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

November 2012
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GROUP 'B' PROCESS

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November 2012
THE PUBLIC RECORD

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(Aberfoyle) R.R. #3
Guelph, ON
N1H 6H9


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<tr>
<td>AANDC</td>
<td>Aboriginal Affairs and Northern Development Canada</td>
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<td>dBA</td>
<td>Decibels (A-weighted)</td>
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<td>DFO</td>
<td>Department of Fisheries and Oceans, Canada</td>
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<td>GRCA</td>
<td>Grand River Conservation Authority</td>
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<td>GTA</td>
<td>Greater Toronto Area</td>
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<td>G.W.P.</td>
<td>Group Work Project</td>
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<td>HADD</td>
<td>Harmful Alteration, Disruption or Destruction</td>
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<td>Species at Risk</td>
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<td>Storm Water Management Practices</td>
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<td>TESR</td>
<td>Transportation Environmental Study Report</td>
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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.

This Preliminary Design and Class Environmental Assessment Study was reviewed by the Project Team and the Ministry of Transportation. The Project Team collectively determined that the project is not “designated” and therefore will not require consideration of a federal environmental assessment. The Protocol requires MTO and their Fisheries Specialists to determine whether the 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.

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.

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.
**Construction**

**Environmental Protection in Construction**

**Planning**

- Review of Transportation Needs Assessment
- Generate, Evaluate, and Select Preferred Planning Alternative

**Preliminary Design**

- Generate and Assess Preliminary Design Alternatives
- Evaluate and Select Preferred Preliminary Design Alternatives
- Develop Preferred Preliminary Design Alternative

**Detail Design**

- Generate and Assess Detail Design Alternatives
- Evaluate and Select Detail Design Alternatives
- Develop Preferred Detail Design Alternative

**Environmental Protection**

- Environmental Protection in Preliminary Design
- Environmental Protection in Detail Design

**Consultation**

- Consultation Regarding Planning (Requirement Varies)*)
- Earliest Consultation
- Latest Consultation
- Phased Consultation Regarding Design Concepts (Mandatory)
  - Earliest Phase for Consultation
  - Latest Phase for Consultation

**Environmental Documentation and Opportunity for Bump-up**

- Alternative Publication points for Study Design for Complex Projects (Optional)
- Alternative submission points for Design and Construction Report (Requirement varies)

**Phased Consultation Regarding Design Concepts (Mandatory)**

Source: Class Environmental Assessment for Provincial Transportation Facilities (2000)
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 Concession #7 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:

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Fax: (519) 873-4600
e-mail: Roger.A.Ward@ontario.ca
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
- Service Centre Redevlopments (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.
G.W.P. 8-00-00 STUDY LIMITS

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.

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.

Region of Waterloo - Rapid Transit EA

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

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

Service Centre Redevelopments (Redevelopment Underway)

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).

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

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

Highway 6 (Hanlon Expressway) Improvements (EA Approved).

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

Highway 7 New (EA Approved)

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 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 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. 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.
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 within 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.

**Birds**

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).

**Amphibians and Reptiles**

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 marginata) 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.
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 C20) 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 allochthonous 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 allochthonous 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 S3 (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 (Cypripedium 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).

November 2012
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. monilfera).

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

**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.

**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 aquifiers 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 (WHPA) 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 southeast 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 Extent (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 Extent (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.

Potential Site Contamination - Low

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 1 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 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;
- Farmhouse and barn located at 7657 Wellington Region Road #36, lot 31, Concession 9, Township of Puslinch, Wellington County;
- Farmhouse and barn located at 4240 Victoria Road South, 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;
- 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;
- 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;
- 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;
- 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;

**Roadway**
- Waterloo Regional Road #24;
- Puslinch Concession 10 Underpass;
- Wellington 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 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.
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.

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; and
- 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);
  - Trowline 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.
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

Section 1: West of Hespeler Road to Townline Road

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.

Section 2: Townline Road to the Hanlon Expressway

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.

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

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.
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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
## SECTION 1: WIDENING ALTERNATIVES

### SUMMARY EVALUATION

<table>
<thead>
<tr>
<th>Factor Area</th>
<th>Do Nothing (Comparison Purposes Only)</th>
<th>Widening Alternative 1A: 6-Lane</th>
<th>Widening Alternative 1B: 10-Lane</th>
<th>Widening Alternative 1C: 10-Lane with High Occupancy Vehicle (HOV) Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>![Icon]</td>
<td>![Icon]</td>
<td>![Icon]</td>
<td>![Icon]</td>
</tr>
</tbody>
</table>
* Will not be sufficient to accommodate forecast travel demands.*
* Additional lanes will increase capacity and improve operations.*
* Additional lanes will increase capacity and improve operations.*
* Additional lanes will increase capacity and improve operations.*

| Natural Environment | ![Icon] | ![Icon] | ![Icon] | ![Icon] |
* 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 improve transportation efficiency and reliability, particularly during peak travel periods.*

| Social-Economic Environment | ![Icon] | ![Icon] | ![Icon] | ![Icon] |
* HOV lanes make carpooling and transit more effective and reliable, particularly during peak travel periods.*

| Cultural Environment | ![Icon] | ![Icon] | ![Icon] | ![Icon] |
* Minimal potential for archaeological impact outside of existing right-of-way.*
* Minor increased potential of archaeological impact outside of existing right-of-way compared to Alternative 1B.*

| Constructability | ![Icon] | ![Icon] | ![Icon] | ![Icon] |
* 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 | ![Icon] | ![Icon] | ![Icon] | ![Icon] |
* Lowest construction cost.*
* Lowest construction cost (Approx. $155 M) & property requirements compared to Alternatives 1B.*
* Lower construction cost (Approx. $155 M) compared to Alternative 1C.*
* Marginally higher construction cost (Approx. $120 M) & property requirements compared to Alternatives 1B.*

### Analysis & Evaluation of Highway 401 Widening Alternatives - Section 1

**Preferred Alternative:** 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.

---

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
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
### SECTION 2: WIDENING ALTERNATIVES

#### SUMMARY EVALUATION

<table>
<thead>
<tr>
<th>Factor Area</th>
<th>Do Nothing (Comparison Purposes Only)</th>
<th>Widening Alternative 2A: 8-Lane</th>
<th>Widening Alternative 2B: 10-Lane</th>
<th>Widening Alternative 2C: 10-Lane with High Occupancy Vehicle (HOV) Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>1. Will not be sufficient to accommodate forecast travel demands.</td>
<td>2. Will not be sufficient to accommodate forecast travel demands.</td>
<td>3. Additional lanes will increase capacity and improve operations.</td>
<td>4. Additional lanes will increase capacity and improve operations.</td>
</tr>
<tr>
<td>Natural Environment</td>
<td>1. Minimal potential for impacts to the natural environment.</td>
<td>2. Widening occurs predominantly within existing right-of-way.</td>
<td>3. Minimal potential for impacts to the natural environment.</td>
<td>4. Widening occurs predominantly within existing right-of-way.</td>
</tr>
<tr>
<td>Socio-Economic Environment</td>
<td>1. Minimal property required.</td>
<td>2. Improved traffic operations for commuters and businesses, but does not accommodate long term needs.</td>
<td>3. Approximately 0.7 ha of property required.</td>
<td>4. Improved traffic operations for commuters and businesses.</td>
</tr>
<tr>
<td>Environmental Impact</td>
<td>1. Requires replacement of Wellington Road 32 and Wellington Road 35 underpasses.</td>
<td>2. Minimal potential for archaeological impact outside of existing right-of-way compared to Alternatives 2B and 2C.</td>
<td>3. Requires replacement of Wellington Road 32 and Wellington Road 35 underpasses.</td>
<td>4. Reduced potential of archaeological impact outside of existing right-of-way compared to Alternative 2B.</td>
</tr>
<tr>
<td>Constructability</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Cost</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**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**

**Analysis & Evaluation of Highway 401 Widening Alternatives - Section 2**

**EXHIBIT 5-5**

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.
- HOV lanes make carpooling and transit more effective and reliable, particularly during peak travel periods.

**PREFERRED ALTERNATIVE**
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
### SECTION 3: WIDENING ALTERNATIVES

#### SUMMARY EVALUATION

<table>
<thead>
<tr>
<th>Factor Area</th>
<th>Do Nothing (Comparison Purposes Only)</th>
<th>Widening Alternative 3A: 12-Lane Core / Collector with Rural Outer Separations (EA Approved – WP 65-76-90)</th>
<th>Widening Alternative 3B: 12-Lane Core / Collector with Urban / Barrier Outer Separations</th>
<th>Widening Alternative 3C: 10-Lane HOV with Continuous Auxiliary Lanes between Hanlon Expressway and Highway 6 South/Brock Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td></td>
<td>Yes: Will not be sufficient to accommodate forecast travel demands</td>
<td>Yes: Additional lanes will increase capacity and improve operations</td>
<td>Yes: Additional lanes will increase capacity and improve operations</td>
</tr>
<tr>
<td>Natural Environnement</td>
<td></td>
<td>Yes: Rural median between core and collector lanes is undesirable</td>
<td>Yes: Additional lanes will increase capacity and improve operations</td>
<td>Yes: Additional lanes will increase capacity and improve operations</td>
</tr>
<tr>
<td>Natural - Socioeconomic Environment</td>
<td></td>
<td>Yes: Minimal potential for impacts to the natural environment</td>
<td>Yes: Minimal potential for impacts to the natural environment</td>
<td>Yes: Minimal potential for impacts to the natural environment</td>
</tr>
<tr>
<td>Cultural Environment</td>
<td></td>
<td>Yes: No change from existing condition</td>
<td>Yes: Minimal potential of archeological impact outside of existing right-of-way</td>
<td>Yes: No change to existing right-of-way</td>
</tr>
<tr>
<td>Constructability</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Cost</td>
<td></td>
<td>N/A</td>
<td>Comparable construction cost (Assumed: $221 M) and property cost to Alternative 3B</td>
<td>Comparable construction cost (Assumed: $241 M) and property cost to Alternative 3C</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
<td>PREFERRED ALTERNATIVE</td>
<td>PREFERRED ALTERNATIVE</td>
<td>PREFERRED ALTERNATIVE</td>
</tr>
</tbody>
</table>

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

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

Analysis & Evaluation of Highway 401 Widening Alternatives - Section 3
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
## SUMMARY EVALUATION

### Factor Area

<table>
<thead>
<tr>
<th></th>
<th>Widening Alternative 4A: 8-Lane</th>
<th>Widening Alternative 4B: 10-Lane</th>
<th>Widening Alternative 4C: 10-Lane with High Occupancy Vehicle (HOV) Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transportation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Will not be sufficient to accommodate forecast travel demands.</td>
<td>Widening occurs within existing right-of-way.</td>
<td>Additional lanes will increase capacity and improve operations.</td>
</tr>
<tr>
<td></td>
<td>Additional lanes will increase capacity for use as an interim stage.</td>
<td>Additional lanes will increase capacity and improve operations.</td>
<td>Additional lanes will increase capacity and improve operations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HOV lanes increase the number of demands through a network of transportation infrastructure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HOV lanes make carpooling and transit more effective and reliable, particularly during peak travel period.</td>
</tr>
<tr>
<td><strong>Natural Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No change from existing condition.</td>
<td>No change from existing condition.</td>
<td>No change from existing condition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Socio-Economic Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cultural Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No change from existing condition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sustainability</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Increased complexity may impact movement of individuals and commercial goods.</td>
<td>Improved traffic operations for commuters and businesses.</td>
<td>Improved traffic operations for commuters and businesses.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increased productivity as commuters are less stressed and have improved reliability and travel times.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Increased construction cost (Approx. $210 M)</td>
<td>No property cost.</td>
<td>No significant difference in construction staging between Alternatives 4B and 4C.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increased construction cost (Approx. $350 M) compared to Alternative 4B.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No property cost.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Better use of infrastructure since a lane full of buses and carpools will move more people than a general traffic lane.</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Wideening 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.

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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

Analysis & Evaluation of Highway 401 Widening Alternatives - Section 4

EXHIBIT

5-9
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
## Hespeler Road Interchange

### Summary Evaluation

<table>
<thead>
<tr>
<th>Factor Area</th>
<th>Alternative #H1: (Do Nothing) EA Approved WP 4-00-00</th>
<th>Alternative #H2: Reconstruction on Existing Centreline</th>
<th>Alternative #H3: Partial Shift to the East</th>
<th>Alternative #H4: Partial Shift to the West</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transportation</strong></td>
<td>✔ Does not accommodate forecast traffic volumes on Hespeler Road</td>
<td>✔ Accommodates forecast traffic volumes</td>
<td>✔ Accommodates forecast traffic volumes</td>
<td>✔ Accommodates forecast traffic volumes</td>
</tr>
<tr>
<td></td>
<td>✔ Ramp improvements limited to W-N/S ramp</td>
<td>✔ All ramps meet or exceed acceptable standards</td>
<td>✔ Increased separation between E-N/S ramp terminal and access connection to Holiday Inn Drive</td>
<td>✔ Increase separation between E-N/S ramp terminal and access connection to Holiday Inn Drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔ All ramps meet or exceed acceptable standards</td>
<td>✔ All ramps meet or exceed acceptable standards</td>
</tr>
<tr>
<td><strong>Natural Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>✔ Lead potential impact to the natural environment</td>
<td>✔ Minor potential impact to the natural environment</td>
<td>✔ Minor potential impact to the natural environment</td>
<td>✔ Minor potential impact to the natural environment</td>
</tr>
<tr>
<td><strong>Socio-Economic Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>✔ Least amount of property requirement (approx. 0.6 ha)</td>
<td>✔ #H2, #H3 and #H4 have similar property requirements (approx. 1.4 ha)</td>
<td>✔ #H2, #H3 and #H4 have similar property requirements (approx. 1.3 ha)</td>
<td>✔ #H2, #H3 and #H4 have similar property requirements (approx. 1.3 ha)</td>
</tr>
<tr>
<td></td>
<td>✔ May require relocation of hydro transmission tower</td>
<td>✔ Increased congestion impacts the movement of commuters and commercial goods</td>
<td>✔ Reaches property from Hespeler Road business frontage</td>
<td>✔ Requires property from Hespeler Road business frontage</td>
</tr>
<tr>
<td></td>
<td>✔ Increased separation between E-N/S ramp terminal and access connection to Holiday Inn Drive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cultural Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>✔ No impacts to cultural environment</td>
<td>✔ Bridge not provincially significant impacted lands are located within previously disturbed, minimal archaeological potential</td>
<td>✔ Bridge not provincially significant impacted lands are located within previously disturbed, minimal archaeological potential</td>
<td>✔ Bridge not provincially significant impacted lands are located within previously disturbed, minimal archaeological potential</td>
</tr>
<tr>
<td><strong>Constructability</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>✔ More complicated construction staging</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔ Does not require lane closures on existing bridge during construction</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔ Comparable construction cost (Approx. $30.6 M) and property cost to #H2 and #H4</td>
<td>✔ Comparable construction cost (Approx. $31.0 M) and property cost to #H2 and #H4</td>
</tr>
</tbody>
</table>

### Summary

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.
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Franklin Boulevard
Interchange Alternatives

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

### SUMMARY EVALUATION

<table>
<thead>
<tr>
<th>Factor Area</th>
<th>Do Nothing (Comparison Purposes Only)</th>
<th>Alternative #F1: Replace Bridge on Existing Alignment</th>
<th>Alternative #F2: Realignment to the West</th>
<th>Alternative #F3: Realignment to the East</th>
<th>Alternative #F4: Relocation of West to South Ramp</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transportation</strong></td>
<td></td>
<td>✓ Accommodates forecast traffic volumes on Franklin Boulevard remains on tangent</td>
<td>✓ Accommodates forecast traffic volumes</td>
<td>✓ Accommodates forecast traffic volumes</td>
<td>✓ Accommodates forecast traffic volumes</td>
</tr>
<tr>
<td></td>
<td>Does not accommodate forecast traffic volumes on Highway 401 under Franklin Boulevard</td>
<td>✓ Curve introduced to Franklin Boulevard</td>
<td>✓ Curve introduced to Franklin Boulevard</td>
<td>✓ Curve introduced to Franklin Boulevard</td>
<td>✓ Curve introduced to Franklin Boulevard</td>
</tr>
<tr>
<td></td>
<td>Ramp design minor realignment accommodates project improvements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Natural Environment

<table>
<thead>
<tr>
<th>Alternative</th>
<th>No change from existing condition</th>
<th>Local potential for impacts to natural environment</th>
<th>Similar low potential for impacts to natural environment on #F1; however has a larger area of construction</th>
<th>Similar low potential for impacts to natural environment on #F1; however has a larger area of construction</th>
<th>Additional impacts to natural environment related to relocation of W-S ramp</th>
</tr>
</thead>
<tbody>
<tr>
<td>#F1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>#F2</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>#F3</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>#F4</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Socio-Economic Environment

<table>
<thead>
<tr>
<th>Alternative</th>
<th>No change from existing condition</th>
<th>Increased congestion impacts the movement of commuters and commercial goods</th>
<th>Increased congestion impacts the movement of commuters and commercial goods</th>
<th>Shifts Franklin Boulevard closer to residents on Wayne Avenue</th>
<th>Additional impacts to natural environment related to relocation of W-S ramp</th>
</tr>
</thead>
<tbody>
<tr>
<td>#F1</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>#F2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>#F3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>#F4</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Cultural Environment

<table>
<thead>
<tr>
<th>Alternative</th>
<th>No change from existing condition</th>
<th>Bridge not provincially significant of impacted lands previously disturbed, minimal archaeological potential</th>
<th>Bridge not provincially significant of impacted lands previously disturbed, minimal archaeological potential</th>
<th>Bridge not provincially significant of impacted lands previously disturbed, minimal archaeological potential</th>
<th>Bridge not provincially significant of impacted lands previously disturbed, minimal archaeological potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>#F1</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>#F2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>#F3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>#F4</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Constructability

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Constructability</th>
<th>Requires closure of staged construction of Franklin Boulevard to accommodate W-S ramp during construction</th>
<th>Realignment allows traffic to be maintained on existing bridge during construction</th>
<th>Realignment allows traffic to be maintained on existing bridge during construction</th>
<th>Realignment allows traffic to be maintained on existing bridge during construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>#F1</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>#F2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>#F3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>#F4</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Cost

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Cost</th>
<th>✓ Lowest construction cost (Approx. $10.5 M) to #F3 and no property cost</th>
<th>✓ Comparable construction cost (Approx. $11.5 M) to #F3 and no property cost</th>
<th>✓ Comparable construction cost (Approx. $12 M) to #F4 and lower property cost than #F4</th>
<th>✓ Highest construction cost (Approx. $13 M) and property cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>#F1</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>#F2</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>#F3</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>#F4</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Summary

| Alternative | Summary | ✓ Preferred alternative | | | |
|-------------|---------|------------------------|| | |
| #F1         | Yes     | Yes                    | | | |
| #F2         | Yes     | Yes                    | | | |
| #F3         | Yes     | Yes                    | | | |
| #F4         | Yes     | Yes                    | | | |

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 W-S 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.

---

**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**

**Analysis & Evaluation of Franklin Boulevard Interchange Alternatives**

**EXHIBIT 5-13**
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.
Alternative #1 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
### HANLON EXPRESSWAY INTERCHANGE

#### SUMMARY EVALUATION

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

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

---

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

Analysis & Evaluation of Hanlon Expressway Interchange Alternatives

EXHIBIT 5-16
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.
Interchange Alternative #H6S3:
Easterly Shift of Highway 6 South / Brock Road

Interchange Alternative #H6S2:
Westerly Shift of Highway 6 South / Brock Road
### BROCK ROAD INTERCHANGE

#### SUMMARY EVALUATION

<table>
<thead>
<tr>
<th>Factor Area</th>
<th>Alternative #H6S1: Realign Brock Road with 4-legged Roundabout/Ramp Terminal is preferred</th>
<th>Alternative #H6S2: Realign Shift of Highway 6 South / Brock Road</th>
<th>Alternative #H6S3: Eastern Shift of Highway 6 South / Brock Road</th>
<th>Alternative #H6S4: Realign Brock Road (4-legged Roundabout / Ramp Terminal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>• Do not realign highway alignments necessarily consume in existing interchange • I-49ours ramp connection is a left exit and does not meet driver expectations • Realignment at W/N-S ramp terminal not conventional and may result in traffic conflict</td>
<td>• W/N-S ramp connection is a left exit and does not meet driver expectations • Realign existing interchange • I-49ours ramp connection is a left exit and does not meet driver expectations • Realignment at W/N-S ramp terminal not conventional and may result in traffic conflict</td>
<td>• W/N-S ramp connection is a left exit and does not meet driver expectations • Realign existing interchange • I-49ours ramp connection is a left exit and does not meet driver expectations • Realignment at W/N-S ramp terminal not conventional and may result in traffic conflict</td>
<td>• W/N-S ramp connection is a left exit and does not meet driver expectations • Realign existing interchange • I-49ours ramp connection is a left exit and does not meet driver expectations • Realignment at W/N-S ramp terminal not conventional and may result in traffic conflict</td>
</tr>
<tr>
<td>Natural Environment</td>
<td>• All alternatives have slight minor impacts to the natural environment • No significant impact due to smaller construction footprint</td>
<td>• Less incremental impact to natural environment than Alternative H6S4</td>
<td>• Less incremental impact to natural environment than Alternative H6S4</td>
<td>• Incrementally more impacts than other alternatives due to larger construction footprint</td>
</tr>
<tr>
<td>Cultural Environment</td>
<td>• Historical lands at roundabout impact are located in Stage 2 Archaeological Assessment</td>
<td>• Historical lands at roundabout impact are located in Stage 2 Archaeological Assessment</td>
<td>• Historical lands at roundabout impact are located in Stage 2 Archaeological Assessment</td>
<td>• Historical lands at roundabout impact are located in Stage 2 Archaeological Assessment</td>
</tr>
<tr>
<td>Constructability</td>
<td>• Minor impacts to existing interchange during construction</td>
<td>• Management or requiring a Brock Road accommodates bridge replacement/traffic staging • Increased ramp staging impacts • Minor impacts to existing interchange during construction</td>
<td>• Management or requiring a Brock Road accommodates bridge replacement/traffic staging • Increased ramp staging impacts</td>
<td>• Management or requiring a Brock Road accommodates bridge replacement/traffic staging • Increased ramp staging impacts compared to Alternative H6S1</td>
</tr>
<tr>
<td>Cost</td>
<td>• Lowest construction cost (Approx. $49.8 M) and property cost</td>
<td>• Comparable construction and property cost • Higher construction cost (Approx. $54.9 M) and property cost</td>
<td>• Comparable construction cost (Approx. $54.9 M) and property cost</td>
<td>• Comparable construction cost (Approx. $54.9 M) and property cost</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
<td></td>
<td></td>
<td>PREFERRED ALTERNATIVE</td>
</tr>
</tbody>
</table>

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.
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

<table>
<thead>
<tr>
<th>Factor Area</th>
<th>Alternative WR36-1</th>
<th>Alternative WR36-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accommodates existing traffic operations</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Uses existing road alignments</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Maintains existing visibility/sight distance conditions</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Natural Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grading impacts to wooded area north of Highway 401</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Socio-Economic Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires significantly less property (approximately 0.77 ha)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Minimizes effects of entrance grading</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Natural Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grading impacts to wooded area north of Highway 401</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Socio-Economic Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires greater amount of property to accommodate road realignment</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Entrance grading effects on several residences</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Affects agricultural operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires replacement of the Wellington Road 36 underpass</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Wellington Road 36 underpass considered provincially significant, conservation options to be assessed at detail design stage</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Minimal potential for archaeological impact outside of existing right-of-way</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Constructability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single construction season if Wellington Road 36 closed for duration of construction</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Two construction seasons if Wellington Road 36 remains open during construction</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased bridge cost due to longer spans and use of steel girders</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Reduced cost associated with use of existing alignment, minor property requirements, and minor increase in grade compared to Alternative WR36-2</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Cultural Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires replacement of the Wellington Road 36 underpass</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Wellington Road 36 underpass considered provincially significant, conservation options to be assessed at detail design stage</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Minimal potential for archaeological impact outside of existing right-of-way</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PREFERRED ALTERNATIVE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wellington Road 36 Underpass
SUMMARY EVALUATION

- Accommodates existing traffic operations
- Significant road realignment
- Poor visibility/sight distance conditions on structure and at adjacent intersections

- 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
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.
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

**STUDY COMMENCEMENT**

**DATA COLLECTION / NEEDS ASSESSMENT**

**ALTERNATIVES ASSESSMENT**

**IDENTIFY PREFERRED PLAN**

**FINALIZE PRELIMINARY DESIGN**

**COMPLETE AND FILE TRANSPORTATION ENVIRONMENTAL STUDY REPORT FOR PUBLIC REVIEW**

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**INITIAL STUDY NOTIFICATION**

(June 2009)

- Public
- Property Owners
- External Agencies

**PUBLIC INFORMATION CENTRE #1**

(December 2009)

**PUBLIC INFORMATION CENTRE #2**

(December 2011)

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**STUDY COMPLETION NOTIFICATION**

(Fall 2012)

- Public
- Property Owners
- External Agencies

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**ONGOING OPPORTUNITIES FOR PUBLIC INPUT**