
- Concerns about damage or destruction of Mill Creek and McCrimmon Creek as a result of the proposed improvements and the construction process;
- Request for a fence to prevent deer from crossing Highway 401 between Hespeler Road and Wellington Road 35; and
- Concerns about air quality and climate change impacts.

Relationship to Other Studies

- Inquiries about adjacent studies;
- Suggestion that this project should not delay the Highway 6 realignment in Morriston;
- Inquiries about improvements at Brock Road integrating with the Highway 6 South bypass; and
- Concern about the distance between new Highway 6 alignments in Morriston and residential property lines.

Traffic Operations and Safety

- Support for the future expansion;
- Inquiries about the operations of HOV lanes and support for the addition of HOV lanes;
- Concern about the roundabout becoming too "saturated" with cars during periods of heavy traffic;
- Concern about collisions in the roundabout and potential congestion that could result from collisions;
- Question about the need for continuous auxiliary lanes between the Hanlon Expressway and Highway 6 South; comment noted that this looks like unnecessary land requirements and needless expense; and
- Suggestion to re-consider the alignment of the replacement bridge at Victoria Road to reconnect Victoria Road across Highway 401 and eliminate difficult turns. It was understood that a new alignment might impact a residential property, but a request was made for the consideration of an alternate alignment with minimal property impacts.

Other Comments and Inquiries

- Inquiries about cost;
- Inquiries about the timing of construction. Some would like to see construction start soon;
- Suggestion to consider incentives to get people to move closer to work;
- Multiple requests for the consideration of high speed rail within the Highway 401 corridor. Suggestion that the provision of rail transit is a better long term solution than HOV lanes; Indication of the need to expand rail traffic to Kitchener and Cambridge;
- Suggestion that south service roads should be considered within Cambridge to keep local traffic off Highway 401;
- Concerns about highway expansion impacting a proposed development on the north side of the highway in Cambridge;
- Concern over high volumes of traffic on Wellington Road 36 and Victoria Road;
- Concerns about the property impacts at Brock Road across from expanded carpool lot;
- Concerns about overall property impacts;
- Questions about the effects to Calfass Road as a result of the proposed changes; and
- Suggestion that the median between eastbound and westbound lanes within the Highway 401 corridor be used as a location for wind mills.

6.3.3 Integration of External Consultation

The intent of holding Public Information Centres (PICs) for this project was to ensure the public had an opportunity to identify any potential concerns and influence the outcome of the preferred plans as appropriate while also addressing the consultation principles identified in the Class EA document. One of the consultation principles relates to showing how the input received in earlier stages affected the project.

Exhibit 6-3 highlights some of the key concerns and comments provided by the public and how they were addressed throughout the study.

Exhibit 6-3: Summary of Public Comments and Responses

Summary of Key Comments	MTO Response
Questions about the need for Highway 401 improvements and expansion.	Improvements to Highway 401 are being recommended to address existing and future traffic conditions, and to the existing pavement structure conditions, as well as identify the rehabilitation and/or replacement of bridges. The Highway 401 corridor between Hespeler Road and the Wellington County/Halton Region west boundary is currently operating at constrained levels during peak hours and is approaching the operational capacity of the 6-lane freeway. In addition, the existing percentage of trucks ranges from 21% to 30%. The traffic forecasts indicate that the travel demand will exceed the existing capacity of the Highway 401 corridor and that by the year 2031, 10 lanes will be required to accommodate those demands. The existing pavement structure is nearing the end of its service life and is not capable of handling the future traffic volumes. Considering the age of the existing concrete underneath some of the asphalt, combined with the need to expand the highway, it is preferable to reconstruct the existing lanes at the time of expansion. There are 16 structures within the study limits. These include 10 underpasses, one railway overpass and 5 large concrete culverts. Nearly all of the existing structures were constructed between 40 and 50 years ago and now require extensive rehabilitation. All of the bridges, except the Townline Road underpass constructed in 2004, are not long enough to accommodate a widened Highway 401 and replacement should be considered in place of rehabilitation. New bridges would be designed with a 75 year service life.
Suggestion that transit (in particular, high speed rail), be considered as part of, or as an alternative to, this project.	Future traffic forecasts include the most recent land use allocations from the Province's Places to Grow initiative and the reduction in vehicle trips based on the planned long-term GO Transit expansions to the Region of Waterloo along the Georgetown and Milton GO Train service corridors. Expansion of Highway 401 is also required to accommodate the high percentage of heavy trucks that use Highway 401 for interregional and international movements of goods. Expanding just rail and transit service is not expected to fully accommodate future capacity needs and will not address future structural and pavement needs.
Questions about the relationship between the proposed Highway 401 improvements and other related studies. Concern that this study is not being conducted in cooperation with other transportation initiatives. Concern that this project may delay the improvements to the Highway 6 South (EA Approved 2009, WP 65-76-05).	MTO has been working in consultation with the County of Wellington, Region of Waterloo, Township of Puslinch and City of Cambridge throughout the study process and has considered input from them in the identification and analysis of the preferred plan. MTO will continue to work with the municipalities as the study progresses. There are a number of related studies being undertaken within and or near the study limits of this Preliminary Design Study. This includes the Highway 6 (New) Freelton to Guelph study, Highway 7 (New) Kitchener to Guelph, and Highway 401 Widening from Regional Road 8 to Hespeler Road. As part of the staged implementation of rapid transit initiatives in the Region of Waterloo, bus by-pass shoulders will be provided on the Highway 401 shoulder west of the Hespeler Road interchange. This is a separate municipal initiative from the current Highway 401 study, however the results of that initiative will be considered as part of the potential improvements at the Highway 401 and Hespeler Road interchange and will be carried forward as part of the improvements in that area if they are implemented by the municipality. The Southern Highways Program (SHP) presents the most recent annual update of the five-year construction program for Southern Ontario highways, keeping Ontarians apprised of where and when highways will be improved. The SHP is published annually to provide a clear understanding of where and how tax dollars are being spent. The SHP lists all major highway projects already under construction or starting this year. The program also provides a five-year outlook for planned projects. With respect to coordination with the other studies being undertaken in the area, the following is noted: *GTA West EA Study* The GTA West EA Study is considering many alternatives and some of them include Highway 401 widening between Milton and Guelph. The Highway 401 project team is also considering a widened Highway 401 from the Hanlon Expressway to the Wellington County/Halton Region boundary. Consultation between the two Project Teams is ongoing and the two teams will coordinate the analysis/evaluation and the selection of the preferred widening alternative for Highway 401 between the Hanlon Expressway and the Wellington County/Halton Region Boundary.

Summary of Key Comments	MTO Response
	Highway 6 Bypass of Morriston The Highway 6 EA Study received EA approval in early 2009 and involves a new alignment of Highway 6 from Freelton to the Hanlon Expressway. A portion of this new alignment parallels the Highway 401 corridor from just east of 7th Concession to the Hanlon Expressway. The widening alternatives for Highway 401 between the Hanlon Expressway and Highway 6 South/Brock Road include the EA approved alignment and new alternatives. The interchange alternatives for the Hanlon Expressway and Highway 6 South/Brock Road include the EA approved interchange designs and new alternatives. An analysis/evaluation of the EA approved alignment of Highway 6 and the new alternatives will be carried out to determine the preferred plan. Any changes to the Highway 6 EA approved configuration that are impacted or require revision by a widened Highway 401 would require EA approval as part of this current study. With respect to the Highway 6 (New) Freelton to Guelph study, the Environmental Assessment is approved and is currently in the initial detail design phase. *Brantford to Cambridge Transportation Corridor Individual EA Study* The MTO initiated an Individual Environmental Assessment (EA) study under the Environmental Assessment Act to address the long-term needs and opportunities (to 2031) relative to the inter-regional movement of people and goods in the Brantford to Cambridge area. The Brantford to Cambridge Transportation Corridor Individual EA replaces the former Highway 24 Transportation Corridor Class EA Study. On July 17, 2009 the EA Terms of Reference was approved by the Minister of Environment. The Ministry of Transportation is currently assessing its planning priorities and schedule for starting the Individual EA study. The EA Terms of Reference contains an overview of the environmental assessment process, which provides a framework to guide the future EA study. A portion of the Brantford to Cambridge Transportation Corridor analysis area overlaps the project limits of the current Highway 401 study. The east limit of the analysis area is located west of Wellington Road 35.
The proposed Highway 6 (New) improvements are required as soon as possible.	The Highway 6 (New) Freelton to Guelph study received EA approval in early 2009. A portion parallels the Highway 401 corridor from the Hanlon Expressway to just east of the 7th Concession underpass. The preferred Highway 401 improvement plan between the Hanlon Expressway and Highway 6 South/Brock Road includes the EA approved alignment and modifications to the Hanlon Expressway and Highway 6 South/Brock Road interchanges. Any changes to the Highway 6 EA approved configuration that are impacted or require revision by a widened Highway 401 require EA approval as part of this current study. Both the Highway 6 (New) and Highway 401 studies will be prioritized among all Provincial and Regional projects, therefore it is not possible to provide a construction timing at this point.
Comments about project timelines and construction staging.	Once this Preliminary Design Study and Class Environmental Assessment is complete, the project will be prioritized among all Provincial/Regional projects. It is not possible to provide construction timing at this time. For a project of this scope, the work will likely be phased over a number of years.
Concerns about cycling and pedestrian issues including: • The provision of additional cycling and pedestrian facilities; • Safety (especially along Franklin Boulevard); and • Location of a cycling/pedestrian bridge across Highway 401.	MTO is supportive of active transportation measures and will work with municipalities to determine appropriate opportunities to further encourage the use of active modes and methods of travel. MTO takes the safety of pedestrians and cyclists very seriously. MTO participated in the feasibility study undertaken by the Regional Municipality of Waterloo and the City of Cambridge to determine the needs of pedestrians and cyclists crossing over Highway 401. MTO has considered the recommendations of the study in the development of the preferred plan and design of the Franklin Boulevard interchange, and is working with the municipalities to determine their future requirements for bicylce and pedestrian facilities at these locations so that they may be incorporated into the reconstruction of the interchanges and bridges.

Summary of Key Comments	MTO Response
• Request for improved pedestrian facilities at Highway 6 South/Brock Road	However, constructing and funding new sidewalks and bicycles lanes approaching the bridge, additional widening of any new bridges for sidewalk and bicycle lanes, or building a separate bridge for pedestrians and cyclists, would be a municipal responsibility. MTO will continue to work with the City of Cambridge and the Region of Waterloo regarding provisions for pedestrian and cyclists. The exact location of any future pedestrian crossing will be determined through a further municipal led EA study.
Concerns about noise, and suggestion that sound barriers be installed to reduce the impacts of Highway 401 traffic noise on adjacent residential properties.	Provincial noise policy requires that noise impacts be considered when planning highway improvements. For the current Highway 401 study, a noise analysis was conducted. Sound levels were predicted for two situations, one with no highway expansion, and the other assuming the planned improvements were in place. The analysis determined that changes greater than 5 dB are not anticipated in any areas. However, absolute sound levels greater than 65 dBA are predicted at some adjacent noise sensitive locations . Noise mitigation at these locations has been investigated, in accordance with the MTO Environmental Guide for Noise requirements. Mitigation has been shown to be both technically and economically feasible at Wayne Avenue southwest of the Franklin Boulevard underpass. A noise barrier is recommended in this area. Noise mitigation measures at other locations predicted to be greater than 65 dBA are not economically feasible and are not recommended.
Concern that Highway 401 expansion will result in increased vehicle emissions. Concern that reduced air quality will lead to negative health impacts for nearby residents.	An air quality assessment was carried out to determine the potential air quality impacts from the proposed improvements to Highway 401. By comparing conditions with and without the highway widening, the air quality assessment determines the potential changes in levels of key volatile organic compounds and selected air contaminants including nitrogen dioxide, carbon monoxide, and particulate matter. The results of the study indicate minor changes resulting from the proposed improvements. Full details will be documented in a subsequent air quality report available for review.
Comments about HOV lanes • Support for the use of HOV lanes in the study area • Suggestion that HOV lanes will not be effective in rural areas	The province has a vision for managing traffic congestion on our highways as user demand continues to grow. This vision includes managing congestion by adding High Occupancy Vehicle (HOV) lanes to many provincial highways to get people and goods to their destinations safely and in less time. HOV lanes benefit not only those who share the ride but all drivers in the following ways: • Managing congestion: Moving more people in fewer vehicles. • Better use of infrastructure: A lane full of buses and carpools can move many more people than a general traffic lane. • Added capacity: Existing carpools and buses move into the new HOV lanes, freeing up space in the general purpose lanes for other vehicles, including trucks. • Air quality benefits: Moving more people in fewer vehicles can lead to reduced vehicle emissions and improved air quality.
Questions and concerns about roundabout operations.	Roundabouts are appropriate for many intersections, including locations experiencing high numbers of collisions, long traffic delays, four or more approaches with relatively balanced traffic flows, and frequent left turn movements. They are an appropriate solution in both urban and rural settings, along busy arterial roadways, as well as at certain highway entrances and exits. With proper design, roundabouts can accommodate the turns and movements of larger vehicles, such as trucks, buses, farm equipment and other large vehicles. A main design feature is a truck apron which provides an area between the circulatory roadway and the central island, over which the rear wheels of these vehicles can safely track. A truck apron is used rather than increasing the normal lane width, which might encourage smaller vehicles to move at higher speeds through the roundabout. Typically, the truck apron is composed of a different material and/or texture than the paved surface, to discourage routine use by smaller vehicles.

Summary of Key Comments	MTO Response
Concern about safety and security in MTO parking lots; suggestion for video surveillance.	The proposed improvements to the existing MTO carpool parking lots at the Highway 401/Townline Road interchange and the Highway 401/Brock Road (Highway 6 South) interchange will primarily include the addition of parking spaces. These unsupervised lots are equipped with lighting to enhance security. OPP is aware of the security concerns at this lot. For all commuter parking lot users, it is good practice to place any valuables in the trunk so they are not visible from the exterior of the vehicle.
Concerns about traffic operations and safety at Franklin Boulevard. Suggestion that Franklin Boulevard interchange be converted to a full interchange, and that existing ramps be closed until interchange improvements can be implemented.	The Region of Waterloo recently completed the Franklin Boulevard Improvements Class Environmental Assessment (EA), which examined improvement opportunities along Franklin Boulevard south of Highway 401, including the Franklin Boulevard and Pinebush Road intersection. The Region plans to construct a roundabout at the Franklin Boulevard and Pinebush Road intersection to improve traffic operations at that location. Proposed works will also include a raised median to prevent left turns as well as reduce weaving between the Highway 401 off-ramp and Pinebush Road.
Concerns about traffic safety and operations with the proposed replacement of the Victoria Road/County Road 36 structure on existing alignment.	Regarding the Wellington Road 36 underpass, opportunities for a new alignment were considered due to the angle of the existing crossing. As presented at the PIC, there are increased bridge costs due to the need for longer spans and the use of steel girders if the existing alignment is maintained. However, when assessed overall as part of the other criteria, the existing alignment remains preferred as it maintains the existing visibility and sight distance conditions, requires significantly less property, and minimizes the effects on adjacent entrances and residences. MTO has been working in consultation with both the County of Wellington and the Township of Puslinch during this study. Any improvements to the existing Wellington Road 36 or Victoria Road alignments, as a result of traffic volumes, geometric design, maintenance etc., would need to be initiated by the municipalities.
Question about how Calfass Road will be affected by the proposed improvements.	Regarding Calfass Road and the proposed Highway 6 (New) alignment, the preferred plan is to grade separate Calfass Road to maintain continuous access across Highway 6 (New).
Concerns about the connecting road between the existing Highway 6 South and the proposed Highway 6 alignment, including: • Noise impacts and proximity to Telfer Glen; • Location of the commuter parking lot.	The alignment of the proposed connecting road between existing Highway 6 South and the new Highway 6 Bypass was determined as part of the separate Highway 6 EA Study (WP 65-76-05), that received Environmental Assessment approval in early 2009. The Highway 6 South/Brock Road interchange will require reconstruction to accommodate a widened Highway 401. The project team presented alternatives to reconstruct the interchange either at the existing location, or to the east or west of the existing location to better accommodate traffic during construction. The team will review these alternatives including impacts to the existing commuter parking lot. The existing carpool parking lot at Highway 6 South will be maintained with all interchange alternatives, except for Interchange Alternative #H6S3, which will require relocation of the carpool parking lot from the southeast quadrant of the interchange to the southwest quadrant of the interchange due to the proposed realignment of the interchange structure and ramps. Detailed vegetation assessments in areas of potential impact, including the area south of Highway 401 and west of Highway 6 South, are being carried out as part of the analysis/evaluation process. Where impacts cannot be avoided, mitigation will be developed in consultation with appropriate external agencies.
Concern about PIC notification procedures and timelines.	The Project Team typically initiates notification two weeks in advance of the PIC. In addition to newspaper notices, the Project Team maintains a mailing list of property owners and other interested individuals who will receive project notices by direct mail.

Summary of Key Comments	MTO Response
Property requirements and concerns about artesian wells in the vicinity of Highway 401 and the Hanlon Expressway Impacts to adjacent creeks and wetlands.	As part of this study for improvements to Highway 401, the existing conditions within the study area were identified, assessed, and evaluated with respect to the alternatives that were developed. Preliminary property requirements were identified. No additional property is required to accommodate the widening of Highway 401 between the Hanlon Expressway and Highway 6 South. Minor property requirements are necessary to accommodate the proposed interchange improvements. A groundwater assessment was carried out to determine the existing groundwater conditions within the study area. Mitigation measures during construction typically include: • MTO best management practices for erosion and sedimentation control to be in place during all stages of construction and operation of the site in order to avoid potential impacts to surface water and groundwater. • Design and operational components that emphasize prevention of any off-site impacts by first avoiding or minimizing potential for spills, and then ensuring proper containment measures are in place so that deleterious materials cannot migrate off-site. Stringent management of site drainage will protect groundwater and surface water resources. • If diversion of surface water or the extraction of groundwater will be in excess of 50,000 litres per day, a Permit to Take Water (PTTW) will be obtained from MOE during the detail design phase. • A residential well water survey for the for potentially impacted wells within the study area will be carried out in the detail design phase to determine if water wells within the study area will be impacted during construction. Regarding surface water, impacts to the existing drainage patterns were reviewed and stormwater management practices (i.e. ditching, ponds, etc.) will be identified as part of the preferred plan. Stormwater management practices will be implemented to minimize environmental degradation and erosion and sediment control measures will be identified during the detail design phase and further developed prior to/during construction. Regarding impacts to adjacent creeks and wetlands, detailed field surveys and assessments were conducted along the length of the study area, including at interchanges. The preferred alternative for improvements to the Hanlon Expressway interchange minimizes or avoids intrusion into the adjacent natural areas. Overall, impacts are limited to localized edge removal of wetland habitat and removal of culturally influenced roadside habitats. Removal of the existing W-N and N-E ramps will provide an opportunity to re-naturalize the area south of Highway 401 which could provide additional habitat. Where direct impacts to species cannot be avoided, site specific mitigation measures will be developed as appropriate, and in consultation with appropriate external agencies during the detail design phase.
Question about the effects of Highway expansion on climate change.	Climate change, growing traffic congestion and increasing urbanization are all factors that are putting pressure not only on the province's transportation system but also on the environment. While sustainability is itself a priority, it is also essential to ensure that it is a consideration in all of MTO business areas. Combating climate change will require less carbon-intensive forms of transportation and strategies that reduce the need to travel. As part of this study, the addition of High Occupancy Vehicle (HOV) lanes and the expansion of existing carpool parking lots are recommended as a means to encourage motorists to carpool and manage congestion. Moving more people in fewer vehicles can lead to reduced vehicle emissions and improved air quality. For more information regarding MTO's strategy on social, environmental and economic sustainability, please read the document Sustainability inSight, available at www.mto.gov.on.ca/english/sustainability/
Concerns about wildlife crossing the highway, in particular, proximity to the greenbelt and the effects on deer within the study area.	There are currently no plans to construct barriers that would prevent wildlife from crossing the highway. Wildlife movement and opportunities to address habitat connectivity across the highway at specific locations will be considered in the detail design phase. An investigation of the collision data within the study area with respect to animal related collisions did not indicate any specific locations being more prone to animal related collisions than others.

This page intentionally left blank

7.0 PREFERRED PLAN

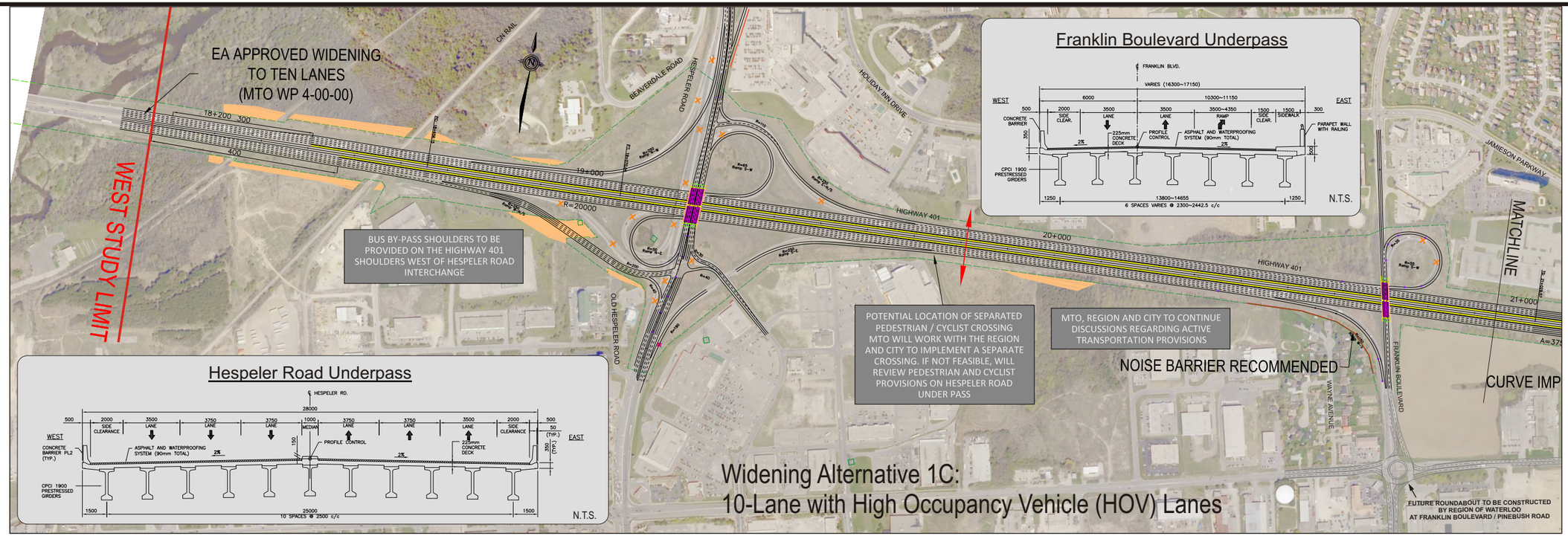
Based on the analysis and evaluation of alternatives and the review and integration of comments received through the consultation process, the preferred plan is shown in **Exhibit 7-1a** through **Exhibit 7-1d**, and summarized as follows:

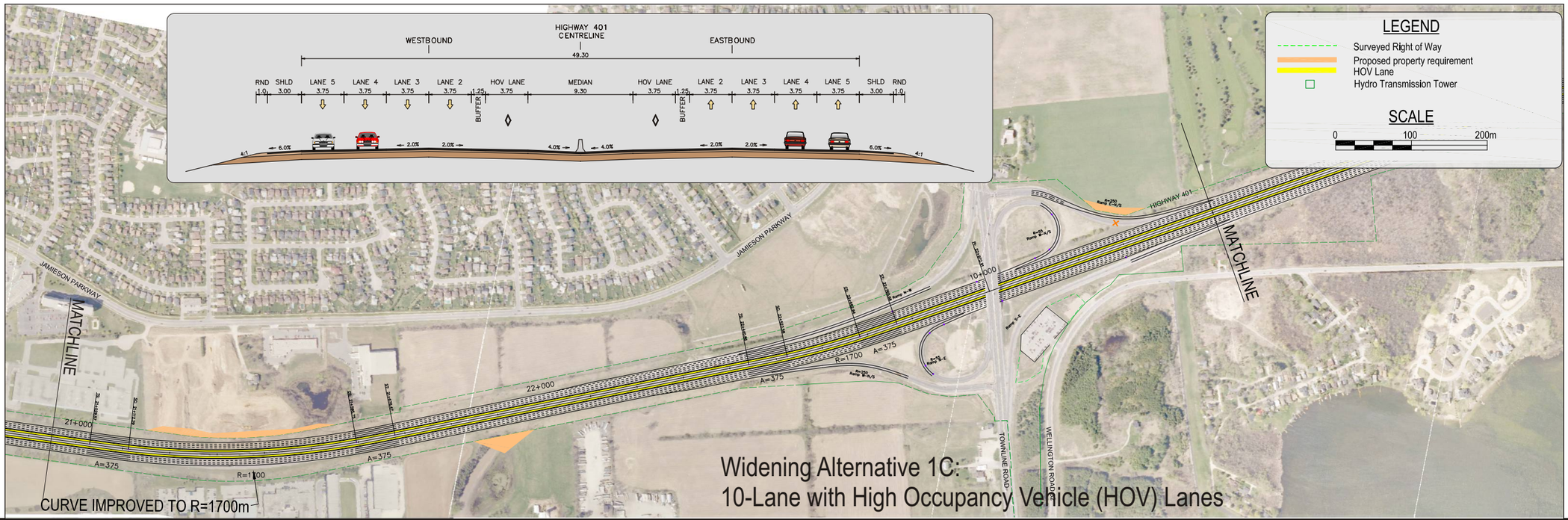
- Between 1.0 km west of Hespeler Road to the Hanlon Expressway and between Highway 6 South and the Wellington County/Halton Region boundary, widen Highway 401 from 6 general purpose lanes to 10 lanes consisting of:
    - 8 general purpose lanes; and
    - 2 High Occupancy Vehicle (HOV) lanes.
- Between the Hanlon Expressway and Highway 6 South, widen Highway 401 from 6 general purpose lanes to 12 lanes consisting of:
    - 8 general purpose lanes;
    - 2 High Occupancy Vehicle (HOV) lanes; and
    - 2 auxiliary lanes.
- Throughout the study area:
    - Upgrade vertical curves to 120 km/h design standards; and
    - Reconstruct existing Highway 401 to address deteriorated pavement condition.
    - Reconstruct and/or modify the interchanges at Hespeler Road, Franklin Boulevard, Townline Road, Hanlon Expressway and Highway 6 South/Brock Road to accommodate future highway expansion and improve operations:
    - Reconstruct the Hespeler Road interchange with a partial shift to the east to accommodate Highway 401 widening;
    - Replace the Franklin Boulevard structure on the existing alignment to accommodate Highway 401 widening;
    - Realign ramps at the Townline Road interchange to accommodate Highway 401 widening and modify the E-N/S ramp radius to improve the operational performance of the ramp;
    - Modification to the EA Approved (WP 65-76-05) Hanlon Expressway interchange N/S-W ramp to a free flow interchange; and
    - Replace the Brock Road crossing structure and realign Highway 6 South/Brock Road to connect to a 4-legged roundabout with W-N/S and N/S-E ramps (modification to EA Approved WP 65-76-05).
- Improve crossing road vertical alignment where replacement of the crossing structure to accommodate highway expansion is necessary.
- Expand the existing carpool lots at the Highway 6 South/Brock Road and Townline Road interchanges.

The preferred plan will address the future transportation needs and opportunities as discussed in **Section 3**.

Potential environmental effects and the proposed mitigation measures are discussed in **Section 8**.

This page intentionally left blank





GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Preferred Highway 401 Widening and Interchange Plan - Section 1

EXHIBIT
7-1a

Widening Alternative 2C:
10-Lane with High Occupancy Vehicle (HOV) Lanes

REQUIRES NEW BRIDGE CROSSING OVER HIGHWAY 401 - TEMPORARY CLOSURE AND DETOUR ROUTES REQUIRED DURING CONSTRUCTION

SERVICE CENTRE CLOSED FOR REDEVELOPMENT (SEPARATE PROJECT)

SERVICE CENTRE CLOSED FOR REDEVELOPMENT (SEPARATE PROJECT)

MATCHLINE

MATCHLINE

11+000

12+000

13+000

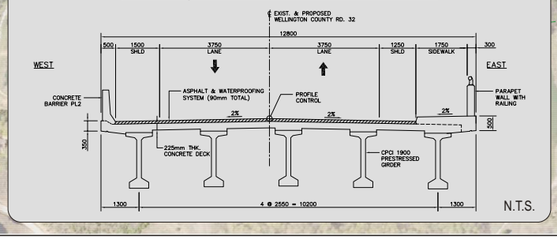
14+000

A=375 R=1700m A=375

A=375 R=1700m A=375

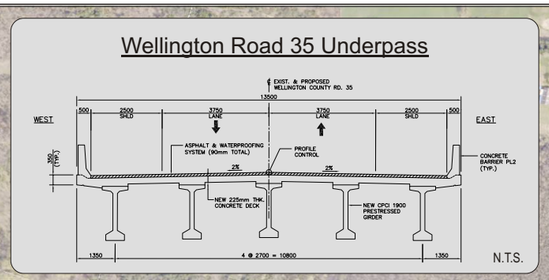
WELLINGTON 32

Wellington Road 32 Underpass



Widening Alternative 2C:
10-Lane with High Occupancy Vehicle (HOV) Lanes

Wellington Road 35 Underpass



LEGEND

- Surveyed Right of Way
- Proposed property requirement
- HOV Lane

SCALE

0 200 400m

REQUIRES NEW BRIDGE CROSSING OVER HIGHWAY 401- TEMPORARY CLOSURE AND DETOUR ROUTES REQUIRED DURING CONSTRUCTION

WELLINGTON 35

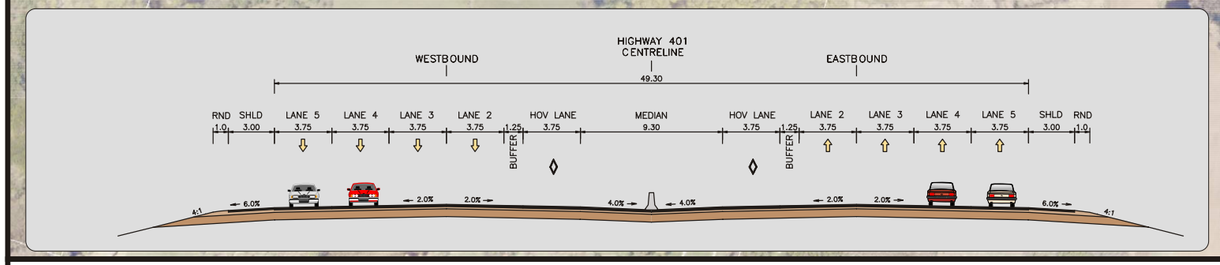
MATCHLINE

MATCHLINE

15+000

16+000

17+000

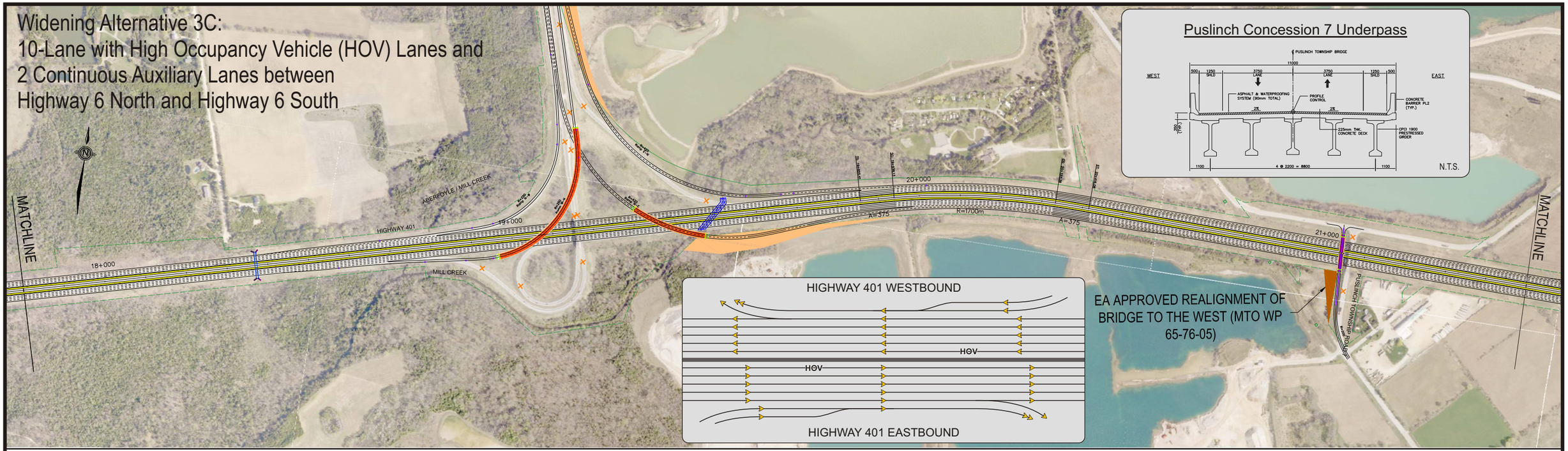


GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Preferred Highway 401 Widening and Interchange Plan - Section 2

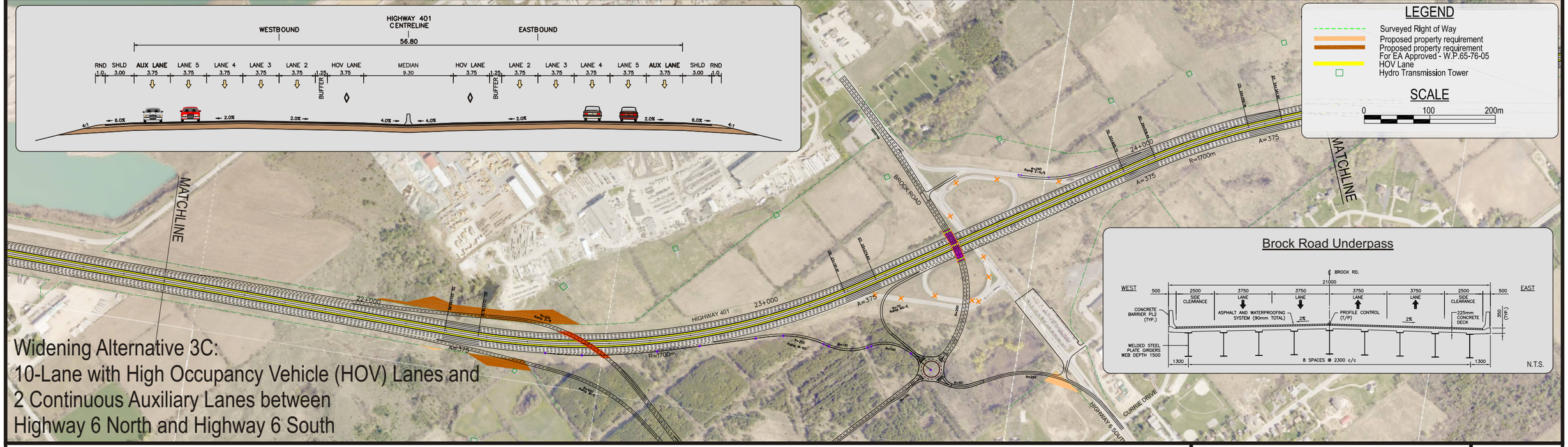
EXHIBIT
7-1b

Widening Alternative 3C:
10-Lane with High Occupancy Vehicle (HOV) Lanes and 2 Continuous Auxiliary Lanes between Highway 6 North and Highway 6 South



Puslinch Concession 7 Underpass

N.T.S.



LEGEND

- Surveyed Right of Way
- Proposed property requirement
- Proposed property requirement For EA Approved - W.P.65-76-05
- HOV Lane
- Hydro Transmission Tower

SCALE

0 100 200m

Brock Road Underpass

N.T.S.

Widening Alternative 3C:
10-Lane with High Occupancy Vehicle (HOV) Lanes and 2 Continuous Auxiliary Lanes between Highway 6 North and Highway 6 South

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

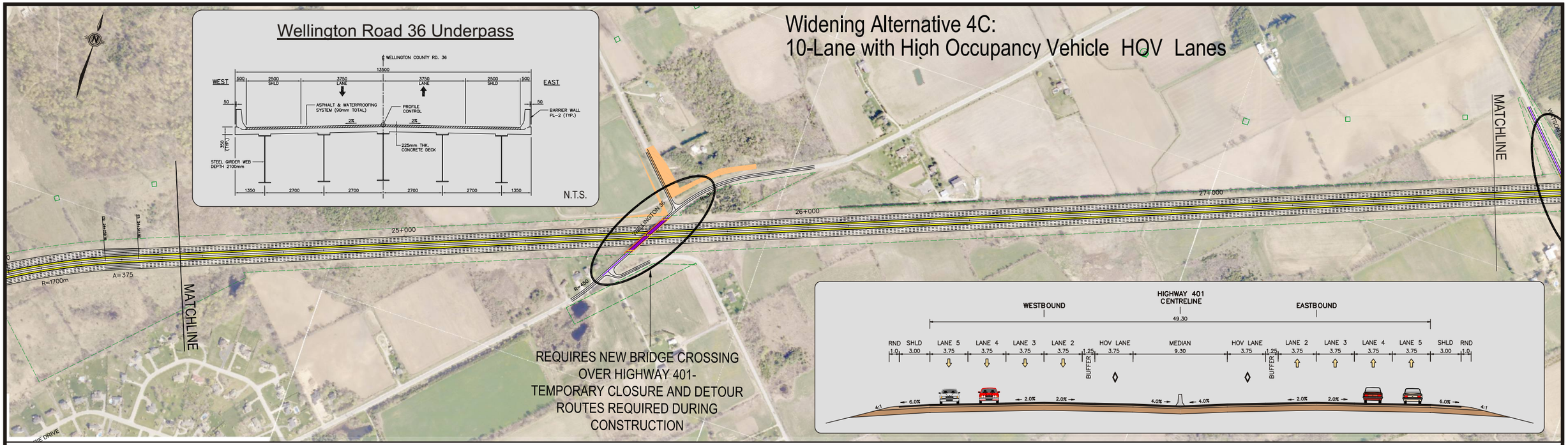
Preferred Highway 401 Widening and Interchange Plan - Section 3

EXHIBIT
7-1c

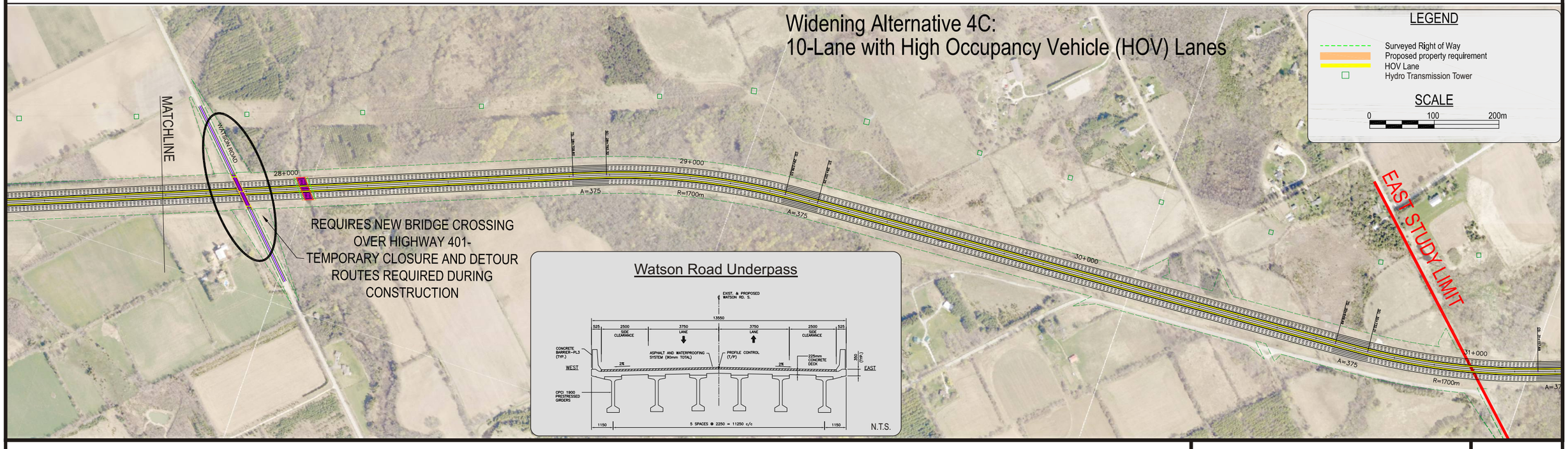
Widening Alternative 4C:
10-Lane with High Occupancy Vehicle HOV Lanes

Wellington Road 36 Underpass

N.T.S.



Widening Alternative 4C:
10-Lane with High Occupancy Vehicle (HOV) Lanes



Watson Road Underpass

N.T.S.

LEGEND

- Surveyed Right of Way
- Proposed property requirement
- HOV Lane
- Hydro Transmission Tower

SCALE

0 100 200m

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Preferred Highway 401 Widening and Interchange Plan - Section 4

EXHIBIT
7-1d

8.0 Potential Environmental Effects, Mitigation Measures and Commitments to Further Work

This section focuses on the direct and indirect environmental effects associated with the project. It also describes mitigation measures that will be further reviewed in the detail design phase of the study. Mitigation includes planning decisions, design features, construction requirements and construction constraints.

The key to ensuring effective environmental quality control and risk management during the project is the development and proactive implementation of an approach that:

- Identifies the environmental sensitivities;
- Presents the environmental protection measures in a way that can be translated into contractual requirements and for which compliance can be verified; and
- Includes a monitoring program that verifies that the environmental protection measures are being implemented and are effective.

The mitigation measures outlined in this report will be refined in greater detail as the design is developed and assessed in the next phase of the project.

8.1 Erosion & Sediment Control

Without the implementation of appropriate mitigation measures, creation of erosion and generation of sediment during excavation and grading activities associated with the construction of the proposed improvements may impact the watercourses/municipal drains within the study area.

Erosion and sediment control practices will focus on two separate targets: minimizing site erosion and keeping any eroded materials on site. General measures such as erosion control blanket, silt fence barriers, rock flow checks and quickly treating exposed earth surfaces with stabilizing cover material (seed and mulch, sod, etc.) are governed by special provisions (i.e. Ontario Provincial Standard Specification (OPSS) 565), which will be specified and refined in relation to the site conditions and construction requirements during the detail design stage. Erosion and sedimentation control practices will be developed during the subsequent detail design phase. All relevant erosion and sediment control measures will be identified on the contract drawings. Implementation of the sediment and erosion control measures will then be monitored and documented during construction.

Relevant mitigation measures will include the following:

- Vegetation removal will be limited to only what is required for grading and ditching operations, and will be clearly identified on the drawings;
- Erosion and sediment control practices will be implemented throughout construction to prevent migration of sediment to the watercourses/municipal drains within the study area and all other natural features;
- All appropriate temporary erosion and sediment control measures such as: silt fence barriers, erosion control blanket, and rock flow checks will be used to contain the construction area and prevent any migration of sediment. The silt fencing and other containment measures will be regularly inspected and maintained as necessary;
- New or re-constructed ditches will be properly stabilized using vegetation or rock protection depending on slope;
- Rip rap or other stabilizing systems will be installed at outlets and spillways;
- All disturbed surfaces will be stabilized with the most appropriate treatments available;
- Stabilization and re-vegetation of all disturbed surfaces will be established as soon as possible following excavation and construction to protect against erosion and sedimentation of local drainage features; and
- An environmental inspector will be employed throughout construction to ensure the sediment and erosion control measures are functioning properly and all of the mitigation measures are being implemented.

8.2 Management of Excess Material and Property Contamination

There is potential to encounter contaminated material from undertaking improvement works to Highway 401, which will require removal of existing pavement, site excavation and grading, and application of new pavement. Contaminated materials will be managed in accordance with OPSS 180.

Surplus materials will be generated during construction, such as old pavement, guardrail materials, and concrete. These materials will be sorted and either reused if feasible, recycled, or disposed of at an approved landfill facility in accordance with OPSS 180. In addition, implementation of the contingency plan measures provides a mechanism for dealing with soil contaminant issues if they arise during construction.

Standard mitigation will be used for dust control (i.e. water, calcium chloride) during construction.

8.3 Landscape Composition

The potential effects on Landscape Composition from the proposed transportation corridor can be described in terms of the likely alterations to the landscape character and scenic integrity, as well as the landscape experience of the area. Areas of considerable disturbance include:

- Highway 6 South/Brock Road realignment; the highway access and associated structures will be relocated west and south of the existing overpass.
- Hanlon Expressway eastbound access; the eastbound on and off ramps will be reconfigured as flyovers and the existing ramps decommissioned.

Minor disturbances are anticipated for the Mill Creek, Aberfolyle Creek and Mountsberg Creek crossings and adjacent lowland areas including wetlands, swamps and marshes, some of which contain highly sensitive fish species and habitat. Several small woodlots will also be disturbed. There will be no significant alterations to topography, viewsheds, or adjacent land use within the transportation corridor. Cultural vegetation shall be protected and preserved, where feasible, to maintain the scenic character of the transportation corridor and provide buffer, screening, and aesthetic value.

The exposed woodlot edges located at the Highway 6 South/Brock Road realignment will have plantings incorporated to screen the woodlot edge from salt spray. The woodlot edge plantings should utilize mixed aged pioneer species with a combination of shrubs and trees, to promote natural succession. The vegetation of the decommissioned on and off-ramps will also require the planting of pioneer species that promote natural succession and the plantings should be complimentary to those that are existing.

Additional visual screening with coniferous and deciduous tree plantings at key locations along the traffic corridor will help augment the existing plantings and screen views for adjacent land users.

Riparian planting will be provided for the disturbed creek/culvert crossings and new plantings implemented along exposed wetlands to buffer salt spray.

All disturbed areas will be seeded with a road side seed mix and any slopes exceeding 3:1, will require additional applications of erosion control slope stabilization.

8.4 Terrestrial Ecosystems and Wildlife Habitat

The Preferred Plan adds additional lanes to parallel the existing highway to minimize fragmentation effects and limit effects to the edge habitats along the existing highway. This is done by confining construction to the existing ROW and, where possible, avoiding impacts to the more sensitive and natural habitat located outside of the existing ROW. For the most part, adjacent vegetation and wildlife habitat features that will be affected by the recommended widening are culturally modified, having been disturbed through historical vegetation removal and construction activities, and decades of highway road effects (winter salt spray, noise). The exception is in areas where new interchange designs are being proposed for the Hanlon Expressway and for Highway 6 South/Brock Road.

8.4.1 Vegetation

Impacts to vegetation are largely contained within the existing highway ROW. Minor edge removals may occur, however, these effects are limited to the already disturbed edges of vegetation communities and protrusions of these communities into the ROW, which have already been slated for development. Removal effects on roadside vegetation (i.e., cultural meadow) to accommodate the highway lane additions are considered minor based on the abundance, tolerance, and generally disturbed nature of these features. Species observed in these features are common throughout the study corridor and will quickly re-colonize temporarily disturbed areas along the widened highway following construction. Opportunities for retention of some vegetation along the edges of the ROW may be possible, and can be explored further during detail design.

<u>Species of Conservation Concern</u>

One Species at Risk (Endangered), the Butternut Tree, was observed in the study area. Two Butternut were observed during field surveys. One is located in the north east quadrant of the Hanlon Expressway interchange and the other is located north of the highway, approximately 600m east of Watson Road South. Both trees are located far enough from the ROW edge that they should not be affected by the proposed works.

One provincially rare (S3) species, Sharp-fruit Rush, was observed in the study area. Sharp-fruit Rush was observed in the Puslinch Lake – Irish Creek Wetland Complex PSW,and should be unaffected by the proposed works and potential edge removals.

Twenty-one plant species with regional rankings (Regional Municipality of Waterloo 1999) were observed in the study area. The majority of these species should not be affected by the proposed works and potential edge removals associated with the highway widening. Six species with regional rankings (Canada Rush, Large Yellow Lady's-slipper, Eastern Cottonwood, White Spruce, Black Walnut and Canada Plum) were observed in natural and semi-natural areas.

8.4.2 Wildlife and Wildlife Movement

Impacts to potential wildlife habitat are largely contained within the existing highway ROW.

Although some amphibian breeding habitat will be affected, these features tend to be either small localized inclusions or part of larger units, only portions of which are affected, or they are located in small drainage depressions along the existing highway. The majority of amphibians noted were observed in small swales, meadow marshes and swamp thicket communities associated with habitats resulting from previous anthropogenic disturbance (i.e., small depressions and ditching created by past highway construction). Again these features and other potential breeding habitats are common throughout the area, and in many cases are artifacts of highway work and drainage. Impacts to breeding habitat will be managed with the implementation of the vegetation and watercourse mitigation measures.

Attempted turtle crossing has been observed along an area of the traffic corridor and requires further investigation during detail design and may require the implementation of turtle fencing or other mitigation measures.

In general, some increase in wildlife mortality can be expected to occur as a result of gradually increasing traffic volumes although this may be in part offset by improvements in visibility and expansion of the ROW, which will further deter some wildlife movement across the highway. Highway 401 functions as an almost absolute barrier to wildlife at present, and will continue to do so with the lane additions.

Significant Wildlife Habitat exists within the study area in the form of deer wintering areas, which bisect the study area at the location of the Speed River Wetland Complex PSW and the Mill Creek Wetland Complex PSW, as well as potential movement corridors along major creeks and along existing hydro corridors. With the proposed alignment confined to the existing ROW in these locations, and only minor edge encroachments, no Significant Wildlife Habitat will be adversely affected.

The two locations where specific impacts are anticipated to occur are discussed below:

Hanlon Expressway Interchange

The proposed new W-N off-ramp will intersect through black ash mineral deciduous swamp immediately south of Highway 401 as well as through green ash deciduous swamp located in the northeast corner of the existing interchange, resulting in the loss of localized wildlife habitat. Since the partial removal of the black ash mineral deciduous swamp is located adjacent to the existing highway alignment, impacts to wildlife are expected to be negligible in this area since it is already highly disturbed. Similarly, the green ash deciduous swamp located in the centre of the existing interchange is located in a highly disturbed location that is essentially isolated from surrounding habitat, bounded on all sides by the Hanlon Expressway. This location also represents a major barrier to wildlife movements.

It should be noted that the pavement for the existing W-N and N-E ramps will be removed, resulting in an area south of Highway 401 that provides an opportunity for regeneration back to a more naturalized state adjacent to Mill Creek.

Highway 6 South/Brock Road

The realignment of Brock Road will involve two new ramps for northbound and southbound lanes to Highway 401 and Highway 6 South, a 4-legged roundabout, which includes W-N/S and N/S-E ramps to Highway 401 and connections to Brock Road and Highway 6 South. These new alignments and roundabout will intersect through a large area of conifer plantations as well as an unevaluated cattail marsh on the west side of existing Highway 6 South on the south side of Highway 401 (across from the carpool lot).

The addition of lanes through the conifer plantation mainly follows existing gaps in the plantation which are currently open areas; however two plantation blocks closer to Highway 401 will be bisected. Wildlife habitat that may be disturbed as a result of the proposed works may include potential owl roosting and raptor nesting habitat or passerines that are known to nest in conifer plantations (i.e., Pine Warbler). Targeted surveys for these species and features were not conducted, however given that this cultural habitat is directly adjacent to Highway 401 and Highway 6 South (two very busy transportation routes) and is already exposed to a high level of disturbance (traffic noise, intersecting roads), the additional roadway construction will not occur in what would be considered a pristine area. The majority of plantation blocks will still be retained albeit with increased fragmentation by the roadways. Potential for owl use and other potential wildlife use may still continue in some of the blocks.

The small unevaluated cattail marsh that is to be removed will result in a loss of habitat suitable for common reptile and amphibian species. The location of this marsh is directly adjacent to the west side of Highway 6 South, immediately south of the Highway 401 interchange. This area is a highly disturbed, busy transportation route resulting in ongoing noise disturbance, and some release of highway contaminants (such as metals, oils and salt spray) through runoff and/or drift. Highway 6 South presents a major barrier to animal movement and high risk of road mortalities. There is also no adjacent suitable or similar habitat where wildlife movement and/or linkages would be expected in this section where two major transportation routes intersect. Consequently, this wetland likely supports tolerant species which are highly adaptable and/or likely do not have high rates of reproductive success given the surrounding conditions.

Mitigation measures for this wetland should involve construction works that ensure protection for migratory birds under the Migratory Birds Convention Act (MBCA 1994). Given the tolerant nature of this type of wetland, opportunities to salvage substrates and protect/expand residual wetland areas should be examined during the detail design phase.

<u>Species of Conservation Concern</u>

No wildlife species of conservation concern were recorded during Ecoplans field surveys, with the exception of the Monarch butterfly (Danaus plexippus). Common Milkweed (larval food plant for Monarch) is present in various locations throughout the study area, and attracts Monarch to these sites for breeding (i.e., old field meadows, culturally disturbed areas, etc.). It should be noted that the Monarch's Special Concern status is based on ongoing threats to wintering habitat outside of Canada rather than the rarity of its summer habitat and key host plant, Common Milkweed, which are still generally common throughout the province.

Additional review during detail design should identify if there are any new species of conservation concern that has been designated federally or provincially after the completion of the preliminary design phase

8.4.3 Construction-Related Vegetation and Wildlife Mitigation Measures

The impacts to vegetation and wildlife habitat associated with the proposed highway works have been minimized to the extent possible through the process of choosing the preferred plan, which can be largely accommodated within the current ROW except for nominal incremental widenings at selected locations as well as the more substantial roadway work in the Highway 6 South area. Further refinements during detail design may be possible to further reduce local effects on vegetation, wildlife and habitat, where the specific characteristics of these features warrant.

The following suite of mitigation measures is recommended for incorporation and refinement during the detail design phase in order to minimize the potential direct and indirect effects of the project on terrestrial features.

Vegetation

Where direct impacts to rare plant species cannot be avoided, site specific mitigation measures will be developed as appropriate, and in consultation with appropriate external agencies during the detail design phase. These measures may include the following:

- Ensure the use of appropriate vegetation clearing techniques.
- Design and install standard sediment and erosion control measures.
- Stabilize and re-vegetate exposed surfaces as soon as possible using a combination of native plantings and the application of an appropriate native seed mix.
- Delineate "Environmental Sensitive Areas" in Contract Drawings and Specifications and in the field use temporary vegetation protection fencing or other appropriate fencing or other appropriate measures to prevent encroachment into sensitive areas.
- Implement environmental inspection throughout construction to ensure that protection measures are implemented, maintained and repaired and remedial measures are instigated where warranted.

Wildlife and Wildlife Habitat

Wildlife habitat quality is typically lower in the vicinity of highway corridors, particularly with elevated traffic volumes. Although wildlife in the area is already adapted to the presence of the existing highway, the construction of the additional lanes will incrementally extend indirect effects beyond the ROW. Potential construction disturbances and noise will tend to displace wildlife temporarily during the construction period, and increased traffic and associated noise may also increase local disturbance of wildlife such as breeding birds and amphibians within the "road effect zone". However, for most of the alignment, these effects are already present along the existing highway.

Potential for other indirect effects to habitat occurs in relation to potential changes such as alteration of drainage patterns that would alter associated local amphibian breeding habitats.

In addition to protecting vegetation and aquatic habitat, which in turn protects the associated wildlife habitat functions, it is necessary to ensure the protection of breeding birds, as well as wildlife generally that may nest or otherwise use areas where construction is proposed.

Migratory Birds

Specifically, nesting migratory birds are protected under the Migratory Birds Convention Act (MBCA 1994). No work is permitted to proceed that would result in the destruction of active nests (nests with eggs or young birds), or the wounding or killing of birds, of species protected under the Migratory Birds Convention Act, 1994 and/or Regulations under that Act .

It should be noted that while Barn Swallow was not recorded during surveys, it is expected to occur. Barn Swallows are known to nest inside culvert structures and bridges that provide suitable clearance and that have internal surfaces conducive to nest building (i.e., concrete box culverts with angles/corners). Impacts to Barn Swallows nesting under culverts and bridges may occur at locations where culvert and bridge replacements are necessary.

As of January 14, 2012, Barn Swallow has been listed as threatened and protected under the provincial Endangered Species Act (ESA 2007). This will be reviewed in greater detail during the detail design phase.

Other Wildlife

For the protection of wildlife in general, the contractor will ensure that:

- Any wildlife incidentally encountered during construction will not be knowingly harmed;
- As required, any incidental small wildlife (e.g. turtles, amphibians) stranded within the constructions zone will be captured and released by a suitably qualified individual (e.g. Environmental Inspector); and
- In the event that wildlife encountered during construction does not move from the construction zone or is stranded within the construction zone, the Contract Administrator will be notified.

It is the responsibility of the Contractor to ensure that any required permits for wildlife handling, including fish rescue, are obtained and posted on site prior to engaging in such activities.

8.5 Fisheries and Aquatic Habitat

The widening of the existing Highway 401 from 6 lanes to 10 lanes will result in the extension of all the existing culverts through the study limits, either through extension of existing culverts or replacement of the existing culverts with longer culverts. The existing condition and hydraulic capacity of the culverts was considered in determining whether the existing culverts would be extended or replaced. In other cases where the existing culverts are in good shape and support sufficient capacity, they will be extended rather than replaced to accommodate the widening of the highway.

In a few cases the existing drainage features flow parallel to the existing highway. Therefore, these features will have to be moved/relocated/realigned in order to accommodate the widening and/or to transition the new culverts/structures with the up and downstream reaches. These transitions will be designed so as to properly convey flow and sediment (e.g, without increasing/causing erosion, creating barriers etc.).

Various general and site specific mitigation measures will be applied to the watercourse crossings, depending on the type of work being proposed and their characteristics (e.g., whether or not the watercourse supports fish use).

Specific mitigation measures are recommended to address specific design aspects or specific watercourse characteristics, proposed works and associated potential impacts, as outlined below. These measures will be further specified and detailed and additional measures may be added as the design progresses through the subsequent Detail Design stage.

Overall Footprint

- Embankment slopes will be steepened at crossings that support direct fish use, with specific emphasis on the more sensitive fish habitat (i.e. pike nursery, potential spawning areas), as well as those crossings where channel realignments are required, in order to minimize the overall crossing footprint (including habitat infill, culvert enclosure, valley impacts and realignment length).

Culvert Replacements/Extensions

- Replacement culverts will be designed to span bankfull channel width (at a minimum) of watercourses that support direct fish use.
- All feasible and reasonable design measures will be implemented to minimize the length of the new or extended culverts.
- To the extent possible, in-water works will be avoided or minimized.
- All replacement culverts will be embedded and backfilled with substrate and low flow channels will be created, including removing any existing perched culverts (if possible), to maintain or potentially enhance fish movement opportunities through new culverts.
- Any required channel modifications to tie in new culvert inlets and/or outlets with the existing up and downstream channel sections will be designed and constructed to transition smoothly and avoid development of any potential barriers to movement. Existing pools (both inlet and outlet) will be re-instated at the ends of the culvert extensions wherever appropriate (based on habitat and channel functioning) to maintain fish habitat elements.
- Replacement culverts will be inspected carefully prior to release of flow through the new culverts, to ensure the substrates and low flow channels have been properly installed, are stable and transition smoothly with the up and downstream channel sections, and there are no potential barriers to fish movement. The substrates and low flow channels will be specifically inspected again following release of flow into the new culverts, and following at least one storm event, to ensure they remain stable, the transitions remain smooth and no erosion points are developing. Any identified instabilities will be addressed, re-inspected and documented.

Channel Realignments

Channel relocations/realignments will be designed using naturalized design principles in partnership with a Fluvial Geomorphologist/channel specialist (and landscape architect where appropriate) to maintain existing channel length and therefore overall channel slope; and to maintain or enhance where possible, stream form, habitat elements and associated productivity. The following design-related measures will be followed generally, for all channel relocations:

- The relocated channel sections will be shifted as far as possible from the existing highway within the ROW in order to maximize opportunities for vegetative filtration of highway runoff prior to the watercourse.
- Low flow channels will be designed to transition smoothly with the up and downstream channel sections and avoid development of any potential barriers to movement. Existing pools (both inlet and outlet) will be re-instated at the ends of the culvert extensions wherever appropriate (based on habitat and channel functioning) to maintain fish habitat elements.
- Channel realignment sections will be inspected carefully both during and following construction to ensure the substrates and low flow channels have been properly installed, are stable and transition smoothly with the up and downstream channel sections, and there are no potential barriers to fish movement. The substrates and low flow channels will be specifically inspected again following release of flow into the new channel section, and following at least one storm event, to ensure they remain stable, the transitions remain smooth and no erosion points are developing. Any identified instabilities will be addressed, re-inspected and documented.
- Replacement plantings will be designed using native species compatible with the existing habitat conditions and specifically considering channel and fish habitat functions (e.g., bank stability, overhanging cover). Seedbank salvage and reinstatement techniques will be used at the majority of the channel relocations to facilitate rapid re-establishment of native riparian/floodplain vegetation cover.
- Appropriate interim stabilization/erosion control measures (e.g., biodegradable erosion control fabric) will be used for the channel relocations and transitions, to provide interim stability until the bank vegetation becomes established.
- The new channel sections and overbank areas will be fully stabilized and inspected prior to opening and transfer of flow. The transition zones will be carefully constructed and inspected to ensure a ‘seamless transition’ with the upstream and downstream channel sections, and to avoid creation of any potential barriers to fish movement.

Species At Risk Permitting

It is anticipated that a Permit(s) under Section 17(2)c of the Endangered Species Act (ESA) will be required from the MNR for the proposed works on Culvert C34, associated with MNR's classification of these watercourse reaches as occupied Redside Dace habitat, and may be required for the works on C31 and C32 based on their regulation as contributing habitat. It is recommended that consultation with the MNR regarding the permitting requirements commence as early as possible during Detail Design (or previously if a mechanism exists and depending on anticipated construction start). It is expected that MNR will request an Information Gathering Form as the first step in determining whether or not a Permit will be required at the various locations. It is also anticipated that MNR will be involved in reviewing and commenting on alternatives to avoid or minimize impacts, refining the site-specific mitigation measures and developing the overall benefit plan as the design evolves.

8.6 Groundwater Resources

Uncontrolled runoff during construction or operation of the Highway 401 improvements could result in contamination of groundwater through the infiltration of potential contaminants, and/or surface water as a result of potential contaminants or sediment. There is also the potential for secondary effects to the watercourses within the study area via impacts to groundwater and surface water quality.

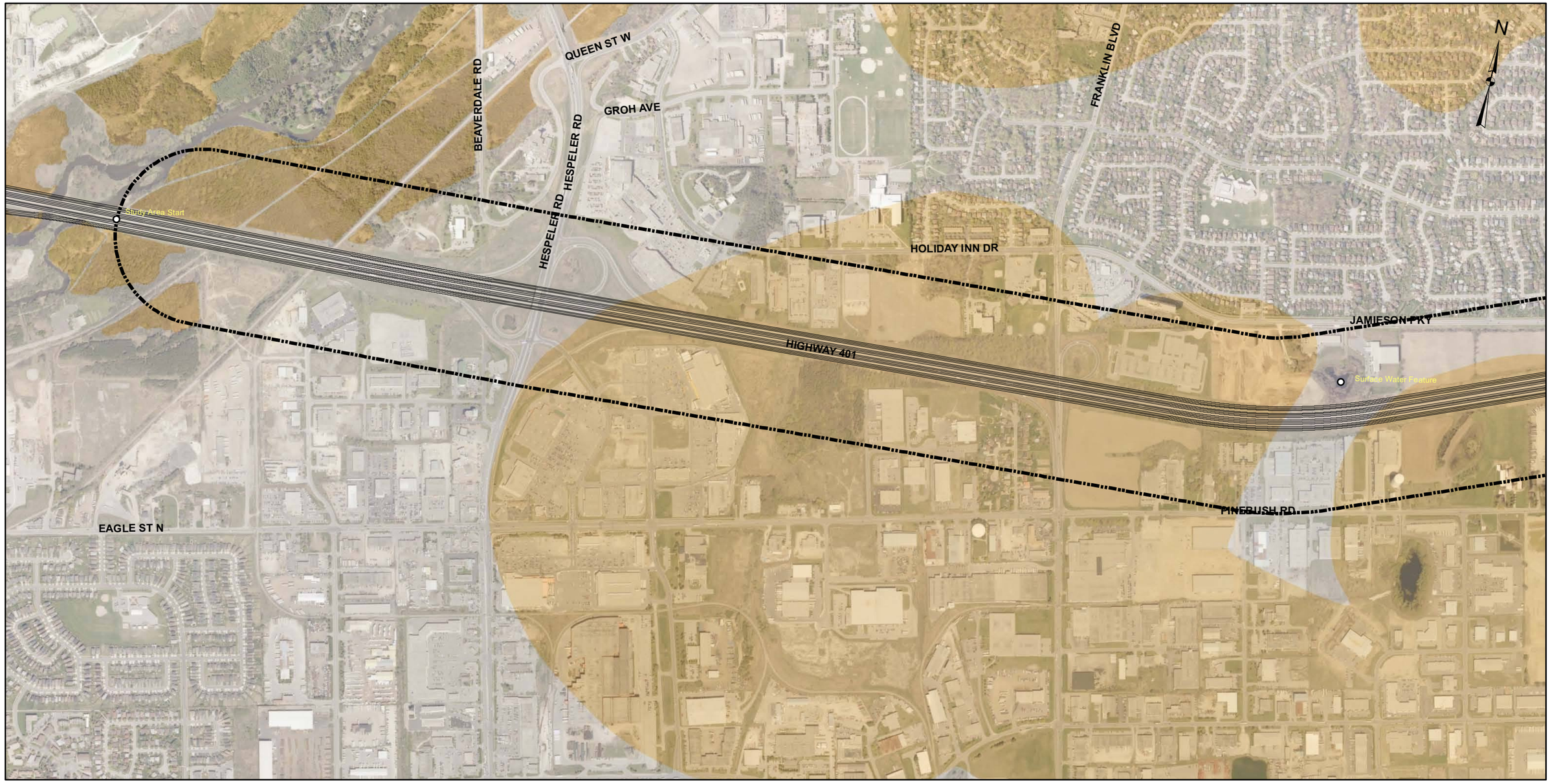
Impacts to groundwater are anticipated to be minimal for highway improvement activities proposed within the existing right-of-way. However, impacts may be more significant in the areas where interchange improvements are proposed, and in places identified as Wellhead Protection Areas (WHPAs), Provincially Significant Wetlands (PSWs) or areas in which geologic formations contain higher permeability.

Potential Widening Impacts

Exhibit 8-1 identifies areas exhibiting the greatest potential for groundwater impacts, and the approximate locations and features that contribute to groundwater sensitivity. A summary of all potential locations of groundwater impact is presented in **Exhibits 8-2a to 8-2f**.

Exhibit 8-1: Identified Area of Higher Groundwater Susceptibility

Distance from Western Limit of Study Area (km)			Feature Contributing to Potential Groundwater Impacts	Potential Interference
0.0	to	0.7	Provincially Significant Wetland	Change infiltration and/or discharge patterns within wetland
1.3	to	3.2	Wellhead Protection Area	Effect infiltration quantity/quality
3.4	to	4.1	Wellhead Protection Area	Effect infiltration quantity/quality
0.0	to	4.7	Geology – higher permeability soil types	Infiltration/mobilization of contaminants
5.3	to	10.1	Geology – higher permeability soil types	Infiltration/mobilization of contaminants
5.5	to	7.7	Wellhead Protection Area	Effect infiltration quantity/quality
8.6	to	8.7	Provincially Significant Wetland	Change infiltration and/or discharge patterns within wetland
9.8	to	10.8	Provincially Significant Wetland	Change infiltration and/or discharge patterns within wetland
10.8	to	13.2	Provincially Significant Wetland	Change infiltration and/or discharge patterns within wetland
13.2	to	15.2	Geology – higher permeability soil types	Infiltration/mobilization of contaminants
16.5	to	17.3	Geology – higher permeability soil types	Infiltration/mobilization of contaminants
18.6	to	18.8	Provincially Significant Wetland	Change infiltration and/or discharge patterns within wetland
19.3	to	19.3	Provincially Significant Wetland	Change infiltration and/or discharge patterns within wetland
20.0	to	20.2	Provincially Significant Wetland	Change infiltration and/or discharge patterns within wetland
21.5	to	21.6	Wellhead Protection Area	Effect infiltration quantity/quality
22.0	to	23.5	Greenbelt	Change infiltration and/or discharge patterns
22.9	to	23.4	Geology – higher permeability soil types	Infiltration/mobilization of contaminants
24.1	to	24.9	Greenbelt	Change infiltration and/or discharge patterns
24.9	to	25.2	Wellhead Protection Area	Effect infiltration quantity/quality



Private Water Well Location Recommended for Well Survey
Natural Environment Feature Based on Inspection
Proposed Alignment
Potential Area of Groundwater Susceptibility
Conservation Authority Area Boundary
Study Area - 250m Buffer

Source: 2010 Microsoft Corporation and its data suppliers. http://www.bing.com/maps
Ontario Base Mapping

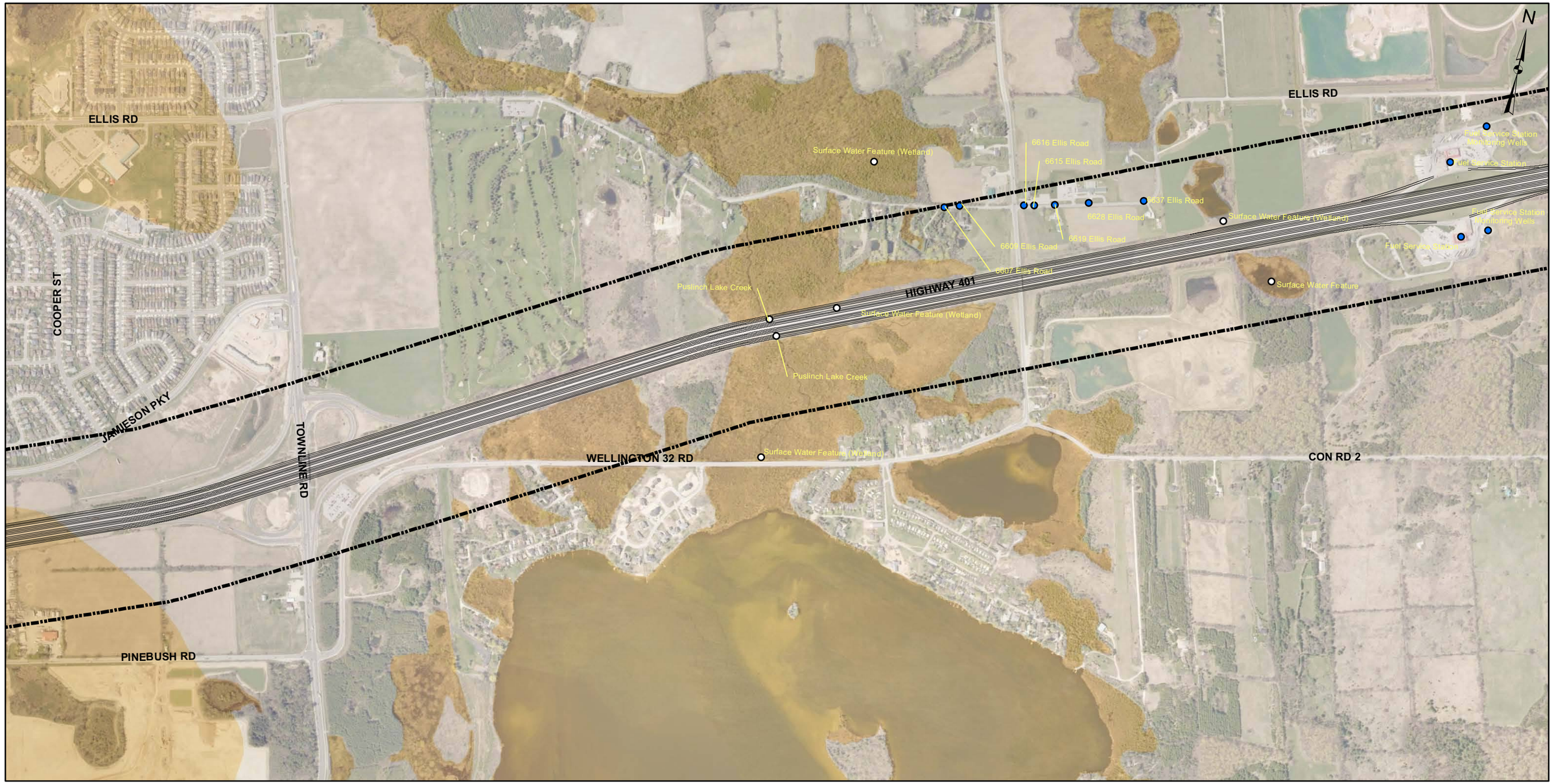
0 100 200 400 Meters

Scale: 1:11,000

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Potential Area
of Groundwater Susceptibility

EXHIBIT
8-2a



- Private Water Well Location Recommended for Well Survey
- Natural Environment Feature Based on Inspection
- Proposed Alignment
- Potential Area of Groundwater Susceptibility
- Conservation Authority Area Boundary
- Study Area - 250m Buffer

Source: 2010 Microsoft Corporation and its data suppliers. http://www.bing.com/maps
Ontario Base Mapping

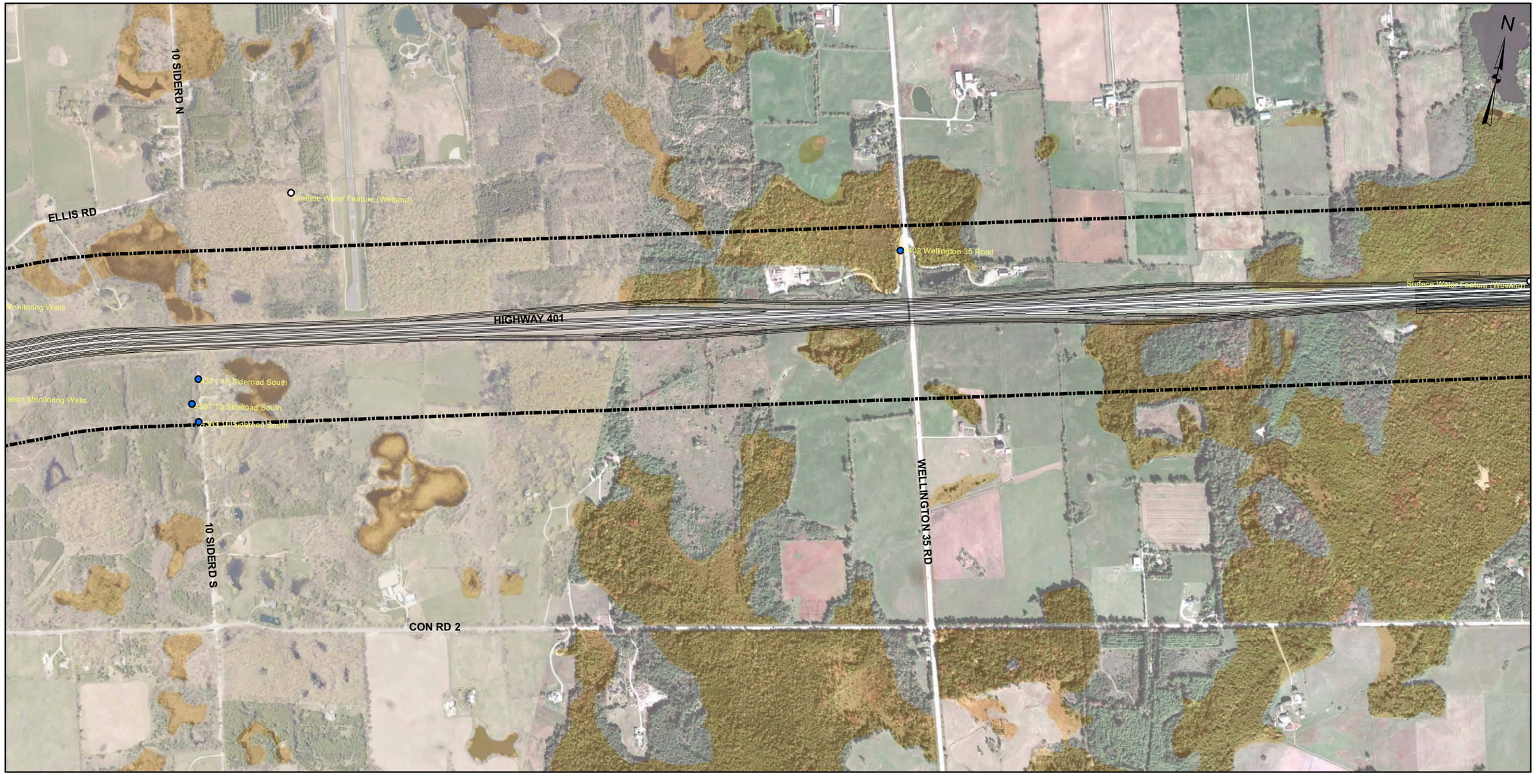
0 100 200 400 Meters

Scale: 1:11,000

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Potential Area
of Groundwater Susceptibility

EXHIBIT
8-2b



- Private Water Well Location Recommended for Well Survey
- Natural Environment Feature Based on Inspection
- Proposed Alignment
- Potential Area of Groundwater Susceptibility
- Conservation Authority Area Boundary
- Study Area - 250m Buffer

Source: 2010 Microsoft Corporation and its data suppliers. http://www.bing.com/maps
Ontario Base Mapping

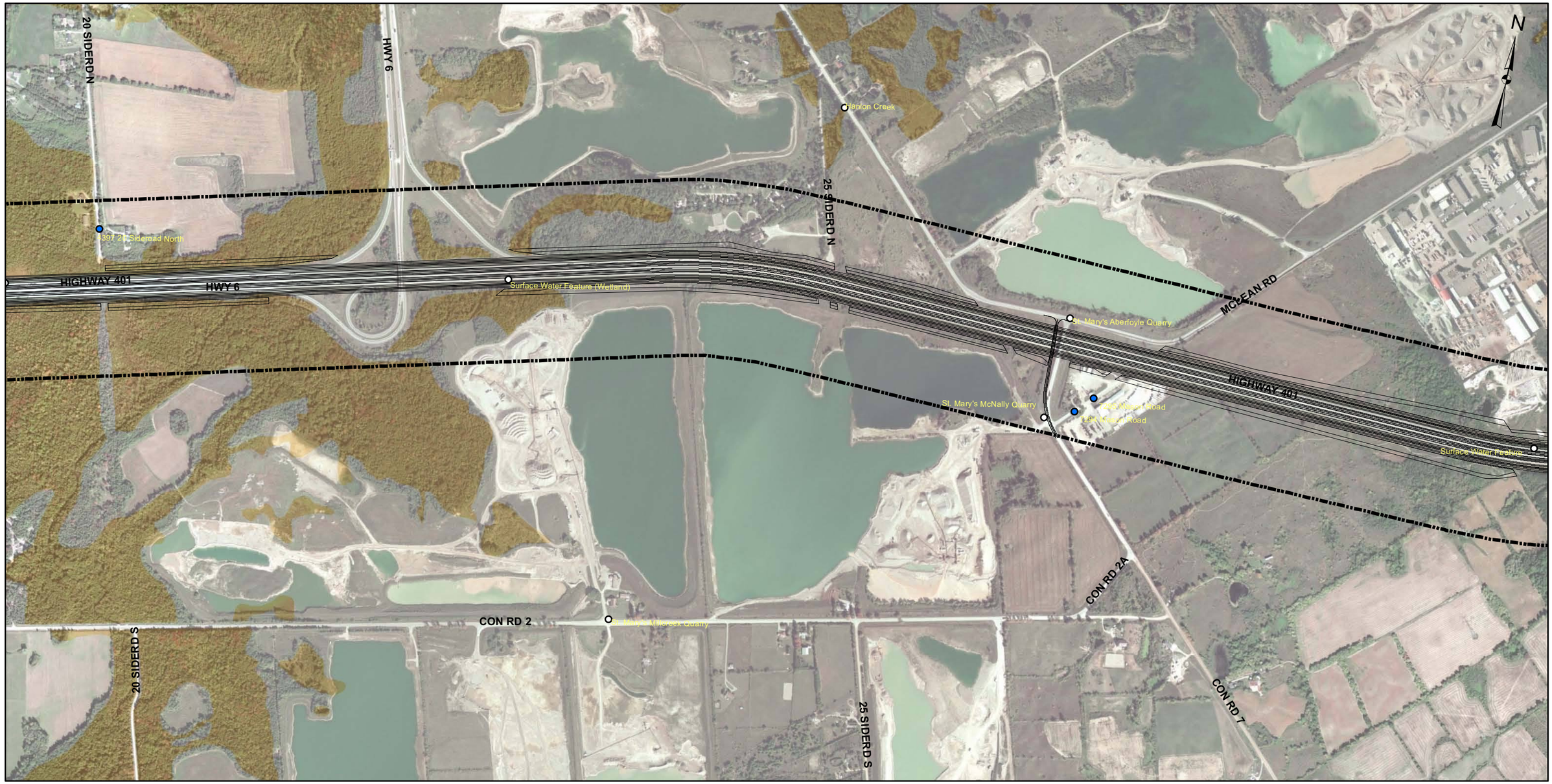
0 100 200 400 Meters

Scale: 1:11,000

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Potential Area
of Groundwater Susceptibility

EXHIBIT
8-2c



- Private Water Well Location Recommended for Well Survey
- Natural Environment Feature Based on Inspection
- Proposed Alignment
- Potential Area of Groundwater Susceptibility
- Conservation Authority Area Boundary
- Study Area - 250m Buffer

Source: 2010 Microsoft Corporation and its data suppliers. http://www.bing.com/maps
Ontario Base Mapping

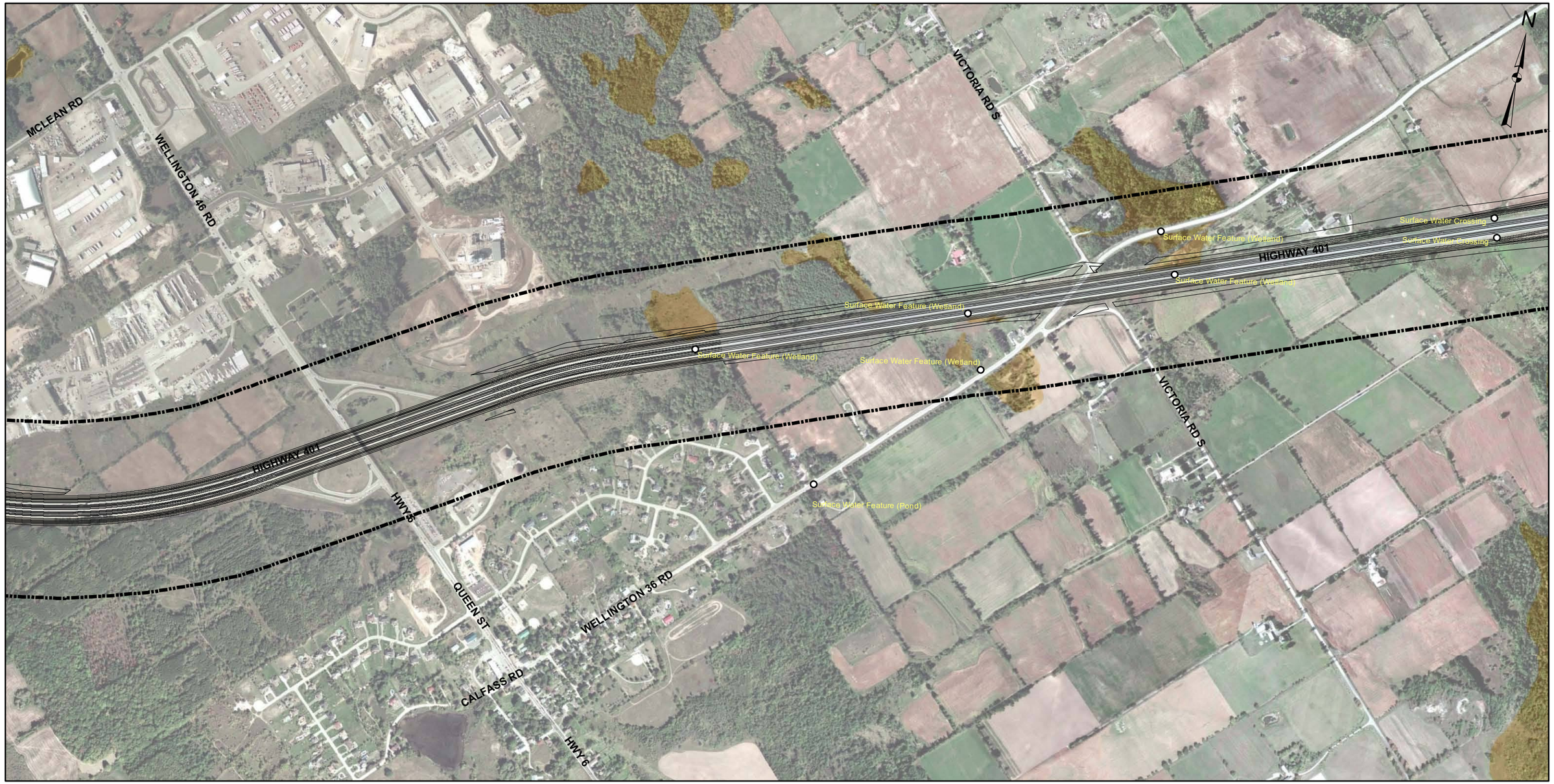
0 100 200 400 Meters

Scale: 1:11,000

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Potential Area
of Groundwater Susceptibility

EXHIBIT
8-2d



- Private Water Well Location Recommended for Well Survey
- Natural Environment Feature Based on Inspection
- Proposed Alignment
- Potential Area of Groundwater Susceptibility
- Conservation Authority Area Boundary
- Study Area - 250m Buffer

Source: 2010 Microsoft Corporation and its data suppliers. http://www.bing.com/maps
Ontario Base Mapping

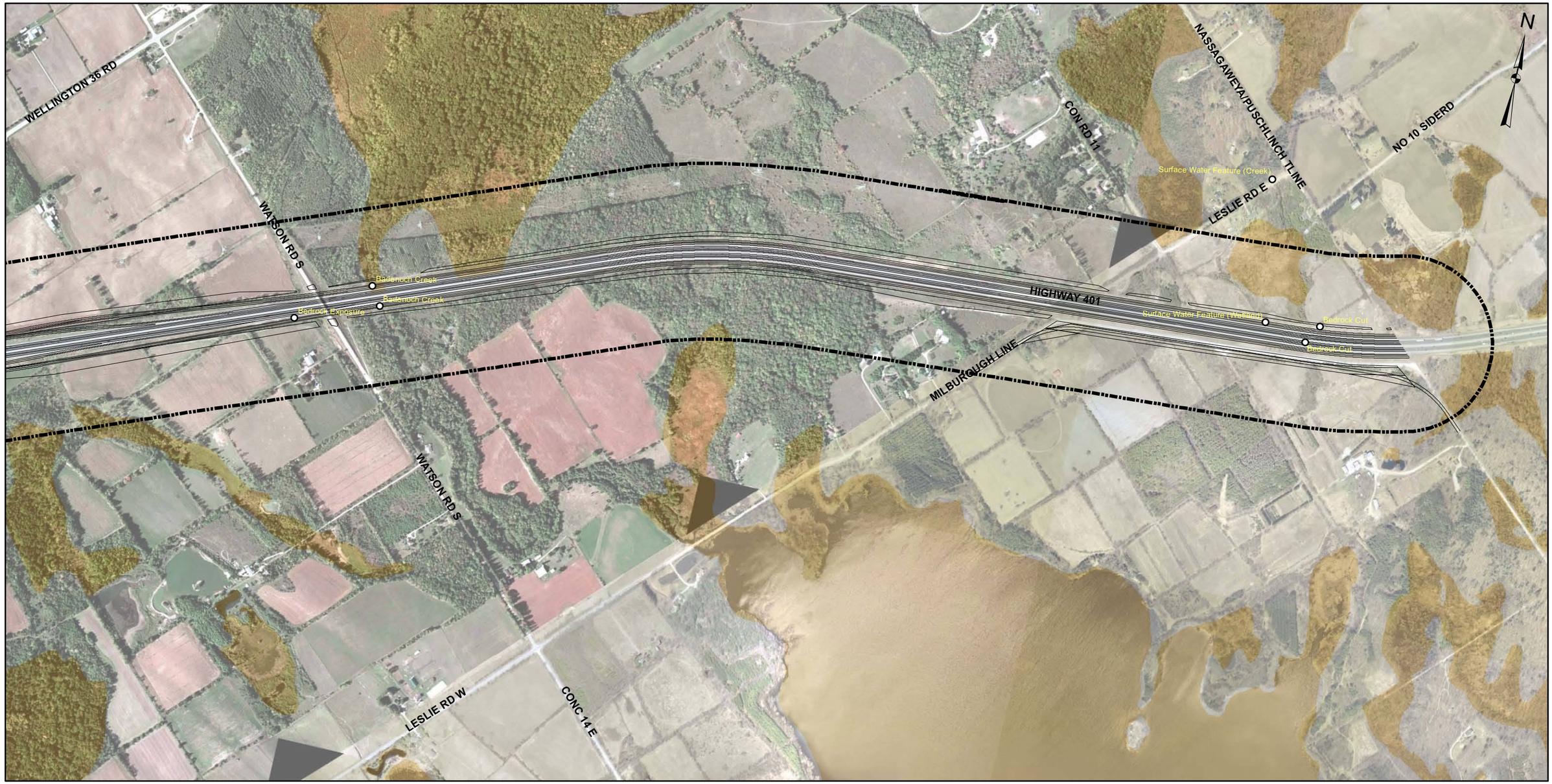
0 100 200 400 Meters

Scale: 1:11,000

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Potential Area
of Groundwater Susceptibility

EXHIBIT
8-2e



- Private Water Well Location Recommended for Well Survey
- Natural Environment Feature Based on Inspection
- Proposed Alignment
- Potential Area of Groundwater Susceptibility
- Conservation Authority Area Boundary
- Study Area - 250m Buffer

Source: 2010 Microsoft Corporation and its data suppliers. http://www.bing.com/maps
Ontario Base Mapping

0 100 200 400 Meters

Scale: 1:11,000

GWP 8-00-00: Highway 401
from 1.0 km west of Hespeler Road easterly to the Wellington County/Halton Region Boundary
Preliminary Design and Environmental Assessment Study

Potential Area
of Groundwater Susceptibility

EXHIBIT
8-2f

Potential Interchange Impacts

There is the potential for intersection improvements to result in impacts to groundwater resources.

Two of the interchanges fall within designated wellhead protection areas (Hespeler Road Interchange, and Franklin Road Interchange). In these locations, the preferred alternatives may result in groundwater impacts due to the general sensitivities of the areas. Further, the area around the Highway 6 North Interchange has been identified as a PSW. There is the potential for groundwater impacts due to the increased footprint of the ramps of the preferred alternative at this interchange.

Soil permeability can also affect groundwater impacts. Although a few of the interchanges are in part situated on soil with low permeability (such as peat and muck deposits and the Port Stanley till) several of the interchanges, are situated on soil types with higher permeability. Parts of the Hespeler Road Interchange, the Franklin Road Interchange, the Highway 6 North, and Highway 6 South/Brock Road Interchange, are situated on gravel deposits with high permeability. Groundwater may be impacted due to increased infiltration and mobilization of surface contaminants through the gravel formation. In addition, part of the Townline Road Interchange is situated on highly permeable sand. Groundwater may be impacted due to sand exposure during excavation, construction, and final grading, and increased infiltration and mobilization of surface contamination through the sand formation.

Potential Groundwater Impacts related to Wellhead Protection Areas

- Increased infiltration/mobilization of surface contaminants due to soil removal/excavation;
- Changes in quantity due to grading, installed stormwater controls and physical blockage of infiltration areas (i.e. paving over), which could ultimately reduce the amount of water available to the groundwater system; and
- Changes in quality resulting from increased runoff/infiltration due to the increased road surface area and associated maintenance requirements (i.e. increased application of de-icing materials).

Potential Groundwater Impacts related to PSWs during Construction

- Interference with groundwater infiltration and/or seepage due to creation of an impermeable surface (i.e. asphalt) associated with construction; and
- Disruption of natural drainage/discharge conditions due to excavation and changes to permanent grading.

General Recommendations for Detail Design

- Minimize the number of watercourse crossings;
- Maximize the distance between widening/interchange improvements (and associated construction activities) and any watercourses (including PSWs), water wells, and other water uses (i.e. quarries);
- Implementation of proper erosion and sediment control during construction to ensure hydraulic segregation between construction areas and identified features;
- Minimize the need for land area designated as having a high susceptibility to groundwater impacts (WHPAs, PSWs and areas of higher permeability soil types); and
- Minimize the need for deep cuts into the overburden/bedrock, especially in areas designated as having a high susceptibility to groundwater impacts (including exposed bedrock).

Permit to Take Water

The Ontario Water Resources Act (OWRA) states that the diversion of surface water or the extraction of groundwater in excess of 50,000 litres per day (24 hrs) requires a Permit to Take Water (PTTW) from the MOE. It is anticipated that road improvements will result in the need for stream diversion (around watercourses) and/or dewatering during construction (e.g. ditching, trenching, bridge pier installation). Therefore, the PTTW process will need to be addressed during detail design, in order to assess the potential impacts of construction on groundwater/surface water resources.

The OWRA also stipulates that all groundwater users whose supplies are interrupted during construction activities shall be provided an alternate source of potable water. The impact of any temporary disruption in groundwater supply by construction related dewatering can be reduced through:

- The advance notification of potentially affected users and provision of alternate supply if needed;
- Rapid completion of construction activities;
- The application of effective erosion control outfalls; and
- Proactive mitigation (when identified) measures prior to construction.

Residential Well Survey

A detailed door-to-door well water survey should be completed for the study area to further determine which water wells will be potentially impacted during construction. Characteristics of the well survey should include (but not be limited to):

- Completion of a door-to-door well survey for residents located within the study area; especially residents located in areas of high groundwater susceptibility or in the vicinity of the interchange improvements.
- Data collection and assessment of proposed road improvements and any additional hydrogeologic, geotechnical, and environmental publications not previously available (i.e. individual water well records).

8.7 Drainage and Surface Water

Drainage mitigation measures may include:

- Implementation of storm water management practices (SWMPs) for drainage protection, such as management of water quality drainage off-site, to minimize environmental degradation;
- Erosion and sediment control measures implemented to protect the watercourses and drainage channels within the study area; and
- All open ditches within the limits of the project will be constructed to allow proper storm water flow to the watercourses/municipal drains within the study area.

8.8 Adjacent Land Uses/Property

The widening of Highway 401 primarily occurs within the existing highway right-of-way; however, adjacent property is required to accommodate interchange improvements and highway widening in several locations. MTO will negotiate with individual property owners to provide fair market value for the required property. Property negotiation and acquisition is anticipated to occur in the subsequent detail design phase.

The anticipated property impacts to accommodate the highway, interchange, and crossing structure improvements are shown in the preferred plans in **Section 7**. The property requirements identified in the preferred preliminary design plan are based on property information available at this time and are subject to further verification for accuracy. A preliminary property request plan will be developed to detail the property requirements for the proposed improvements.

8.9 Agriculture

The majority of the proposed widening will be contained within the existing Highway 401 corridor. This area is considered disturbed due to the landforming that was required to create the existing highway. These lands will not require mitigation for agriculture.

A further 11.2 ha of land comprised of 32 individual areas will be required for cut and fill operations. Of these additional lands, Common Field Crop and Forage/Pasture represent the direct loss to agriculture and account for approximately 1.6 ha. Mitigation for these areas is not possible due to the direct loss of land for the construction and maintenance of the proposed Highway 401 widening.

The small portions of land required for the proposed Highway 401 improvements do not impact any areas of registered Tile Drainage, and there are no direct impacts to any agricultural facility as a result of the proposed works.

8.10 Highway and Construction Noise

A noise assessment was undertaken to assess the potential noise impacts from the Highway 401 improvements following the MTO/MOE Noise Protocol and the new MTO Noise Guide. The findings of the noise assessment are highlighted below.

Methodology

In order to determine noise impact, a comparison is made between the predicted future noise levels with the proposed undertaking in place (10 years after construction) and the predicted future noise levels associated with the "do nothing" alternative at the same date. The significance of a noise impact is calculated by comparing these two sound levels, qualified by using the objective of 55 dBA, in addition to the change in noise level above the ambient sound level.

Per the MTO Noise Guide, where increases in noise levels are predicted, the mitigation efforts to be applied for the predicted change in noise level above the ambient and the projected noise level with the proposed improvements are as follows:

Change in Noise Level Above Ambient / Projected Noise Levels with Proposed Improvements	Mitigation Effort Required
< 5 dBA change & < 65 dBA	None
≥ 5 dBA change OR ≥ 65 dBA	• Investigate noise control measures within the right-of-way (ROW) • Introduce noise control measures within ROW and mitigate to ambient if technically, economically and administratively feasible • Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers

Noise levels are predicted in decibels in the A-weighted dBA scale, which best approximates the human perception of sound over a specified time period. An increase of 2–3 decibels in noise levels is considered to be just perceivable to the average person. It should be noted that a 3 dBA increase in noise equates to a doubling of traffic volumes.

Noise Assessment

The findings of the noise assessment are as follows:

- The predicted increase in noise levels is < 5 dBA at all receiver locations.
- Absolute sound levels greater than 65 dBA are predicted at many noise sensitive locations throughout the study area. Noise mitigation at these locations has been investigated, in accordance with the MTO Environmental Guide for Noise:
    - Noise mitigation should be investigated within the right-of-way (off-right-of-way noise mitigation measures such as window upgrades and air conditioning are not considered).
    - Mitigation measures should achieve at least 5 dB of attenuation over the first row of affected receivers.
    - Mitigation should be implemented where administratively, technically and economically feasible.

In areas where 5 dB of attenuation is achievable with noise barriers, mitigation is considered Technically Feasible. Three areas were identified where mitigation was determined to be Technically Feasible:

- Southwest of the Franklin Boulevard Underpass (Wayne Avenue);
- Between Townline Road and Hanlon Expressway (receivers OLA09 and OLA10); and
- Southwest of the Wellington Road 36 Underpass.

Wayne Avenue

At Wayne Avenue, mitigation has been found to be Technically and Economically Feasible on the southwest corner of the Franklin Boulevard underpass. A 270 m barrier is recommended in this area, assuming it is technically feasible to install in the required location. This will be reviewed further during the detail design phase.

Townline Road to Hanlon Expressway

In the area between Townline Road and the Hanlon Expressway, receivers are too widely spaced for mitigation to be deemed economically feasible. Since receivers are widely spaced and set back from the highway, only a small percentage of the viewable roadway could potentially be blocked. It would be impossible to achieve 5 dB of attenuation with an economically feasible barrier. Thus, noise barriers are not recommended in these areas.

Wellington Road 36

In the Wellington Road 36 area, the detailed mitigation calculations include 2 potential mitigation scenarios: a 4 m high barrier of 200 m in length; and a 5 m high barrier of 160 m in length. Neither scenario will lead to a 5 dB reduction averaged over the first row of noise-sensitive receivers. As a result, noise barriers in this area are not considered to be Economically Feasible. Therefore, no mitigation is recommended in this area.

Other noise mitigation measures include:

- Changes to horizontal and vertical alignments:
    - Horizontal changes in alignment can result in increases or decreases in noise levels at noise sensitive receptors, through moving the roadway closer or further away. However, the changes that result are limited, since the distance from the roadway must be doubled to achieve a 3 to 5 dB decrease in noise level. For this particular project, the alignment is constrained by the location and width of the existing right-of-way, and the location of noise sensitive receptors.
    - Vertical changes in alignment can affect noise at NSAs by affecting the line-of-sight between the roadway sources and the receivers. For example, placing the roadway at the bottom of a shallow in-cut can create a natural barrier effect at the edge of the excavation. However, this may create drainage issues or other issues with highway construction and maintenance. Elevated roadways located on embankments or structures may also have reduced noise levels, as the structure/berm can act as a noise barrier for ground level receptors. For this project, the potential for changes in the vertical alignment would be cost prohibitive.
- Changes to pavement surface types
    - In addition to standard asphalt, concrete pavement may be considered for this project. The use of concrete as opposed to standard asphalt is predicted to lead to an additional increase in overall noise impacts by approximately 3dB. However, this increase is not anticipated to affect the effectiveness of the evaluated mitigation measures.

<u>Construction Noise</u>

During construction of the improvements, the contractor will be required to abide by the Contract Operational Constraints and municipal noise control by-laws. The Contractor will be required to keep idling of construction equipment to a minimum and to maintain equipment in good working order to reduce noise from construction activities.

Construction may occur outside of normal working hours and on weekends for certain activities along Highway 401. Such work will be carried out in compliance with local Noise By-Laws and any Noise By-Law exemptions that may be granted.

If complaints regarding construction noise arise, they will be investigated according to the provisions of the existing MTO/MOE Noise Protocol and the new MTO Noise Guide. The Protocol requires that any initial complaint from the public be verified by MTO to determine if the agreed upon general noise control measures are in effect. If not, MTO will warn the contractor of any problems and will take steps to enforce the contract.

8.11 Air Quality Assessment

An air quality assessment was carried out to determine the potential air quality impacts from the proposed improvements to Highway 401. By comparing conditions with and without the highway widening, the air quality assessment determined the potential changes in levels of key volatile organic compounds and selected air contaminants including nitrogen dioxide, carbon monoxide, and particulate matter in three size fractions (suspended particulate matter (SPM), PM10 (particle of sizes smaller than 10 microns), and PM2.5 (particle of sizes smaller than 2.5 microns).

For most contaminants, the predicted maximum concentrations at sensitive receptors near Highway 401 are within provincial air quality thresholds for both the construction year (2021) and 10 years after construction (2031) scenarios.

One exception is benzene over an annual averaging period, and this is the result of a background concentration which already exceeds the threshold. The impact of the highway to the cumulative annual benzene concentration at any of the sensitive receptors is minimal (<4%). The proposed project will have a slight reduction in benzene concentrations due to the improvements of tailpipe emissions from motor vehicles.

Tall vegetation is effective at reducing pollutant concentrations downwind of roadways, and noise barriers can reduce pollutant levels in areas immediately behind the barrier (within 80 m).

In the case of the Highway 401 improvements project, there is a small hill with some trees leading up to the most affected area (Southwest of Highway 401 at the Franklin Boulevard Interchange) which will provide some benefit. Furthermore, a noise barrier is proposed to be added along Highway 401 at this section which may also provide some air quality mitigation to these residences.

In order to minimize potential air quality impacts during construction, the construction tendering process will include requirements for implementation of an emissions management plan. Such a plan would set out established best management practices for dust and other emissions. Some of the best practices include the following:

- Use of reformulated fuels, emulsified fuels, exhaust catalyst and filtration technologies, cleaner engine repowers, and new alternative-fuelled trucks to reduce emissions from construction equipment.
- Regular cleaning of construction sites and access roads to remove construction-caused debris and dust.
- Dust suppression on unpaved haul roads and other traffic areas susceptible to dust, subject to the area being free of sensitive plant, water or other ecosystems that may be affected by dust suppression chemicals.
- Covered loads when hauling fine-grained materials.
- Prompt cleaning of paved streets/roads where tracking of soil, mud or dust has occurred.
- Tire washes and other methods to prevent trucks and other vehicles from tracking soil, mud or dust onto paved roads.
- Covered stockpiles of soil, sand and aggregate as necessary.
- Compliance with posted speed limits and, as appropriate, further reductions in speeds when travelling sites on unpaved surfaces.

8.12 Archaeological Resources

A Stage I archaeological assessment was carried out to assess the proposed improvements to Highway 401. The assessment concluded:

- The Highway 401 study area is disturbed. However, the section of the corridor from the Halton Region boundary westerly to east of Highway 6 South appears to have areas that are not disturbed. A Stage 2 assessment will be required at these locations before construction can occur.
- Some of the interchanges may have some areas that are not disturbed. The Hanlon Expressway interchange and the Highway 6 South/Brock Road interchange will require a Stage 2 assessment before construction can occur.
- The Townline Road interchange has been previously assessed and no further assessment is required.

Given the above, a Stage 2 assessment will be required for the indicated portion of the right-of-way and interchanges along the corridor before construction can proceed as planned. Any new property required for development outside the boundaries of the existing corridor will require a Stage 2 investigation.

Should deeply buried archaeological remains be found on the property during construction activities, the Ministry of Tourism, Culture and Sport should be notified immediately. In the event that human remains are encountered during construction, the MTCS and the Registrar of the Cemeteries Branch of the Ministry of Government Services should be contacted immediately.

8.13 Heritage Resources

Widening and interchange improvements have the potential to adversely affect cultural heritage landscapes and built heritage resources by displacement and/or disruption during and after construction.

Indirect Impacts

The following properties may be subject to disruption, or indirect impacts, by the introduction of physical, visual, audible or atmospheric elements that are not in keeping with their character and/or setting due to construction work, proposed property requirements, and road widening and improvements. All of the properties are included on the Township of Puslinch Heritage Inventory.

No. 319 Brock Road South, (Church and Cemetery)

- There will be some property requirements on Brock Road South that could affect Duff's Presbyterian Church (1903) and Crown Cemetery (1827).

No. 4240 Victoria Road South (Farm Complex)

- There will be some property requirements on Victoria Road South as well as temporary closure and detour routes required during bridge construction.

No. 7657 Wellington County Road #36 (Farm Complex)

- The widening of Highway 401 may introduce audible elements not in keeping with the character and setting of the property.

No. 4148 Puslinch Concession 10 Road (Farm Complex)

- There will be some property requirements as a result of the new bridge crossing.

Direct Impacts

MTO has identified a functional need to replace all eight of the underpass structures for which Cultural Heritage Evaluation Reports (CHERs) were completed, including the Wellington Road #36 bridge which is worthy of consideration for listing on the Ontario Heritage Bridge List.

Mitigation

Road improvements should not adversely affect cultural heritage resources and intervention should be managed in such a way that its impact is sympathetic with the value of the resources. When the nature of the undertaking is such that adverse impacts are unavoidable, mitigation strategies that alleviate the deleterious effects to a cultural heritage resource may include such actions as avoidance, monitoring, protection, relocation, documentation, salvage, and remedial landscaping. Mitigation strategies may be temporary or permanent actions.

The following specific mitigation actions are recommended.

- Wellington County Road #36 underpass (a candidate for the Ontario Heritage Bridge List)
  - Any replacement structure should be designed in a sympathetic manner;
  - Conservation options as outlined in Section 4.3 of the *Ontario Heritage Bridge Guideline* should be considered; and
  - Full recording and documentation of the existing structure should be undertaken prior to any change at the site.
- Brock Road Underpass
  - The existing CHER prepared in 2010 for this structure will serve as the documentation record.
- Six continuous deck slab structures
  - The CHER for the following structures is considered to be the documentation record for:
  - Waterloo Regional Road #24 Underpass;
  - Wellington County Road #32 Underpass;
  - Wellington County Road #35 Underpass;
  - Hanlon Expressway Underpass and Interchange;
  - The Township of Puslinch Bridge No. 11 Underpass; and
  - Puslinch Concession Road 10 (Watson Road South) Underpass.

8.14 Construction Staging

Construction staging/sequencing will be determined during the subsequent detail design phase.

Short term, off-peak closures may be required during some operations. This will be confirmed during detail design.

The exception to this is the S-W ramp from Franklin Boulevard to Highway 401 westbound. Due to the proposed bridge replacement, the preliminary construction staging plans indicate that the ramp may be closed for the duration of construction.

Advance signing of construction zones will be provided.

8.15 Emergency Vehicle Response

The Project Team will continue to consult with emergency services in the detail design phase to determine appropriate mitigation measures for the construction phase.

8.16 Carpool Parking Lots

Access to all carpool parking lots within the study area will be maintained throughout the construction phase.

8.17 Illumination

The primary objective of highway lighting is to improve safety. MTO strives to achieve this objective in a cost effective and energy efficient manner while considering local needs and environmental impacts. This study included the review of existing roadway and interchange illumination. The application of illumination warrants considered conventional and high mast installations. The criteria for evaluating the illumination options considered the following:

- Adjacent land use;
- Environmental impacts;
- Safety;
- Maintenance requirements;
- Ability to accommodate staged highway construction; and
- Cost.

In accordance with Ministry Policy for Highway Illumination, Directive PLNG-B-05, a preliminary illumination warrant analysis for Continuous Illumination of Highway 401 within the study area was undertaken for the Preferred Plans.

Based on the Directive, with the applicable geometric, operational and environmental factors as well as night time accidents collisions, it was concluded that all mainline Highway 401 sections exceeded the minimum requirement for illumination warranting conditions. A Benefit-Cost Analysis was conducted and determined that full illumination is warranted from the west study limit (1.0 km west of Hespeler Road) to Franklin Boulevard, and that full illumination is optional from Franklin Boulevard easterly to the east study limit (Wellington County/Halton Region boundary). The use of high mast or conventional illumination will be determined in the detail design phase.

Other factors and warranting conditions will be reviewed and discussed with MTO during the final warrant analysis and form part of the final recommendations.

Other possible conditions/locations that warrant illumination are:

- Service Centre entrance and exit ramps;
- Areas where provisions for police enforcement are part of HOV lane design; and
- Transition zones that are 500m or less in length.

The design of future lighting will consider a balance of road user safety and environmental concerns. MTO is committed to minimizing glare and spill on adjacent sensitive areas.

8.18 Utilities

Disruptions to utility services as a result of the preferred highway widening and interchange improvement alternatives are not anticipated. Impacts to/relocation of the existing utilities are anticipated to be minor, and will occur through consultation with the affected utility providers in the subsequent detail design phase.

8.19 Summary of Identified Concerns and Proposed Mitigation

Exhibit 8-3 summarizes the identified concerns and the proposed mitigation measures, based on the identified environmental sensitivities and the proposed preliminary design plan. The proposed improvements to Highway 401 may be subject to minor refinements during the development of the detail design plan. Any potential refinements, however, are not anticipated to increase impacts to the identified concerns.

Exhibit 8-3: Summary of Identified Concerns and Proposed Mitigation

ENVIRONMENTAL ISSUE/CONCERN	PROPOSED MITIGATION
Erosion and Sediment Control (See **Section 8.1** for further details)	
• Excavation and grading may result in erosion of exposed soils that can be carried to the watercourses/municipal drains during storm events.	• Vegetation removal will be limited to only what is required. • Erosion and sediment control practices will be implemented throughout construction to prevent migration of sediment into adjacent areas. • All appropriate temporary erosion and sediment control measures such as silt fence barriers, erosion control blanket, and rock flow checks will be used to contain the construction area and prevent any migration of sediment. • All disturbed slope areas will be stabilized and vegetated with top soil, seed and mulch. • Stabilization and re-vegetation will be established as soon as possible following excavation and construction. • An environmental inspector will be employed throughout construction to ensure sediment and erosion control measures are functioning properly and all mitigation measures are being implemented.
Management of Excess Material and Property Contamination (See **Section 8.2** for further details)	
• Excess materials may be encountered during construction and require proper management/disposal. • Property contamination may be encountered during construction and require proper management/disposal. • Further investigations (Phase I and/or Phase II ESAs) during detail design are required for sites to be directly impacted by the preferred plan.	• Excess materials generated during construction will be managed by the Contractor in accordance with OPSS 180. • Opportunities to minimize excess material through salvage or reuse, such as slope flattening, will be identified during the detail design phase. • Mitigation measures during construction typically include: - Ensure proper containment, filtering and proper release away from sensitive features of sediment from all construction-generated dewatering discharge. - Employ proper handling of potentially toxic construction materials and ensure proper spills management. The Contractor will be required to have a Spills Prevention and Management Plan.
Landscape (See **Section 8.3** for further details)	
• Alterations to landscape character and scenic integrity.	• A landscape composition plan will be prepared during the detail design phase. Mitigation recommendations may include: - Plantings incorporated to screen woodlot edges from salt spray; - Visual screening with coniferous and deciduous tree plantings along the corridor; and - Riparian planting for disturbed creek/culvert crossings.
Vegetation (See **Section 8.4.1** for further details)	
• There is potential for direct and indirect impacts to natural areas adjacent to, and within, the right-of-way. It is anticipated that direct impacts will be minimal as the widening will occur largely within the existing right-of-way.	• Impacts to areas of designated natural features such as Provincially Significant Wetlands (PSW) and Areas of Natural and Scientific Interest (ANSI) adjacent to the highway will be minimized. • Where direct impacts to rare plant species cannot be avoided, site specific mitigation measures will be developed as appropriate, and in

ENVIRONMENTAL ISSUE/CONCERN	PROPOSED MITIGATION
In some areas, such as at interchanges, an expanded right-of-way may encroach into adjacent natural areas resulting in localized impacts including temporary disturbance to common species and minor edge removal of vegetation. • From background information and field surveys, 1 species at risk (Butternut) was identified at 2 locations within the study area adjacent to the existing right-of-way.	consultation with appropriate external agencies during the detail design phase. These measures may include the following: - Ensure the use of appropriate vegetation clearing techniques. - Design and install standard sediment and erosion control measures. - Stabilize and re-vegetate exposed surfaces as soon as possible using a combination of native plantings and the application of an appropriate native seed mix. - Delineate "Environmental Sensitive Areas" in Contract Drawings and Specifications and in the field use temporary vegetation protection fencing or other appropriate fencing or other appropriate measures to prevent encroachment into sensitive areas. - Implement environmental inspection throughout construction to ensure that protection measures are implemented, maintained and repaired and remedial measures are instigated where warranted.
Wildlife (See **Section 8.4.2** for further details)	
• Sensitive wildlife habitat features (e.g. deer wintering habitat) occur on both sides of the highway at Mill Creek Wetland, there is concern that increased traffic and associated noise could displace wildlife and disturb breeding birds during construction. • Background information indicates 10 species at risk potentially occur within the study area; based on a review of suitable habitat, 1 species (Blanding's Turtle) has been confirmed directly in the study area.	• Wildlife movement and opportunities to improve habitat connectivity across the highway at specific locations will be examined. • Appropriate protection/mitigation measures for potential habitat will be developed with the Ministry of Natural Resources (MNR) during the detail design phase. Mitigation measures may include the following: - Wildlife incidentally encountered during construction will be protected; - If required, the environmental inspector will capture and release any small wildlife (e.g. amphibians, small mammals, reptiles) stranded within the construction zone; - No active nests will be removed or disturbed in accordance with the *Migratory Birds Act*; and - Ensure that timing constraints are applied to avoid vegetation clearing during the breeding bird season. Regional timing window to be confirmed with Environment Canada/Canadian Wildlife Service prior to construction.
Fisheries (See **Section 8.5** for further details)	
• Potential impacts to fish habitat due to culvert replacement/ extensions	• Appropriate mitigation measures accepted by the MNR and Department of Fisheries and Oceans (DFO) will be used to protect fish habitat, and may include: - Proper timing of construction to protect movement, spawning and incubation activities; - Stringent water quality and quantity measures and sediment and erosion control plan, both during construction as well as on-going operations will be implemented to protect both surface water and groundwater; and - Proper design of extended or new culverts to maintain groundwater discharge and other habitat functions, and re-establishment of reaches where culverts are abandoned. • All relevant environmental approvals from DFO and MNR will be acquired during the detail design phase.

ENVIRONMENTAL ISSUE/CONCERN	PROPOSED MITIGATION
Navigable Waters	
• Consultation with Transport Canada is ongoing with respect to navigation clearance requirements associated with the widening of the existing structures and approvals required under the Navigable Waters Protection Act.	• Application for approvals where applicable under the Navigable Waters Protection Act will be submitted during the subsequent detail design phase.
Groundwater (See **Section 8.6** for further details)	
• Uncontrolled runoff during construction or operation of the site could result in contamination of groundwater through infiltration of potential contaminants, and/or surface water as a result of potential contaminants or sediment. There is also the potential for secondary effects via impacts to groundwater and surface water quality in relation to watercourses/municipal drains.	• Mitigation measures during construction may include: - MTO best management practices for erosion and sedimentation control to be in place during all stages of construction and operation of the site in order to avoid potential impacts to surface water and groundwater; and - Design and operational components that emphasize prevention of any off-site impacts by first avoiding or minimizing potential for spills, and then ensuring proper containment measures are in place so that deleterious materials cannot migrate off-site. Stringent management of site drainage will protect groundwater and surface water resources. • If diversion of surface water or the extraction of groundwater will be in excess of 50,000 litres per day, a Permit to Take Water (PTTW) will be obtained from MOE during the detail design phase. • A residential well water survey for the study area will be carried out in the detail design phase to determine if water wells within the study area will be impacted during construction.
Drainage and Surface Water (See **Section 8.7** for further details)	
• Runoff from Highway 401 and crossing roads could impact water quality if not properly handled.	• Storm water management practices will be implemented to minimize environmental degradation. • Erosion and sediment control measures will be will be identified during the detail design phase and further developed prior to/during construction. • All open ditches within the limits of the project will be constructed to allow proper storm water flow to the watercourse/municipal drains within the study area.
Adjacent Land Uses/Property (See **Section 8.8** for further details)	
• Property acquisition required at some interchange and mainline widening locations.	• MTO will negotiate with individual property owners to provide fair market value for the required property. Property negotiation and acquisition is anticipated to occur in the subsequent detail design phase.

ENVIRONMENTAL ISSUE/CONCERN	PROPOSED MITIGATION
Agriculture (See **Section 8.9** for further details)	
• The majority of the widening will be contained within the existing Highway 401 corridor. • The preferred interchange improvements are expected to result in some direct and indirect impacts to agriculture.	• Mitigation for areas directly affected by the widening is not possible due to the direct loss of land for construction and maintenance of the proposed Highway 401 improvements. The small portions of land required do not impact any areas of registered Tile Drainage, and there are no direct impacts to any agricultural facility.
Highway and Construction Noise (See **Section 8.10** for further details)	
• Noise Assessments determined that absolute sound levels greater than 65 dBA are predicted at many noise sensitive locations throughout the study area. Noise mitigation at these locations has been investigated and should be implemented where administratively, technically, and economically feasible.	• Noise barriers were determined to be Technically Feasible but not Economically Feasible at Wellington Road 36 and the area between Townline Road and the Hanlon Expressway. Noise mitigation is not recommended in these areas. • Noise mitigation was determined to be both Technically and Economically Feasible at the southwest corner of the Franklin Boulevard underpass (Wayne Avenue). A 270 m barrier is recommended in this area, assuming it is technically feasible to install in the required location. • The Contractor will be required to abide by the Contract Operational Constraints and municipal noise control by-laws. • The Contractor will be required to keep idling of construction equipment to a minimum and to maintain equipment in good working order to reduce noise from construction activities. • If construction work occurs outside of normal working hours and on weekends, such work will be carried out in compliance with local noise By-Laws or Noise By-Law exemptions will be obtained. • Complaints from construction will be investigated according to the provisions of the existing MTO/MOE Noise Protocol.
Air Quality (See **Section 8.11** for further details)	
• The predicted maximum concentrations at sensitive receptors near Highway 401 are expected to be within applicable air quality thresholds for most contaminants. • Maximum 24-hour PM_{10} concentrations may approach or possibly slightly exceed the threshold over a small area. • Maximum 24-hour benzene concentrations may approach or exceed the threshold. The contribution from the project is expected to be small relative to ambient background concentrations.	• Mitigation measures such as tall vegetation and noise barriers can be effective in reducing air contaminant concentrations. This will be reviewed in the detail design phase. • An emissions management plan based on established best practices will be implemented during construction and may include: - Dust suppressants; - Reduced travel speeds; - Efficient staging of activities; - Minimization of haul distances; and - Covering stockpiles.

ENVIRONMENTAL ISSUE/CONCERN	PROPOSED MITIGATION
Archaeological Resources (See **Section 8.12** for further details)	
• A Stage I Archaeological Assessment revealed that some interchanges and a section of the Highway 401 corridor between the Halton Region boundary westerly to east of Highway 6 South have areas that are not disturbed. A Stage II Archaeological Assessment will be required.	• A Stage II Archaeological Assessment will be carried out during the subsequent detail design phase. • If the Contractor's operations expose any items that may indicate an archaeological find, work in the area will be suspended immediately and MTCS will be contacte
Heritage Resources (See **Section 8.13** for further details)	
• Indirect impacts by the introduction of physical, visual, audible, or atmospheric elements not in keeping with existing character or setting due to construction work, proposed property requirements, and road widening to properties included on the Township of Puslinch Heritage Inventory. • All of the bridge structures (with the exception of the structure at Townline Road) are greater than 40 years old, and will be replaced, including the Wellington Road #36 bridge which is worthy of consideration for listing on the Ontario Heritage Bridge List.	Site specific mitigations measures include: • Wellington County Road #36 underpass - Replacement structure should be designed in a sympathetic manner; - Conservation options as outline in Section 4.3 of the *Ontario Heritage Bridge Guidelines* should be considered; and - Full recording and documentation of the existing structure. • Brock Road underpass and six continuous deck slab structures - The existing CHERs prepared in 2010 shall service as the documentation record for these structures.
Construction Staging/Traffic (See **Section 8.14** for further details)	
• Full access between Highway 401 and all of the interchanges is expected to be maintained during construction, with the exception of the S-W ramp at the Highway 401 and Franklin Blvd. interchange. Short term, off-peak closures may be required during some operations. This will be confirmed during detail design. • Potential for disruption to regular traffic operations and traffic delays during the construction phase.	• A preliminary staging plan will be prepared to minimize impacts to the travelling public and ensure a safe work zone during the construction phase. • Advance signing of construction zones will be provided.
Emergency Vehicle Response (See **Section 8.15** for further details)	
• Potential impacts to emergency service response times.	• Mitigation measures to be developed in consultation with emergency service providers in the detail design phase to maintain appropriate emergency response times.
Illumination (See **Section 8.17** for further details)	
• Potential for light spillage onto private properties and adjacent sensitive areas.	• The design of future lighting will consider a balance of road safety and environmental concerns. MTO is committed to minimizing glare and spill from highway luminaries.

ENVIRONMENTAL ISSUE/CONCERN	PROPOSED MITIGATION
Utilities (See **Section 8.18** for further details)	
• Disruptions to utilities are not anticipated. • Impacts to/relocation of the existing utilities are anticipated to be minor.	• Relocation of affected utilities will occur through consultation with the affected utility providers in the subsequent detail design phase.
Greenbelt	
• The section of Highway 401 between Highway 6 South and the Wellington County/Halton Region boundary are situated within Ontario's Greenbelt.	• The assessment of alternatives and the selection of the preferred plan considered environmental protection and mitigation within the Greenbelt in accordance with the Greenbelt Plan.

9.0 MONITORING

9.1 Monitoring During Construction

The MTO has an internal process to identify and address updates to the Ontario Provincial Standard Specifications, and MTO Special Provisions and Non-Standard Special Provisions. This includes ongoing review of unanticipated events that occur during other construction contracts and incorporation of required updates into future contract provisions. This helps to assess the effectiveness of the contract provisions to ensure that they are providing the expected control and/or protection.

On-site construction administration/inspection staff (retained by MTO) will ensure that the environmental protection measures outlined in this report are carried out. In the event that problems develop, the MTO Environmental Planner and appropriate external agency representatives will be contacted to provide additional input.

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