

# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

## Transportation Environmental Study Report Addendum

W.O. 06-20016

Class Environmental Assessment and Preliminary Design Study Update

Ontario Ministry of Transportation

November 2017

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

**Prepared by: AECOM Canada Ltd.**

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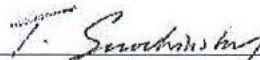
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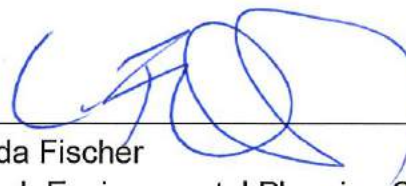
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89 to the Junction of Highway 11

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## Executive Summary

In 2001 the Ontario Ministry of Transportation (MTO) undertook a Planning and Preliminary Design Study to identify required improvements and widening requirements along 30 km of Highway 400 from 1 km south of Highway 89 to the Junction at Highway 11. A Transportation Environmental Study Report (TESR) was made available for public review in 2004 and in 2006 received Environmental Clearance to proceed to further stages of design. AECOM (formerly URS Canada Inc.) was retained by the MTO to undertake a Class Environmental Assessment (EA) and Preliminary Design Study Update to address the changes throughout the corridor.

This current study update revisits the approved plan outlined in the 2004 TERS to incorporate future (2031) traffic projections and address associated capacity, operational and safety needs. Consistent with the Recommended Plan outlined in the 2004 TERS, current traffic projections indicate that the Highway 400 corridor needs to be widened to 10 lanes (five (5) lanes in each direction including four (4) general purpose lanes and one (1) High Occupancy Vehicle (HOV) lane) throughout the majority of the study area (transitioning at the north end to eight (8) general purpose lanes prior to the junction at Highway 11) by 2031 (refer to **Section 2.3** for further details). The addition of lanes to the Highway 400 corridor will require the widening and replacement of the structures that cross Highway 400 (bridges and culverts) within the study limits and improvements will be required to the interchanges to accommodate the proposed widening and provide adequate traffic operations. Improvements to highway drainage and illumination along this section of the Highway 400 corridor have also been identified as part of this study. Many of the structures are currently scheduled for replacement on the MTO *Southern Highways Program* within the next five years and therefore the long-term needs of these structures need to be determined in order to allow infrastructure investments to be made with the long-term vision in mind. It should be noted that interchanges may be initially constructed in a phased approach, prior to the ultimate widening of Highway 400, where interim configurations are required to match the existing highway or crossing roads.

This study followed the approved planning process for a Group 'B' project under the *MTO Class EA for Provincial Transportation Facilities* (2000) and the project limits are within the Town of Innisfil, City of Barrie, and the Township of Springwater within the County of Simcoe, Ontario.

Reasonable alternatives to address the required widening and improvements were developed and evaluated leading to the selection of preferred alternatives and ultimately a recommended plan for this section of the Highway 400 corridor.

### General Description of the Changes to the 2004 TERS

The following sections describe the locations where there are recommended changes to the approved plan outlined in the 2004 TERS. Only the changes to the 2004 TERS noted below and also described in **Sections 2.5.2** and **2.5.3** are eligible to Part II Orders under the Class EA. Refer to **Section 1.3** for further details on the Part II Order process.

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Refer to **Appendix A** for preliminary design plates outlining the Recommended Plan and changes to the 2004 TESR.

### **Highway 400 / Highway 89**

The current Highway 400 / Highway 89 Bridge and Interchange will not accommodate the future Highway 400 widening, which means that the bridge will eventually need to be replaced (as identified in the 2004 TESR). The existing Highway 89 Bridge over Highway 400 is 67 years old (constructed in 1950) and is currently scheduled for replacement in 2018 as per MTO's *Southern Highways Program*. As such the Highway 400 / Highway 89 Interchange is being advanced from the overall study and the bridge will be replaced along with interim improvements to the interchange. A TESR Addendum outlining the need for interim improvements for this Interchange was completed in March 2017, and a "Notice of TESR Addendum Submission" was placed in the *Innisfil Journal* and *Alliston Herald* newspapers on Thursday March 23, 2017 for a 30-day review period. These works have received environmental clearance and are therefore not addressed in this TESR Addendum. For further questions regarding the Highway 400 and Highway 89 TESR Addendum please contact the Project Team as listed in **Section 1.3**.

### **Highway 400 from 1 km South of Highway 89 to North of 10<sup>th</sup> Line (McKay Road)**

Changes to the 2004 TESR approved plan for this section of Highway 400 include the following:

- Additional property required at the Highway 89 Interchange to accommodate grading requirements associated with turning lanes at Reive Blvd;
- Additional property required along the Reive Blvd realignment to accommodate grading requirements;
- Additional property required approximately 1 km south of Highway 89 to the west of Highway 400 to accommodate grading requirements;
- Additional property required for the implementation of five (5) stormwater management ponds and a dry detention cell;
- Additional property required for the culvert replacement and drainage requirements to the west of Highway 400 north of 6<sup>th</sup> Line;
- Additional property required for the speed change lane from Innisfil Beach Road eastbound to Highway 400 Southbound in the southwest quadrant of the Innisfil Beach Road Interchange;
- Widening of Innisfil Beach Road from the existing two (2) lanes to four (4) lanes within the Highway 400 interchange to match the cross section to be constructed beyond the Highway 400 right-of-way that was approved through the *County Road 21 Improvements (Innisfil Beach Road), County Road 27 to County Road 39, Schedule C Class EA Environmental Study Report (County of Simcoe, 2015)*; The replacement of the following culverts: C43, C44, C46, C49, C56, and C60; and,

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- Additional property required at the Highway 89 Interchange to accommodate grading requirements associated with speed change lanes and turning lanes along Highway 400 and Highway 89 (these changes were addressed as part of the *Highway 400 and Highway 89 Interchange Interim Improvements TESR Addendum* (March 2017) which have received environmental clearance).

***Highway 400 from North of 10<sup>th</sup> Line (McKay Road) to Duckworth Street West***

Changes to the 2004 TESR approved plan for this section of Highway 400 include the following:

- Changes to the configuration of the previously approved Diamond interchange at Highway 400 and Maplevue Drive to the newly recommended Diverging Diamond Interchange. The Diverging Diamond Interchange will address the capacity deficiencies at Maplevue Drive as the traffic analysis indicated that it operates at a higher level of service and provides an improvement in traffic operations and safety at the ramp terminals;
- Additional property, on the east side of Highway 400, between Maplevue and Essa Road at Big Bay Point, required to maintain the existing centreline of Highway 400;
- Additional property required for the grading of the ditch associated with the culvert extension north of Essa Road on the west side of Highway 400;
- Additional property required on the west side of Highway 400 at the Barrie/Collingwood Railway structure and the Tiffin Street structure to accommodate construction staging of the bridge replacements;
- Additional property required for a stormwater management pond northeast of Essa Road;
- Additional property required for the improvements to the Highway 400 and Dunlop Street Interchange in the southwest, northwest and northeast quadrants including the following:
  - Improvements to the Dunlop Street intersection with Cedar Pointe Drive;
  - Realignment of the Highway 400 centreline to accommodate construction staging of the interchange improvements and provide flexibility in keeping Dunlop Street open during construction;
  - The two-lane Highway 400 southbound exit ramp;
  - Culvert replacements at Highway 400, the west ramp terminal and at Dunlop Street west of Highway 400; and,
  - Geometric improvements to the cul-de-sac on Henry Street to meet the current standard;
- Additional property required for the improvements to the Highway 400 / Bayfield Street interchange in the northeast and southwest quadrants along Bayfield Street including:

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- Improvements to the geometry of the Bayfield Street eastbound to Highway 400 southbound ramp and the Bayfield Street westbound to Highway 400 northbound ramp; and,
- Addition of a right-turn lane on the Highway 400 southbound to Bayfield Street eastbound / westbound ramp;
- Widening of Bayfield Street to six (6) lanes within the MTO right-of-way to match the City of Barrie's planned future cross-section of Bayfield Street (three (3) lanes in each direction);
- The addition of two (2) noise walls (one (1) on the west side of Highway 400 south of Anne Street and one (1) on the west side of Highway 400 north of Duckworth Street), and the extension of noise walls recommended in the 2004 TESR (refer to **Section 6.2.3** for further information on noise mitigation); and,
- The replacement of the following culverts: C62, C64, C65, C66, C68, C73, C74, C75, C76, C79, C80, C82 and C83.

### **Highway 400 Duckworth Street West to the Junction of Highway 11**

There have been no changes from the 2004 TESR that require additional property in this section of the study area.

Additional condition surveys identified that because of the deteriorating condition of culverts C84 and C85, they are recommended for replacement as part of this update study. The 2004 TESR only recommended the extension of all culverts within the study area. The replacement of these culverts is not anticipated to require additional property.

### **Purpose of this TESR Addendum**

The Class EA requires that a TESR Addendum be prepared if significant design changes are identified compared to the proposed improvements put forth in the Preliminary Design TESR. This TESR Addendum has been prepared to document the proposed improvements and modifications to the recommended plan for the *Highway 400 Improvements from 1 km South of Highway 89 to the Junction at Highway 11* relative to that outlined in the TESR (April 2004) for the *Highway 400 Planning and Preliminary Design Study from 1 km South of Highway 89 Northerly 30 km to the Junction at Highway 11* (G.W.P. 30-95-00). The TESR Addendum includes a discussion on the need for improvements to various interchanges along the Highway 400 between Highway 89 and Highway 11, the addition of noise mitigation measures, as well as the requirement for additional property for stormwater management ponds and stormwater management facilities. Furthermore, this TESR Addendum includes an overview of the generation, assessment and evaluation of alternatives, the recommended plan, a summary of environmental issues and potential mitigation measures, a summary of consultation undertaken throughout the study, and commitments to be carried out during Detail Design and construction.

As required under the Class EA, this TESR Addendum is being made available to the public, other interested parties and external agencies for a 30-day review period at the

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following six (6) locations as well as the project website  
**<http://highway400improvements89to11.com/>:**

- Innisfil Public Library, Churchill Branch;
- Barrie Public Library, Downtown Branch;
- City of Barrie, City Hall, 6<sup>th</sup> Floor;
- Town of Innisfil, Town Hall;
- AECOM, Barrie Office; and,
- Ministry of Transportation, Central Region, Environmental Section.

A “*Notice of TESR Addendum Submission*” was placed in the *Innisfil Journal*, *Alliston Herald*, *Barrie Advance*, and *Barrie Examiner* newspapers on **Thursday November 9, 2017** to notify interested parties of the opportunity to review this TESR Addendum. Letters were also sent to individuals on the project mailing list on **Friday December 8, 2017**

Detailed background information, including supporting study reports, is contained in the environmental study file. The Ministry of Transportation and the AECOM Project Team members are available to discuss this information.

The TESR Addendum has been made available on **Thursday November 9, 2017** for a 30-day public review period. Interested persons are encouraged to review the TESR Addendum and provide written comments to the MTO during the 30-day review period (ending **Friday December 8, 2017**). If after consulting with MTO and Consultant staff, you still have serious unresolved concerns, you have the right to request the Ministry of Environment and Climate Change (in writing to: 77 Wellesley Street West, 11<sup>th</sup> Floor, Ferguson Block, Toronto, Ontario M7A 2T5) to issue a Part II Order (i.e. “bump up”) for the proposed changes to the Highway 400 improvements between Highway 89 and Highway 11. A Part II Order may lead to the preparation of an Individual EA. A copy of the Part II Order request that is sent directly to the Minister of the Environment and Climate Change should also be forwarded to the Ministry of Transportation and Consultant Staff at the addresses listed below. If there are no outstanding concerns at the end of the 30-day review period (ending **Friday December 8, 2017**) the project will be considered to have met the requirements of the Class EA.

Only the changes documented in the TESR Addendum outlined above and in **Sections 2.5.2 and 2.5.3** are eligible for Part II Order requests. The changes documented in the *Highway 400 and Highway 89 Interchange Interim Improvements TESR Addendum* (March 2017), noted above, have received environmental clearance and are therefore not eligible for Part II Order Request. In the event that a Part II Order request is granted, MTO has the option to withdraw the Addendum.

Notification of the locations of the TESR Addendum for review has been published in local newspapers and mailed to those on the project mailing list.

Comments are being collected to provide and obtain information, and to identify concerns in accordance with the *EA Act*. This material will be maintained on file for use during the project and may be included in study documentation.

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Information collected will be used in accordance with the *Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

If you have any accessibility requirements in order to participate in this study, please contact the Project Team.

**The Public Record**

**Innisfil Public Library, Churchill Branch**

2282 4th Line  
Innisfil, ON L0L 1K0  
Telephone: 705 456 2671  
Tuesday to Thursday: 3:00 pm – 7:00 pm  
Saturday: 10:00 am – 3:00 pm

**City of Barrie, City Hall**

70 Collier Street, 6<sup>th</sup> Floor  
Barrie, ON L4M 4T5  
Telephone: 705 739 4220  
Monday to Friday 8:30 am to 4:00 pm

**Ministry of Transportation**

**Central Region, Environmental Section**  
159 Sir William Hearst Avenue, 3<sup>rd</sup> Floor  
Toronto, ON M3M 1J8  
Telephone: 416 235 4954  
Monday to Friday: 8:30 am to 4:00 pm

**Barrie Public Library, Downtown Branch**

60 Worsley Street  
Barrie, ON L4M 1L6  
Telephone: 705 728 1010  
Monday to Thursday: 9:30 am to 9:00 pm  
Friday and Saturday: 9:30 am to 5:00 pm  
Sunday: 12:00 pm to 5:00 pm

**Town of Innisfil, Town Hall**

2101 Innisfil Beach Road  
Innisfil, ON L9S 1A1  
Telephone: 705 436 3710  
Toll Free: 1 888 436 3710  
Monday to Friday: 8:30 am to 4:00 pm

**AECOM, Barrie Office**

55 Cedar Pointe Drive, Suite 620  
Barrie, ON L4N 5R7  
Telephone: 705 797 3284  
Monday to Friday: 9:00 am to 3:00 p.m.

The TESR Addendum is also available for review on the project website at:  
<http://highway400improvements89to11.com/>

The MTO and consultant representatives named below may be contacted to further discuss this project.

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## 1. The Environmental Assessment Process

### 1.1 Ontario Environmental Assessment Act

The purpose of Ontario's *Environmental Assessment (EA) Act* is to help protect and conserve Ontario's environment by ensuring that projects subject to the *Act* follow a planning process leading to environmentally sound decision-making. The Ministry of Transportation (MTO) *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000) outlines the EA process to be followed for specific groups of provincial transportation projects. The *Class EA* is a planning document approved under the *EA Act* that provides a streamlined process that projects or activities within a defined "class" must follow. Provided that this process is followed, projects and activities included under the *Class EA* do not require formal review and approval under the Ontario *EA Act*.

This project is following the *Class EA* process for a Group 'B' project, which generally includes major improvements to existing transportation facilities.

Other aspects of the EA process applicable to Group 'B' projects are contained in the *Class EA*. Readers interested in these matters are encouraged to refer to that document.

A previous study for improvements to the Highway 400 corridor from south of Highway 89 to the Highway 11 Junction included the preparation and submission of a Transportation Environmental Study Report (TESR) in April 2004, which subsequently received environmental clearance (see **Appendix B** for the EA Minister's Decision Letter provided by the Minister of the Environment subsequent to a Part II Order received during the 2004 study). This Class EA and Preliminary Design Study Update has been undertaken to review and update the recommendations of the 2004 TESR. Only the changes documented in the TESR Addendum outlined above and in **Sections 2.5.2** and **2.5.3** are eligible for Part II Order requests. Further details on Part II Order requests can be found in **Section 1.3**.

### 1.2 Canadian Environmental Assessment Act

In July 2012, the Government of Canada released new regulations required to implement the *Canadian EA Act, 2012 (CEAA 2012)*. The CEAA 2012 establishes a federal EA process focused on major projects that have a greater potential to have significant adverse effects on areas within federal jurisdiction. The types of activities to which the new *Act* applies ("designated projects") are identified in the regulations. The *Act* requires the proponent of a designated project to submit a description of the project to the Canadian Environmental Assessment Agency (the Agency). Upon receipt of a project description, the Agency has 45 days, including a 20-day public comment period, to determine whether a federal EA is required.

The proposed improvements Highway 400 from 1 km South of Highway 89 to the Junction of Highway 11 were reviewed and the project is not listed as a "designated project" under the CEAA 2012. Therefore, CEAA approvals are not required for this undertaking.

### 1.3 Purpose of this Transportation Environmental Study Report (TESR) Addendum

The Class EA requires that a TERS Addendum be prepared if significant design changes are identified compared to the proposed improvements put forth in the Preliminary Design TERS. This TERS Addendum has been prepared to document the proposed improvements and modifications to the recommended plan for the *Highway 400 Improvements from 1 km South of Highway 89 to the Junction at Highway 11* relative to that outlined in the TERS (April 2004) for the *Highway 400 Planning and Preliminary Design Study from 1 km South of Highway 89 Northerly 30 km to the Junction at Highway 11* (G.W.P. 30-95-00). The TERS Addendum includes a discussion on the need for changes to the proposed improvements to various interchanges along the Highway 400 between Highway 89 and Highway 11, the addition of noise mitigation measures, as well as the requirement for additional property for stormwater management ponds and stormwater management facilities. Furthermore, this TERS Addendum includes an overview of the generation, assessment and evaluation of alternatives, the recommended plan, a summary of environmental issues and potential mitigation measures, a summary of consultation undertaken throughout the study, and commitments to be carried out during Detail Design and construction.

As required under the Class EA, this TERS Addendum is being made available to the public, other interested parties and external agencies for a 30-day review period at the following six (6) locations as well as the project website

**<http://highway400improvements89to11.com/>:**

- Innisfil Public Library, Churchill Branch;
- Barrie Public Library, Downtown Branch;
- City of Barrie, City Hall, 6<sup>th</sup> Floor;
- Town of Innisfil, Town Hall;
- AECOM, Barrie Office; and,
- Ministry of Transportation, Central Region, Environmental Section.

A “Notice of TERS Addendum Submission” was placed in the *Innisfil Journal*, *Alliston Herald*, *Barrie Advance*, and *Barrie Examiner* newspapers on **Thursday November 9, 2017** to notify interested parties of the opportunity to review this TERS Addendum. Letters were also sent to individuals on the project mailing list on **Friday November 3, 2017**

Detailed background information, including supporting study reports, is contained in the environmental study file. The Ministry of Transportation and the AECOM Project Team members are available to discuss this information.

The TERS Addendum has been made available on **Thursday November 9, 2017** for a 30-day public review period. Interested persons are encouraged to review the TERS Addendum and provide written comments to the MTO during the 30-day review period (ending **Friday December 8, 2017**). If after consulting with MTO and Consultant staff, you still have serious unresolved concerns, you have the right to request the Ministry of Environment and Climate Change (in writing to: 77 Wellesley Street West, 11<sup>th</sup> Floor, Ferguson Block, Toronto, Ontario M7A 2T5) to issue a Part II Order (i.e. “bump up”) for

## Highway 400 Improvements from 1 km South of Highway

### 89 to the Junction of Highway 11

the proposed changes to the Highway 400 improvements between Highway 89 and Highway 11. A Part II Order may lead to the preparation of an Individual EA. A copy of the Part II Order request that is sent directly to the Minister of the Environment and Climate Change should also be forwarded to the Ministry of Transportation and Consultant Staff at the addresses listed below. If there are no outstanding concerns at the end of the 30-day review period (ending **Friday December 8, 2017**) the project will be considered to have met the requirements of the Class EA.

Only the changes documented in the TESR Addendum outlined in **Sections 2.5.2 and 2.5.3** are eligible for Part II Order requests. The changes documented in the *Highway 400 and Highway 89 Interchange Interim Improvements TESR Addendum* (March 2017) have received environmental clearance and are therefore not eligible for Part II Order Request. In the event that a Part II Order request is granted, MTO has the option to withdraw the Addendum.

Notification of the locations of the TESR Addendum for review has been published in local newspapers and mailed to those on the project mailing list.

Comments are being collected to provide and obtain information, and to identify concerns in accordance with the *EA Act*. This material will be maintained on file for use during the project and may be included in study documentation.

Information collected will be used in accordance with the *Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

If you have any accessibility requirements in order to participate in this study, please contact the Project Team.

### The Public Record

#### **Innisfil Public Library, Churchill Branch**

2282 4th Line

Innisfil, ON L0L 1K0

Telephone: 705 456 2671

Tuesday to Thursday: 3:00 pm – 7:00 pm

Saturday: 10:00 am – 3:00 pm

#### **City of Barrie, City Hall**

70 Collier Street, 6<sup>th</sup> Floor

Barrie, ON L4M 4T5

Telephone: 705 739 4220

Monday to Friday 8:30 am to 4:00 pm

#### **Ministry of Transportation**

#### **Central Region, Environmental Section**

159 Sir William Hearst Avenue, 3<sup>rd</sup> Floor

Toronto, ON M3M 1J8

Telephone: 416 235 4954

Monday to Friday: 8:30 am to 4:00 pm

#### **Barrie Public Library, Downtown Branch**

60 Worsley Street

Barrie, ON L4M 1L6

Telephone: 705 728 1010

Monday to Thursday: 9:30 am to 9:00 pm

Friday and Saturday: 9:30 am to 5:00 pm

Sunday: 12:00 pm to 5:00 pm

#### **Town of Innisfil, Town Hall**

2101 Innisfil Beach Road, Innisfil, ON L9S 1A1

Telephone: 705 436 3710

Toll Free: 1 888 436 3710

Monday to Friday: 8:30 am to 4:00 pm

#### **AECOM, Barrie Office**

55 Cedar Pointe Drive, Suite 620

Barrie, ON L4N 5R7

Telephone: 705 797 3284

Monday to Friday: 9:00 am to 3:00 p.m.

The TESR Addendum is also available for review on the project website at:  
**<http://highway400improvements89to11.com/>**

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

The MTO and consultant representatives named below may be contacted to further  
discuss this project.

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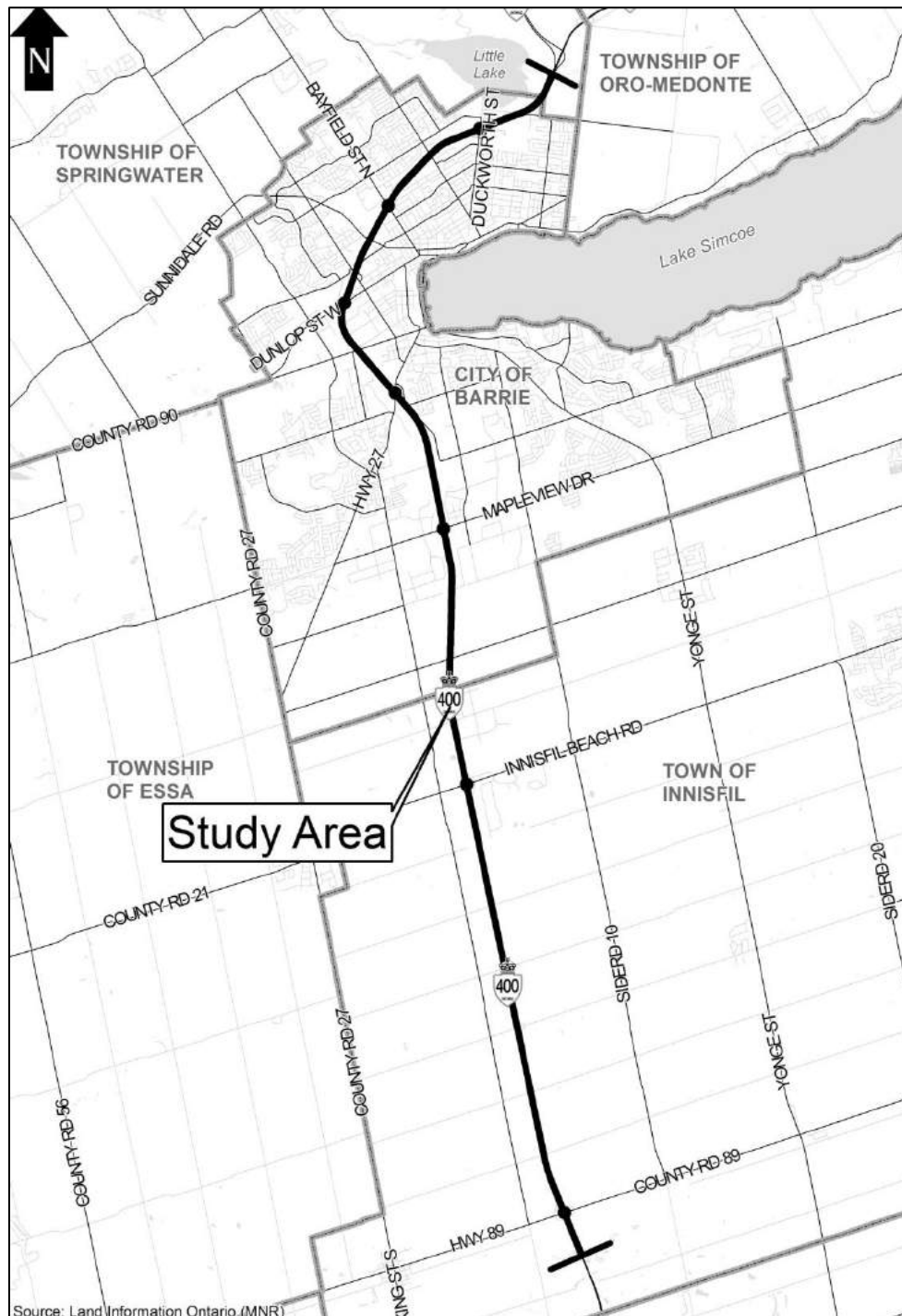
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## 2. Overview of the Project

### 2.1 Project Location

The project area includes 30 km along Highway 400 from 1 km south of Highway 89 to the Junction at Highway 11, hereafter referred to as the study area.

**Figure 1: Study Area**



## 2.2 Project Background

In 2001 MTO undertook a Planning and Preliminary Design Study to identify required improvements and widening requirements along 30 km of Highway 400 from 1 km south of Highway 89 to the Junction at Highway 11. A TESR was made available for public review in 2004 and in 2006 received Environmental Clearance and was granted to proceed to further stages of design. AECOM was retained by the MTO to undertake a Class EA and Preliminary Design Study Update to address the changes throughout the corridor.

This current study update revisits the approved plan outlined in the 2004 TESR to incorporate future (2031) traffic projections, and address associated capacity, operational and safety needs. This study confirms the long-term needs for this section of the Highway 400 corridor so that rehabilitation investments are made with knowledge of the long-term vision for the corridor. The study followed the approved planning process for a Group 'B' project under the *MTO Class EA for Provincial Transportation Facilities* (2000) and the project limits are within the Town of Innisfil, City of Barrie, and the Township of Springwater within the County of Simcoe, Ontario.

To address potential changes to the approved plan from the 2004 TESR, reasonable alternatives have been evaluated leading to the Recommended Plan for this section of the Highway 400 corridor.

## 2.3 Need for Highway 400 Widening

The previous 2004 TESR documented the Highway 400 capacity and operational requirements to address traffic demands for the 2011 planning horizon. For the current study, the planning horizon for addressing Highway 400 capacity and operational improvements is 2031.

This study is focused on improving existing conditions for traffic operations and safety in the following manner:

- Improvements to capacity along Highway 400 to meet 2031 growth projections;
- Improvement of several vertical curves and horizontal curves to improve sight distances, safety and ultimately traffic flow;
- Widening of the median shoulder and replacement of the existing box-beam barrier with a tall wall barrier, improving safety between Highway 400 northbound and southbound traffic by reducing the potential for median cross-over collisions; and,
- Adding high mast lighting throughout the corridor.

### 2.3.1 Policy Context

Since the 2004 TESR, the *Growth Plan for the Greater Golden Horseshoe* (June 2006) was prepared under the *Places to Grow Act* (2005). The most recent version available during the existing conditions investigations that formed the basis of this study is the *Office Consolidation, June 2013*. The document provides a strategy for managing growth and urban sprawl in the Greater Golden Horseshoe to 2031 and specifies density and intensification targets that must be met by the Greater Golden Horseshoe municipalities in developing their Official Plans. The amendments allow the County of

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Simcoe and the City of Barrie to grow, while curbing urban sprawl and continuing to protect green spaces and farmland. Highway 400 is the County of Simcoe's most significant goods movement corridor and a key link to the Greater Golden Horseshoe transportation network. This study directly addresses the Plan's policy direction that *"transportation networks that link urban growth centers [are identified and supported] through an extensive multi-modal system anchored by efficient public transit, together with highway systems for moving people and goods"* along with other directions.

### 2.3.2 Traffic Data

Current traffic projections indicate that the Highway 400 corridor needs to be widened to 10 lanes (five (5) lanes in each direction) throughout the majority of the study area by 2031. The addition of lanes to the Highway 400 corridor will require the widening and/or replacement of the structures that cross Highway 400 (bridges and culverts) within the study area and improvements will be required to the interchanges to accommodate the additional capacity requirement. **Table 1** outlines the anticipated Level of Service (LOS) throughout the corridor for the following scenarios:

- LOS in 2013 with the existing six (6) lanes (three (3) lanes in each direction);
- LOS in 2021 without the Highway 400 widening (existing six (6) lanes);
- LOS in 2031 without the Highway 400 widening (existing six (6) lanes); and,
- LOS in 2031 with the Highway 400 widening (five (5) lanes in each direction).

The LOS were calculated based on the criteria from the *Geometric Design Standards for Ontario Highways*. Peak hour traffic volumes on each section of Highway 400 were compared against the service flow rates for given LOS thresholds to determine the LOS for each section. The peak hour traffic volumes for Highway 400 southbound traffic are represented by "AM" in **Table 1**, and Highway 400 northbound traffic is represented by "PM" in **Table 1**. A LOS of "A" is considered free flowing movement.

**Table 1: Current and Future Traffic Levels of Service (LOS)**

| Section of Highway 400                | 2013 |    | 2021 Do Nothing |    | 2031 Do Nothing |    | 2031 10 Lanes |    |
|---------------------------------------|------|----|-----------------|----|-----------------|----|---------------|----|
|                                       | AM   | PM | AM              | PM | AM              | PM | AM            | PM |
| Highway 89 to Innisfil Beach Road     | D    | C  | E               | F  | F               | F  | D             | D  |
| Innisfil Beach Road to Maplevue Drive | C    | D  | D               | E  | E               | F  | D             | D  |
| Maplevue Drive to Essa Road           | D    | D  | F               | F  | F               | F  | D             | D  |
| Essa Road to Dunlop Street            | D    | F  | F               | F  | F               | F  | D             | D  |

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

| Section of Highway 400                         | 2013 |    | 2021 Do Nothing |    | 2031 Do Nothing |    | 2031 10 Lanes |    |
|--|------|----|-----------------|----|-----------------|----|---------------|----|
|  | AM   | PM | AM              | PM | AM              | PM | AM            | PM |
| Dunlop Street to Bayfield Street               | D    | E  | F               | F  | F               | F  | C             | C  |
| Bayfield Street to Duckworth Street            | C    | C  | D               | D  | D               | E  | C             | C  |
| Duckworth Street to the Junction of Highway 11 | C    | C  | D               | D  | D               | E  | C             | C  |

### 2.3.3 Anticipated Construction Timelines

Many of the structures are currently scheduled for replacement on the MTO *Southern Highways Program* within the next five years and therefore the long-term needs of these structures need to be determined in order to allow infrastructure investments to be made with the long-term vision in mind.

It should be noted that interchanges may be initially constructed in a phased approach, prior to the ultimate widening of Highway 400, where interim configurations are required to match the existing highway or crossing roads.

## 2.4 General Description of the Recommended Plan

Key features of the Recommended Plan including updates to the 2004 approved plan include the following:

- Widening Highway 400 as follows:
  - Widen to five (5) lanes in each direction (four (4) general purpose lanes and one (1) HOV lane with a westerly shift of the centreline) from north of Highway 89 to Maplevue Drive;
  - Widen to five (5) lanes in each direction (four (4) general purpose lanes and one (1) HOV lane about the centreline) from north of Maplevue Drive to Duckworth Street, with the northbound HOV lane ending just north of Bayfield Street;
  - Widen to four (4) general purpose lanes in each direction about the centreline with the southbound HOV lane starting just north of Duckworth Street and the northbound HOV lane ending just south of Duckworth Street. This section will transition to the existing configuration just south of the junction at Highway 11;
- Improvements to the interchanges as follows:

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

- *Highway 89:*
  - Upgrading the single lane exit-ramps from Highway 400 to Highway 89 to two-lane exit ramps;
  - Geometric improvements of the Highway 400 on-ramps and exit-ramps;
  - Adding a second commuter parking lot in the southwest quadrant (in addition to the proposed lot in the northeast quadrant) to provide additional parking capacity;
  - Realignment of Reive Boulevard;
- *Innisfil Beach Road*
  - Maintaining the 2004 study recommendations with minor changes to property foot print to accommodate the Innisfil Beach Road eastbound to Highway 400 southbound onramp;
  - Expanding the commuter parking lot in the northeast quadrant of the interchange;
  - Widening of Innisfil Beach Road from the existing two (2) lanes to four (4) lanes within the Highway 400 interchange to match the cross section to be constructed beyond the Highway 400 right-of-way that was approved through the *County Road 21 Improvements (Innisfil Beach Road), County Road 27 to County Road 39, Schedule C Class EA Environmental Study Report (County of Simcoe, 2015)*;
- *Mapleview Drive*
  - Improving the interchange configuration with a Diverging Diamond interchange (new interchange configuration) to improve traffic capacity at the interchange;
  - No changes to the property requirements from the 2004 approved plan at the Highway 400 / Mapleview Drive interchange;
- *Essa Road*
  - Maintaining the 2004 study recommendation which results in no changes to the property requirements;
  - The addition of a direct ramp for traffic travelling on Essa Road eastbound to Highway 400 southbound;
  - Maintaining the existing commuter parking lots in the northeast and northwest quadrants;
- *Dunlop Street*
  - Matching the existing Highway 400 centreline at Dunlop Street to allow for construction staging;
  - Upgrading the Highway 400 southbound exit ramp to Dunlop Street eastbound / westbound to a two-lane exit;
  - Improving the Dunlop Street intersection with Cedar Pointe Drive;
  - Improving the geometry of the cul-de-sac on Henry Street in the northeast quadrant to meet the current standard;
  - Changes to the property requirements from the 2004 approved plan in the northwest, southwest and northeast quadrants of the Highway 400 / Dunlop Street interchange ;

Highway 400 Improvements from 1 km South of Highway  
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- *Bayfield Street*
  - Widening of Bayfield Street to six (6) lanes within the MTO right-of-way to match the City of Barrie's planned future cross-section of Bayfield Street (three (3) lanes in each direction);
  - Improving the geometry of the Bayfield Street eastbound to Highway 400 southbound ramp including a larger radius near the Bayfield Street bullnose;
  - Extending the Highway 400 southbound ramp to Bayfield Street eastbound / westbound and relocate the bullnose further north to improve sight distance and safety;
  - Changes to the property requirements from the 2004 approved plan in the southwest and northeast quadrants of the Highway 400 / Bayfield Street interchange;
- *Duckworth Street*
  - Widening the new bridge to the median to accommodate the Highway 400 widening as the Duckworth Street interchange improvements were constructed previously as part of a municipal undertaking;
- *Highway 11 (Partial Freeway to Freeway Interchange)*
  - Maintain the 2004 study recommendation which results in no changes to the property requirements.
- Installing high-mast illumination throughout the corridor and improving the illumination at all of the interchanges except for Duckworth Street where illumination improvements were completed as part of a recent municipal undertaking;
- Complete the following drainage improvements:
  - Replacing sections of the median stormsewer;
  - Adding stormwater management ponds and stormwater management facilities (i.e. underground storage, dry detention cells, linear dry detention ditches) throughout the study area as property requirements were not identified in the 2004 TESR for some ponds (refer to **Section 6.1.5** and the TESR Addendum Plates 6, 8, 10, 15, 16, 32 in **Appendix A** for details on the locations of the stormwater management facilities) ;
  - Extending all Highway 400 culverts along the corridor to accommodate the proposed widening;
  - A total of 21 culvert crossings (C43, C44, C46, C49, C56, C60, C62, C64, C65, C66, C68, C73, C74, C75, C76, C79, C80, C82, C83, C84, C85) are recommended for replacement (refer to **Figures 2 to 7** for details regarding the culvert locations);
  - The relocation and replacement of C51 is being undertaken as part of the Highway 400 / 4<sup>th</sup> Line Bridge Replacement which is currently under construction;

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

- The replacement of C71 and C72 are being undertaken as part of the Tiffin Street Bridge Replacement;
- The replacement of the Willow Creek Bridge which is being undertaken as a separate Detail Design Study (G.W.P 2360-10-00);
- Noise barriers at seven (7) locations throughout the corridor, including the five (5) previously recommended noise barriers from the 2004 TESR, and two (2) new noise barriers (one (1) in the southwest quadrant of Highway 400 and Anne Street, and one (1) along Highway 400 southbound north of Duckworth Street); and,
- Intelligent Traffic Systems (ITS) in various locations throughout the corridor.

## 2.5 General Description of the Changes to the 2004 TESR

The following section describes the locations where there are recommended changes to the approved plan outlined in the 2004 TESR. As noted in **Section 1.3**, only the changes noted below within **Sections 2.5.2** and **Section 2.5.3** are eligible to Part II Orders under the Class EA. Refer to **Section 1.3** for further details on the Part II Order process.

Refer to **Appendix A** for Plates outlining the Recommended Plan and changes to the 2004 TESR.

### 2.5.1 Highway 400 / Highway 89

The current Highway 400 / Highway 89 Bridge and Interchange will not accommodate the future Highway 400 widening, which means that the bridge will eventually need to be replaced (as identified in the 2004 TESR). The existing Highway 89 Bridge over Highway 400 is 67 years old (constructed in 1950) and is currently scheduled for replacement in 2018 as per MTO's *Southern Highways Program*. As such the Highway 400 / Highway 89 Interchange is being advanced from the overall study and the bridge will be replaced along with interim improvements to the interchange. A TESR Addendum outlining the need for interim improvements for this Interchange was completed in March 2017, and a "Notice of TESR Addendum Submission" was placed in the *Innisfil Journal* and *Alliston Herald* newspapers on Thursday March 23, 2017 for a 30-day review period. These works have received environmental clearance and are therefore not addressed in this TESR Addendum. For further questions regarding the Highway 400 and Highway 89 TESR Addendum please contact the Project Team as listed in **Section 1.3**.

### 2.5.2 Highway 400 from 1 km South of Highway 89 to North of 10<sup>th</sup> Line

Changes to the 2004 TESR approved plan for this section of Highway 400 include the following:

- Additional property required at the Highway 89 Interchange to accommodate grading requirements associated with turning lanes at Reive Blvd;
- Additional property required along the Reive Blvd realignment to accommodate grading requirements;

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

- Additional property required approximately 1 km south of Highway 89 to the west of Highway 400 to accommodate grading requirements;
- Additional property required for the implementation of five (5) stormwater management ponds and a dry detention cell;
- Additional property required for the culvert replacement and drainage requirements to the west of Highway 400 north of 6<sup>th</sup> Line;
- Additional property required for the speed change lane from Innisfil Beach Road eastbound to Highway 400 Southbound in the southwest quadrant of the Innisfil Beach Road Interchange;
- Widening of Innisfil Beach Road from the existing two (2) lanes to four (4) lanes within the Highway 400 interchange to match the cross section to be constructed beyond the Highway 400 right-of-way that was approved through the *County Road 21 Improvements (Innisfil Beach Road), County Road 27 to County Road 39, Schedule C Class EA Environmental Study Report (County of Simcoe, 2015)*; The replacement of the following culverts: C43, C44, C46, C49, C56, and C60; and,
- Additional property required at the Highway 89 Interchange to accommodate grading requirements associated with speed change lanes and turning lanes along Highway 400 and Highway 89 (these changes were addressed as part of the *Highway 400 and Highway 89 Interchange Interim Improvements TESR Addendum* (March 2017) which have received environmental clearance).

### 2.5.3 Highway 400 from North of 10<sup>th</sup> Line to Duckworth Street West

Changes to the 2004 TESR approved plan for this section of Highway 400 include the following:

- Changes to the configuration of the previously approved Diamond interchange at Highway 400 and Maplevue Drive to the newly recommended Diverging Diamond Interchange. The Diverging Diamond Interchange will address the capacity deficiencies at Maplevue Drive as the traffic analysis indicated that it operates at a higher level of service and provides an improvement in traffic operations and safety at the ramp terminals;
- Additional property on the east side of Highway 400, between Maplevue Drive and Essa Road at Big Bay Point Road, required to maintain the existing centreline of Highway 400;
- Additional property required for the grading of the ditch associated with the culvert extension north of Essa Road on the west side of Highway 400;
- Additional property required on the west side of Highway 400 at the Barrie/Collingwood Railway structure and the Tiffin Street structure to accommodate construction staging of the bridge replacements;
- Additional property required for a stormwater management pond northeast of Essa Road;

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

- Additional property required for the improvements to the Highway 400 and Dunlop Street Interchange in the southwest, northwest and northeast quadrants including the following:
  - Improvements to the Dunlop Street intersection with Cedar Pointe Drive;
  - Realignment of the Highway 400 centreline to accommodate construction staging of the interchange improvements and provide flexibility in keeping Dunlop Street open during construction;
  - The two-lane Highway 400 southbound exit ramp;
  - Culvert replacements at Highway 400, the west ramp terminal and at Dunlop Street west of Highway 400; and,
  - Geometric improvements to the cul-de-sac on Henry Street to meet the current standard;
- Additional property required for the improvements to the Highway 400 / Bayfield Street interchange in the northeast and southwest quadrants along Bayfield Street including:
  - Improvements to the geometry of the Bayfield Street eastbound to Highway 400 southbound ramp and the Bayfield Street westbound to Highway 400 northbound ramp; and,
  - Addition of a right-turn lane on the Highway 400 southbound to Bayfield Street eastbound / westbound ramp;
- Widening of Bayfield Street to six (6) lanes within the MTO right-of-way to match the City of Barrie's planned future cross-section of Bayfield Street (three (3) lanes in each direction);
- The addition of two (2) noise walls (one (1) on the west side of Highway 400 south of Anne Street and one (1) on the west side of Highway 400 north of Duckworth Street), and the extension of noise walls recommended in the 2004 TESR (refer to **Section 6.2.3** for further information on noise mitigation); and,
- The replacement of the following culverts: C62, C64, C65, C66, C68, C73, C74, C75, C76, C79, C80, C82 and C83.

### 2.5.4 Highway 400 Duckworth Street West to the Junction of Highway 11

There have been no changes from the 2004 TESR that require additional property in this section of the study area.

Additional condition surveys identified that because of the deteriorating condition of culverts C84 and C85 they are recommended for replacement as part of this update study. The 2004 TESR only recommended the extension of all culverts within the study area. The replacement of these culverts is not anticipated to require additional property.

### 3. Existing Conditions

The 2004 TESR provided an overview of environmental conditions within the study area. In order to facilitate a fulsome understanding of current environmental conditions (natural, socio- economic and cultural) within the study area, supplemental environmental inventory work and analysis work was undertaken as part of this study update. The following sections outline the results of the work undertaken to characterize existing environmental conditions. .

#### 3.1 Natural Environment

Natural Heritage field investigations occurred on April 22, May 4, July 7, July 8, September 9, and September 10, 2014 and June 5, 2015 within the study area. A description of the natural environment existing conditions are described in the following sections and further details can be found in the *Existing Environmental Conditions Report* (FRi Ecological Services, February 2015) and the *Natural Heritage Existing Impact Assessment Report* (FRi Ecological Services, February 2017), available under separate cover.

##### 3.1.1 Fish and Fish Habitat

Within the study area there are a total of 47 watercourse crossings. Twenty-four (24) of the watercourse crossings are considered fish habitat including, fifteen (15) warmwater, one (1) coolwater/warmwater and eight (8) coldwater fish habitat. Three (3) of the watercourses are of significance because they contain sportfish and/or high quality coldwater habitat. These watercourses include Innisfil Creek, a tributary to Innisfil Creek and Willow Creek. **Table 2** summarizes the watercrossings and the habitat types. Refer to **Figures 2 to 7** for maps of the crossing locations.

**Table 2: Highway 400 Watercrossings and Habitat Type in the Study Area**

| Culvert Number | Station                  | Permanent Stream | Fish Habitat Type  | Waterbody Name              | Current Culvert Size   |
|----------------|--------------------------|------------------|--------------------|-----------------------------|--|
| C-40           | 27+086, West Gwillimbury | Yes              | Warmwater baitfish | Tributary to Innisfil Creek | 1200mm X 900mm   |
| C-41           | 27+293, West Gwillimbury | No               | Warmwater baitfish | Tributary to Innisfil Creek | 1200mm x 900mm (Upstream) and 900mm Corrugated Steel Pipe (CSP) (Downstream) |
| C-42           | 27+527, West Gwillimbury | No               | Warmwater baitfish | Tributary to Innisfil Creek | 2450mm x 1000mm  |
| C-43           | 10+285, Town of Innisfil | Yes              | Warmwater baitfish | Tributary to Innisfil Creek | 4600mm x 2500mm CSP (Upstream) and 4300mm x 1200mm (Downstream)              |

Highway 400 Improvements from 1 km South of Highway  
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| <b>Culvert Number</b> | <b>Station</b>           | <b>Permanent Stream</b> | <b>Fish Habitat Type</b>          | <b>Waterbody Name</b>       | <b>Current Culvert Size</b>                                    |
|-----------------------|--------------------------|-------------------------|-----------------------------------|-----------------------------|--|
| C-44                  | 10+771, Town of Innisfil | Yes                     | Coldwater fishery                 | Innisfil Creek              | 4800mm x 2700mm<br>4800mm x 2700mm<br>1800mm CSP               |
| C-45                  | 11+306, Town of Innisfil | No                      | Warmwater baitfish                | Tributary to Innisfil Creek | 1200mm x 800mm (Upstream) and<br>1200mm x 1.16m (Downstream)   |
| C-46                  | 11+684, Town of Innisfil | Yes                     | Warmwater Fishery                 | Tributary to Innisfil Creek | 4800mm x 2700mm  |
| C-47                  | 12+000, Town of Innisfil | Yes                     | Not fish habitat                  | Tributary to Innisfil Creek | 1200mm x 1000mm (Upstream) and<br>1200mm x 470mm (Downstream)  |
| C-48                  | 12+713, Town of Innisfil | No                      | Not fish habitat                  | Drainage                    | 1200mm x 900mm   |
| C-49                  | 12+908, Town of Innisfil | Yes                     | Coldwater Fishery                 | Tributary to Innisfil Creek | 4200mm x 1700mm (Upstream)                                     |
| C-50                  | 13+110, Town of Innisfil | No                      | Coldwater Fishery                 | Tributary to Innisfil Creek | 5400mm x 1400mm  |
| C-51                  | 14+125, Town of Innisfil | No                      | Not fish habitat                  | Drainage                    | 1200mm x 900mm   |
| C-52                  | 14+671, Town of Innisfil | Yes                     | contributes to Coldwater Fishery  | Tributary to Innisfil Creek | 1200mm x 1000mm (Upstream) and<br>1200mm x 800mm (Downstream)  |
| C-53                  | 15+558, Town of Innisfil | No                      | Not fish habitat                  | Drainage                    | 1200mm x 900mm (Upstream) and<br>1200mm x 500mm (Downstream)   |
| C-54                  | 15+800 Town of Innisfil  | No                      | Not fish habitat                  | Drainage                    | 1200mm x 1160mm (Upstream)<br>1200mm x 560mm (Downstream)      |
| C-55                  | 16+722, Town of Innisfil | Yes                     | Warmwater baitfish                | Tributary to Innisfil Creek | 7000mm x 3600mm  |
| C-56                  | 16+978, Town of Innisfil | No                      | Not fish habitat                  | Drainage                    | 1200mm x 900mm (Upstream)<br>1200mm x 700mm (Downstream)       |
| C-57                  | 18+250, Town of Innisfil | Yes                     | contributes to Warmwater baitfish | Tributary to Lovers Creek   | 2400mm x 1500mm (Upstream) and<br>2400mm x 1200mm (Downstream) |

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| <b>Culvert Number</b> | <b>Station</b>           | <b>Permanent Stream</b> | <b>Fish Habitat Type</b>          | <b>Waterbody Name</b>     | <b>Current Culvert Size</b>                               |
|-----------------------|--------------------------|-------------------------|-----------------------------------|---------------------------|---|
| C-58                  | 18+400, Town of Innisfil | Yes                     | contributes to Warmwater baitfish | Tributary to Lovers Creek | 1500mm x 900mm (Upstream) and 1500mm x 780mm (Downstream) |
| C-59                  | 20+700, Town of Innisfil | No                      | Not fish habitat                  | Drainage                  | 1200mm x 900mm (Upstream) and 1200mm x 460mm (Downstream) |
| C-60                  | 21+825, Town of Innisfil | Yes                     | contributes to Warmwater baitfish | Tributary to Lovers Creek | 1200mm x 900mm  |
| C-61                  | 22+676, Town of Innisfil | Yes                     | Not fish habitat                  | Drainage                  | 1200mm x 900mm (Upstream) and 1200mm x 690mm (Downstream) |
| C-62                  | 23+272, Town of Innisfil | Yes                     | Warmwater baitfish                | Tributary to Lovers Creek | 1500mm x 960mm (Upstream) and 1200mm x 300mm (D/S)        |
| C-63                  | 23+665, Town of Innisfil | Yes                     | Warmwater baitfish                | Tributary to Lovers Creek | 1200mm x 900mm (Upstream) and 1200mm x 600mm (Downstream) |
| C-64                  | 24+327, City of Barrie   | Yes                     | Not fish habitat                  | Tributary to Lovers Creek | 1200mm x 900mm (Upstream) and 1200mm x 540mm (Downstream) |
| C-65                  | 24+713, City of Barrie   | Yes                     | Not fish habitat                  | Drainage                  | 1200mm x 1050mm (Upstream) and 1200mm CSP (Downstream)    |
| C-66                  | 25+072, City of Barrie   | Yes                     | Not fish habitat                  | Tributary to Lovers Creek | 1270mm CSP (Upstream) and 1200mm CSP (Downstream)         |
| C-67                  | 25+543, City of Barrie   | Yes                     | Not fish habitat                  | Tributary to Lovers Creek | 1200mm x 1200mm (Upstream) and 1200mm CSP (Downstream)    |
| C-68                  | 26+105, City of Barrie   | Yes                     | contributes to Warmwater baitfish | Tributary to Lovers Creek | 1200mm x 800mm (Upstream) and 1200mm x 360mm (Downstream) |

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| <b>Culvert Number</b> | <b>Station</b>           | <b>Permanent Stream</b> | <b>Fish Habitat Type</b>         | <b>Waterbody Name</b>       | <b>Current Culvert Size</b>                                 |
|-----------------------|--------------------------|-------------------------|----------------------------------|-----------------------------|---|
| C-69                  | 26+758, City of Barrie   | Yes                     | Warmwater baitfish               | Whiskey Creek               | 1200mm x 900mm  |
| C-70                  | 27+376, City of Barrie   | Yes                     | Not fish habitat                 | Tributary to Whiskey Creek  | 1200mm x 900mm (Upstream) and 1200mm x 450mm (Downstream)   |
| C-71                  | 29+285, Town of Innisfil | Yes                     | Warmwater baitfish               | Hotchkiss Creek             | 1800mm CSP  |
| C-72                  | 10+130, City of Barrie   | No                      | Not fish habitat                 | Drainage                    | 1200mm x 1100mm (Upstream) and 1200mm x 480mm (Downstream)  |
| C-73                  | 11+027, City of Barrie   | Yes                     | contributes to Coldwater Fishery | Tributary to Kempenfelt Bay | 1850mm x 1200mm   |
| C-74                  | 11+424, City of Barrie   | Yes                     | Not fish habitat                 | Bunkers Creek               | 1200mm x 1440mm (Upstream) and 1360mm x 1200mm (Downstream) |
| C-75                  | 11+614, City of Barrie   | Yes                     | Not fish habitat                 | Tributary to Bunkers Creek  | 1200mm x 1130mm (Upstream) and 1200mm x 700mm (Downstream)  |
| C-76                  | 12+193, City of Barrie   | No                      | contributes to Coldwater Fishery | Tributary to Kempenfelt Bay | 1200mm x 900mm  |
| C-77                  | 12+452, City of Barrie   | No                      | contributes to Coldwater Fishery | Tributary to Kempenfelt Bay | 1200mm x 790mm (Upstream)<br>1200mm x 610mm (Downstream)    |
| C-78                  | 12+805, City of Barrie   | Yes                     | Coldwater Fishery                | Kidd's Creek                | 2400mm x 1500mm (Upstream)<br>2400mm x 1030mm (Downstream)  |
| C-79                  | 14+340, City of Barrie   | No                      | Not fish habitat                 | Drainage                    | 1200mm x 1200mm (Upstream)<br>1200mm x 900mm (Downstream)   |

Highway 400 Improvements from 1 km South of Highway  
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| <b>Culvert Number</b> | <b>Station</b>         | <b>Permanent Stream</b> | <b>Fish Habitat Type</b>        | <b>Waterbody Name</b>       | <b>Current Culvert Size</b>                               |
|-----------------------|------------------------|-------------------------|---------------------------------|-----------------------------|---|
| C-80                  | 14+583, City of Barrie | Yes                     | Not fish habitat                | Tributary to Kempenfelt Bay | 1200mm x 1200mm   |
| C-81                  | 14+847, City of Barrie | Yes                     | Not fish habitat                | Tributary to Kempenfelt Bay | N/A   |
| C-82                  | 15+115, City of Barrie | No                      | Not fish habitat                | Drainage                    | 1200mm x 700mm (Upstream) and 1200mm x 560mm (Downstream) |
| C-83                  | 15+532, City of Barrie | No                      | Not fish habitat                | Sophia Creek                | 1200mm CSP  |
| C-84                  | 16+141, City of Barrie | No                      | Not fish habitat                | Drainage                    | 1200mm CSP  |
| C-85                  | 16+537, City of Barrie | No                      | Not fish habitat                | Tributary to Sophia Creek   | 1300mm CSP  |
| B-01                  | 18+283, City of Barrie | Yes                     | Coolwater/<br>Warmwater Fishery | Willow Creek                | 37.82m Bridge   |

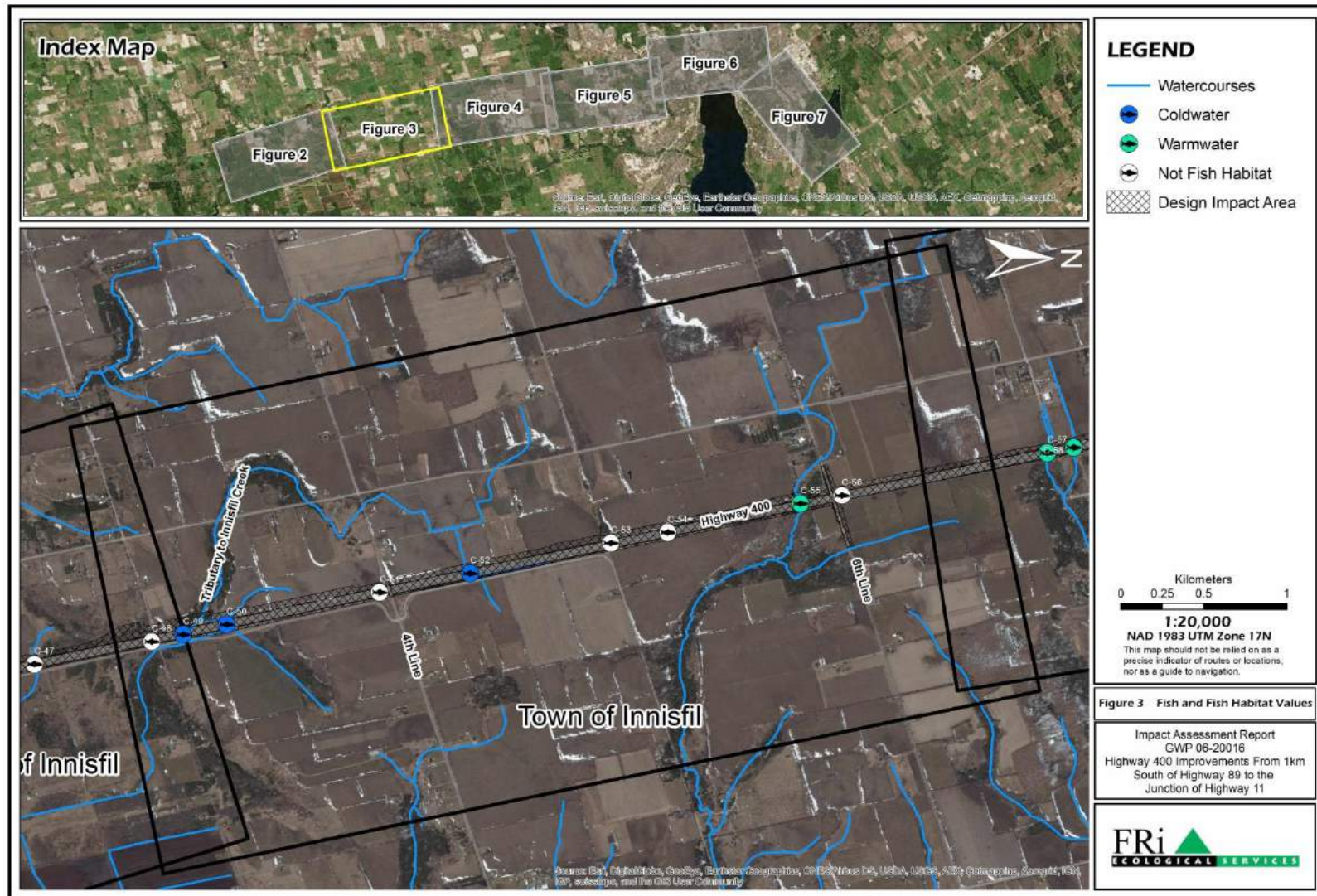
# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 2: Highway 400 Watercrossings and Habitat Type in the Study Area



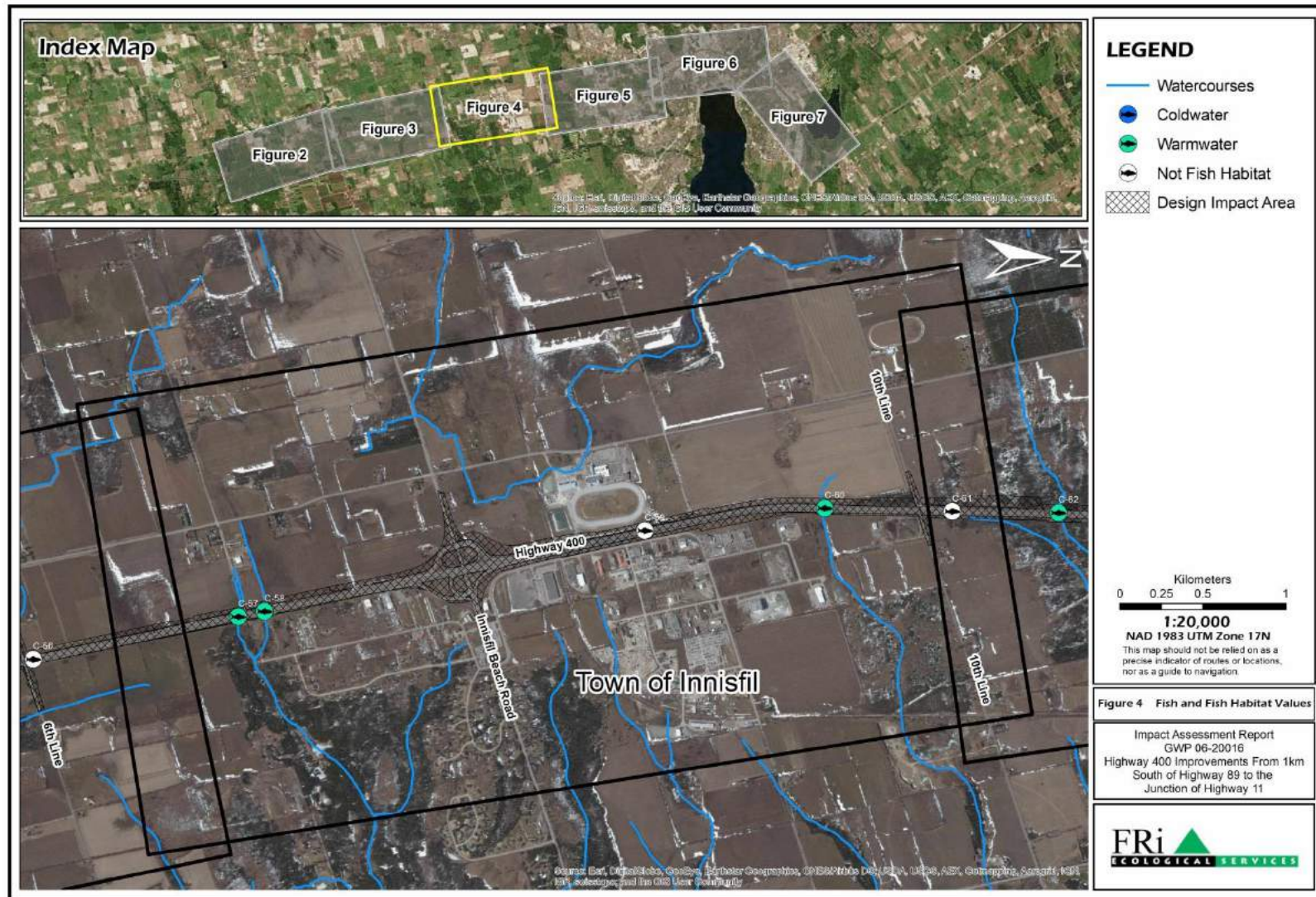
# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 3: Highway 400 Watercrossings and Habitat Type in the Study Area



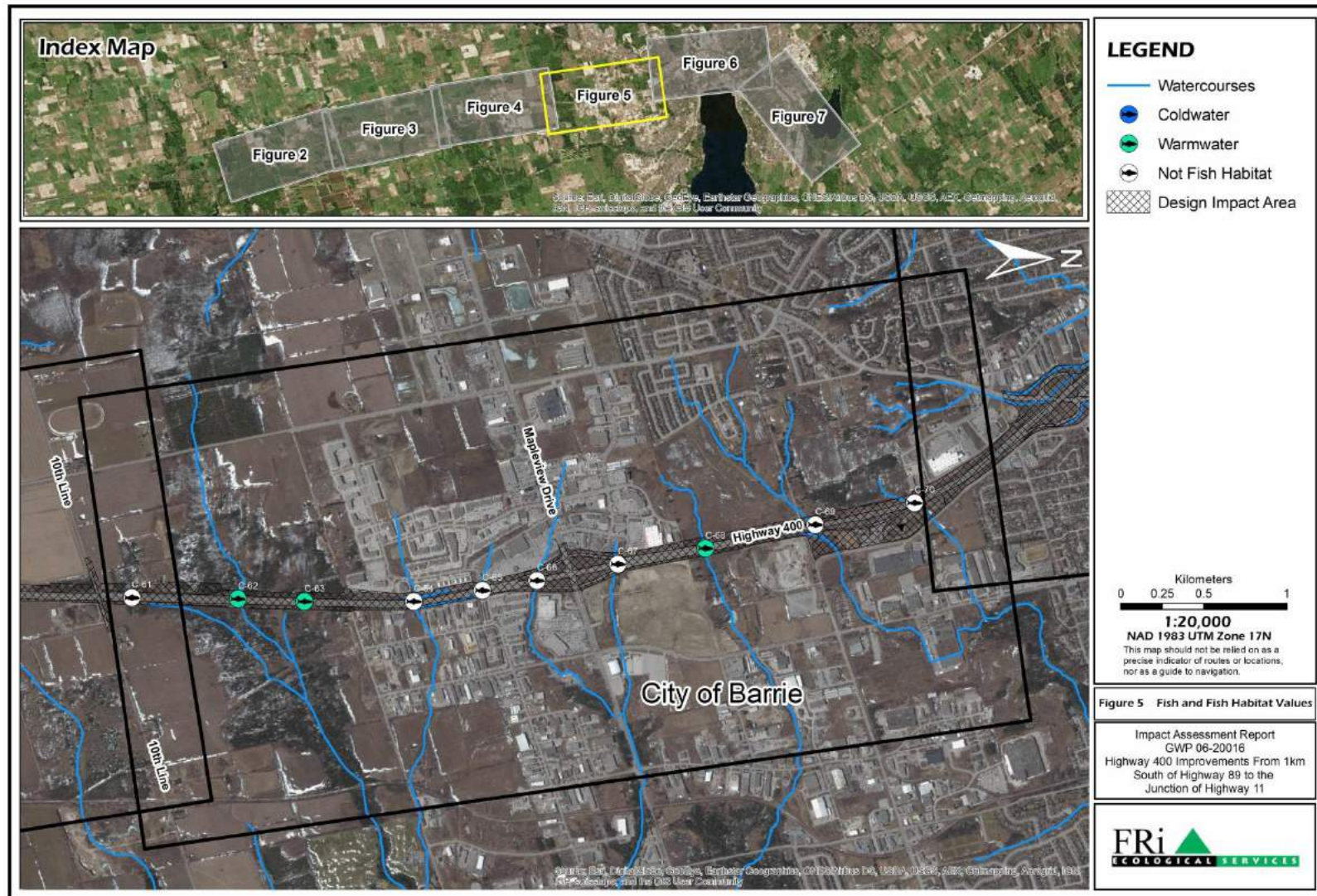
# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 4: Highway 400 Watercrossings and Habitat Type in the Study Area



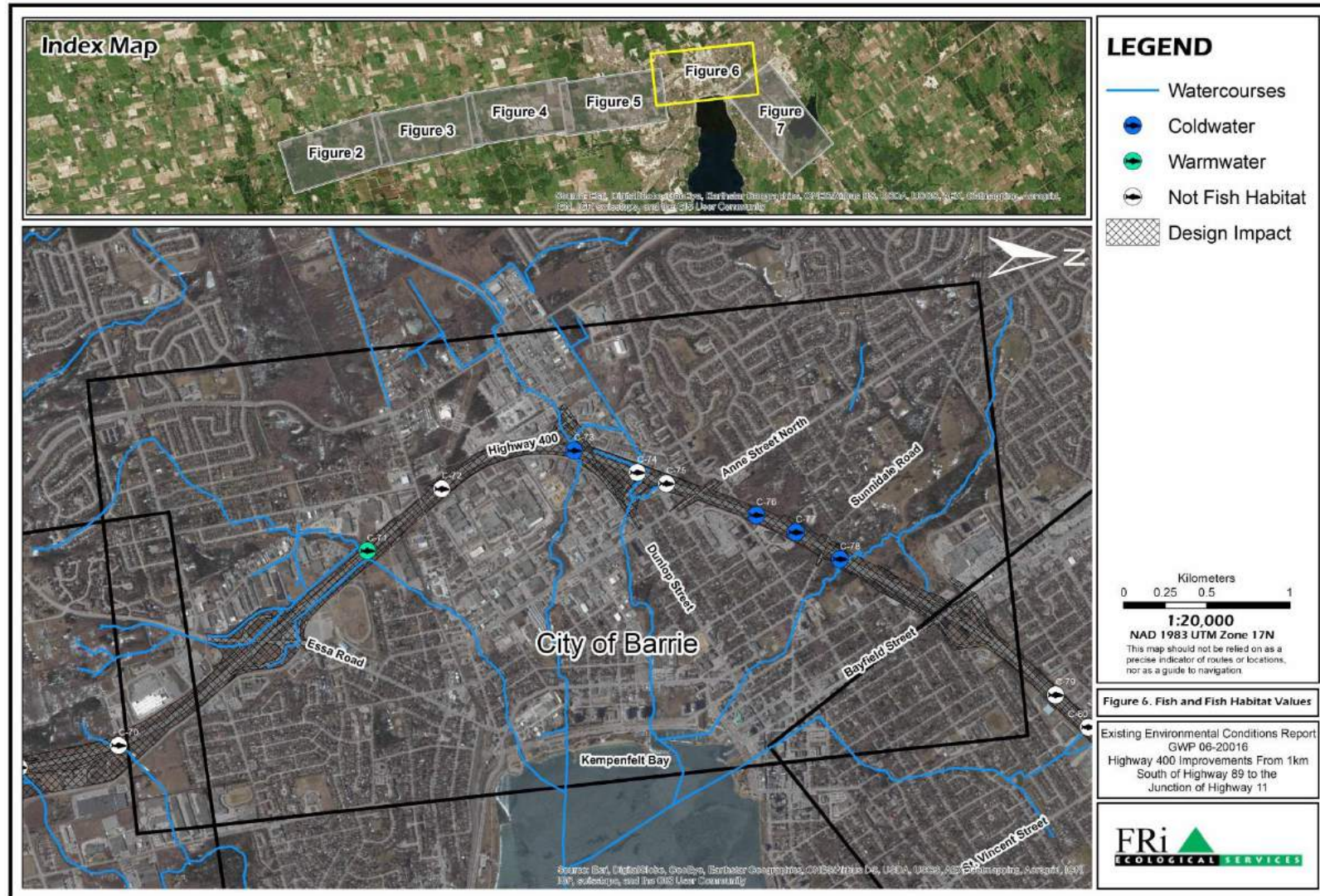
# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 5: Highway 400 Watercrossings and Habitat Type in the Study Area



# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 6: Highway 400 Watercrossings and Habitat Type in the Study Area



# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 7: Highway 400 Watercrossings and Habitat Type in the Study Area



### 3.1.2 Terrestrial Ecosystems

The Nottawasaga Valley Conservation Authority (NVCA) provided land use mapping of their jurisdiction that provides a broad overview of the urban, agricultural and natural land use and vegetation within the study area. Results of the field investigations undertaken as part of this study were added to this database to complete the coverage of the entire study area. The *Ecological Land Classification (ELC) for Southern Ontario* (OMNR 1998) was used to convert these land use designations to ecosite designations. Those land use types that do not have a corresponding ecosite designation were also mapped to provide a more complete coverage of the study area.

#### 3.1.2.1 Ecosites and Land Use

The following section describes the land use and ecosite designations within the study area (refer to **Figures 8 to 13** for maps of the study area with land use and ELC communities).

##### **Coniferous Forest (FOC)**

The coniferous forest communities within the study area are mainly comprised of Eastern White Cedar (*Thuja occidentalis*) and White Spruce (*Picea glauca*) on the moist sites and components of White Pine (*Pinus strobus*), Red Pine (*Pinus resinosa*) and Balsam Fir (*Abies balsamea*) are more common on the well-drained sandy soils. Deciduous species form only a minor component (<25%) in this ecosite and are typically White Birch (*Betula papyrifera*) or Red Maple (*Acer rubrum*).

##### **Deciduous Forest (FOD)**

The deciduous forest communities are typically dominated by Sugar Maple (*Acer saccharum*) with American Beech (*Fagus grandifolia*), Red Maple, White Birch, Basswood (*Tilia americana*), White Elm (*Ulmus americana*), Manitoba Maple (*Acer negundo*). Occasional components of coniferous trees account for less than 25%.

##### **Mixed Forest (FOM)**

The mixed forest community comprises the species in the previous two sections but the composition of deciduous species and coniferous species are both greater than 25%. These communities are often located on side slopes transitioning between coniferous and deciduous forest communities.

##### **Golf Course**

There are two golf courses that are within the study area. The Innisfil Creek Golf Club is situated on the east side of Highway 400 immediately north of Highway 89 and Innisfil Creek flows through it. The other golf course, Landings of Willow Creek Golf Course is at the extreme north end of the study area again on the east side of Highway 400 just south of Willow Creek.

##### **Cultural Meadow (CUM)**

The cultural meadow ecosite includes open areas that are a result of culturally-based disturbances such as agriculture. They include areas that were previously under intense agriculture, current pastures or hay fields.

### ***Agricultural Row Crop***

These areas are presently under intensive agriculture. There is a variety of crops grown in the area but mainly corn, soybean and grain crops.

### ***Marsh (MA)***

Marsh communities are fairly widespread throughout the study area and include wetlands with less than 25% tree or shrub cover. Grasses, rushes and sedges are typically the dominant vegetation and more specifically cattails (*Typha latifolia*) is probably the most common species in these communities.

### ***Swamp (SW)***

Swamp communities are also widespread but are a very common component of the Provincially Significant Wetlands (PSWs) within the study area. These wetlands differ from the marshes in that they have greater than 25% tree or shrub cover. Black Ash (*Fraxinus nigra*), Red Maple, Black Willow (*Salix nigra*), Red-osier Dogwood (*Cornus stolonifera*) and Speckled Alder (*Alnus incana*) are the typical species.

### ***Quarry***

There is only one active quarry operation within the study area located on the west side of Highway 400 just north of Innisfil Beach Road immediately adjacent to the Georgian Downs facility.

### ***Shallow Aquatics (SA)***

The vast majority of these communities are quite small (<1ha) and are characterized by shallow water often with submergent aquatic vegetation but no tree or shrub cover. Many of these are active or historic farm ponds or are directly associated with a watercourse.

### ***Transitional***

These areas are most often associated with culturally-modified lands such as those areas adjacent to major transportation corridors, within interchange ramps and other areas where land use gradually changes from a culturally-modified area to a more natural area.

### ***Urban Pervious***

Urban or developed areas that do not include hard surfaces such as pavement and larger buildings fall into this category. They can include lawns, sports fields or other urbanized settings that do not have an impermeable surface.

### ***Urban Impervious***

Identification of urban impervious areas is useful in evaluating the potential for stormwater flows. Paved areas, larger commercial buildings and concrete surfaces are designated as urban impervious.

#### **3.1.2.2 Provincially Significant Wetlands (PSWs)**

There are three PSWs within the study area (Cookstown Hollows Swamp, Lovers Creek Swamp, and Willow Creek/Little Lake Wetland), two of which are directly adjacent to the Highway 400 corridor.

### ***Cookstown Hollows Swamp***

The Cookstown Hollows Swamp PSW is located just south of Highway 89 and straddles the Highway 400 corridor. The wetland is comprised primarily of swamp wetland types and occupies an area of 583.07ha.

***Lovers Creek Swamp***

The Lovers Creek Swamp PSW is mainly on the east side of the Highway 400 corridor but does cross the highway between 10<sup>th</sup> Line and Lockhart Road. It is also composed mainly of swamp wetland types and is the largest PSW in the study area at 1011.63ha.

***Willow Creek / Little Lake Wetland***

The Willow Creek/Little Lake Wetland PSW abuts the west side of the corridor immediately south of the north study limit fringing Little Lake and the riparian zone of Willow Creek at the west end of the lake. It is again primarily swamp wetland types and is the smallest PSW within the study limits at 227.13ha.

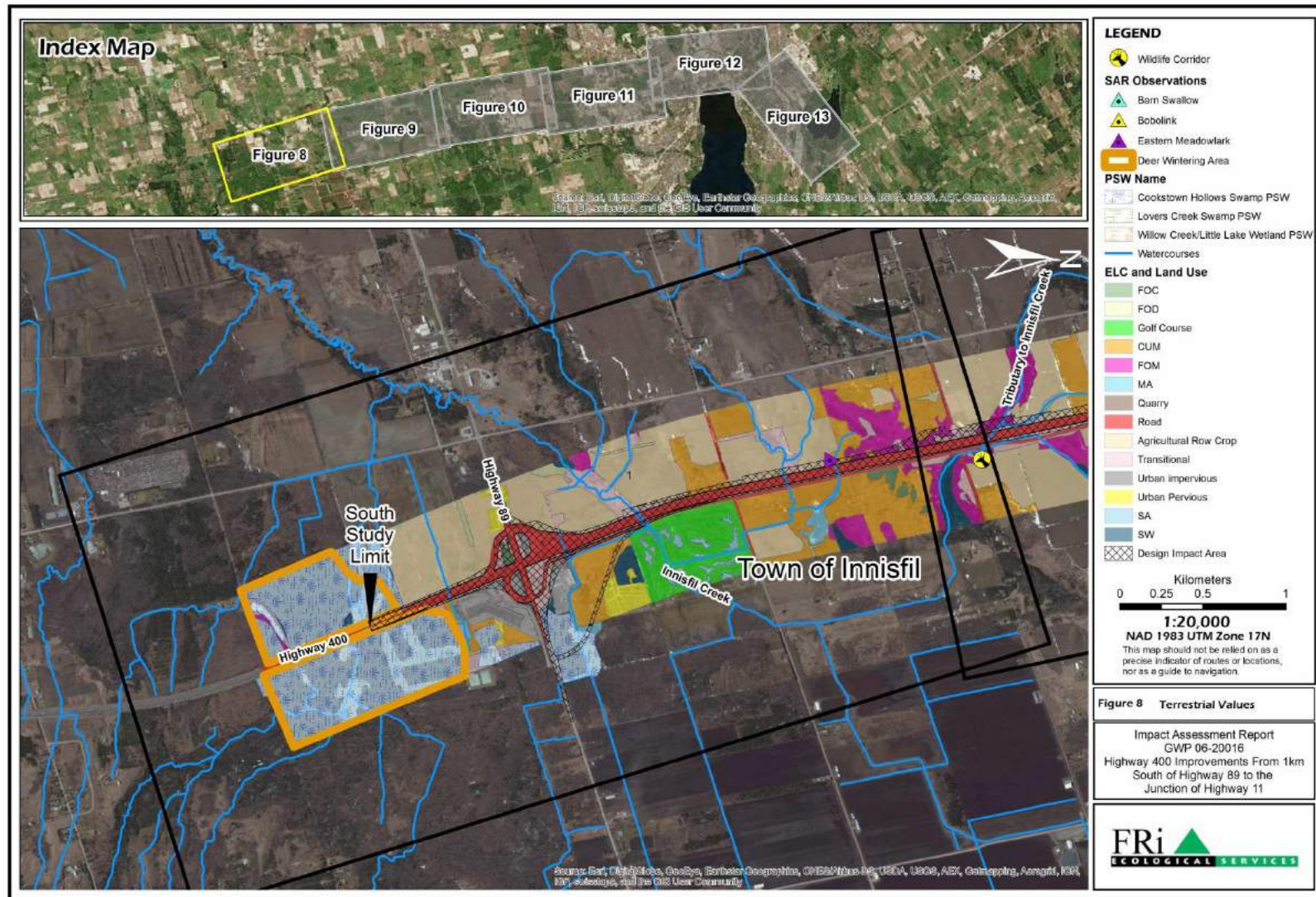
3.1.2.3 Seasonal Concentration Areas

***Deer Wintering Area***

An inquiry with the Ministry of Natural Resources and Forestry (MNRF) on March 11, 2015 revealed two Stratum 1, core deer wintering areas within the study area. The southernmost site is adjacent to the boundary of the Cookstown Hollows Swamp PSW which is mainly composed of hardwood swamp at this location. The second site is just north of 10<sup>th</sup> Line and includes the Lover's Creek Swamp PSW as well as the adjacent conifer and mixed wood forests on both sides of the corridor. Refer to **Figures 8, 10 and 11** for their locations within the study area.

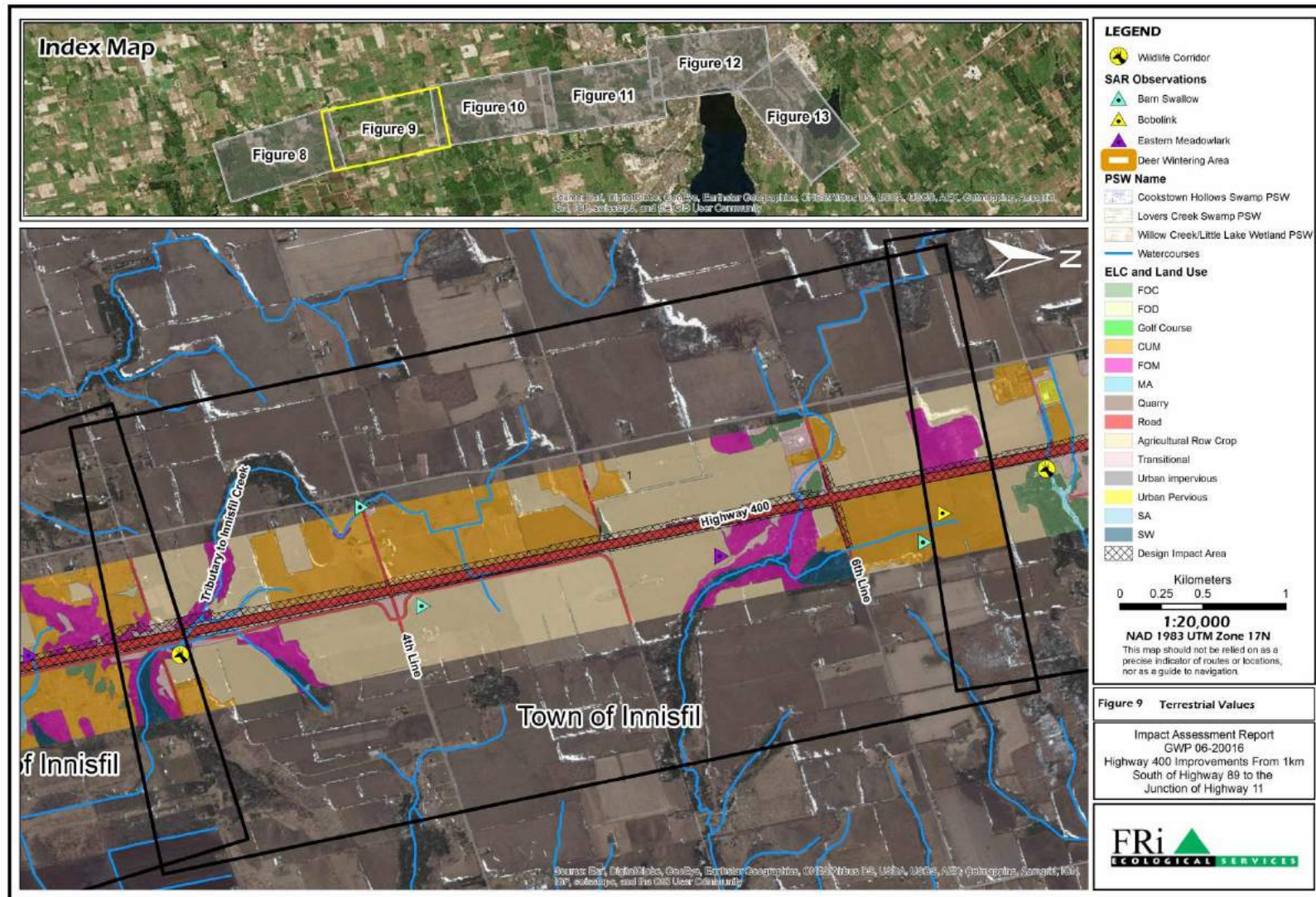
# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Figure 8: Ecological Land Classifications and Land Use in the Study Area**



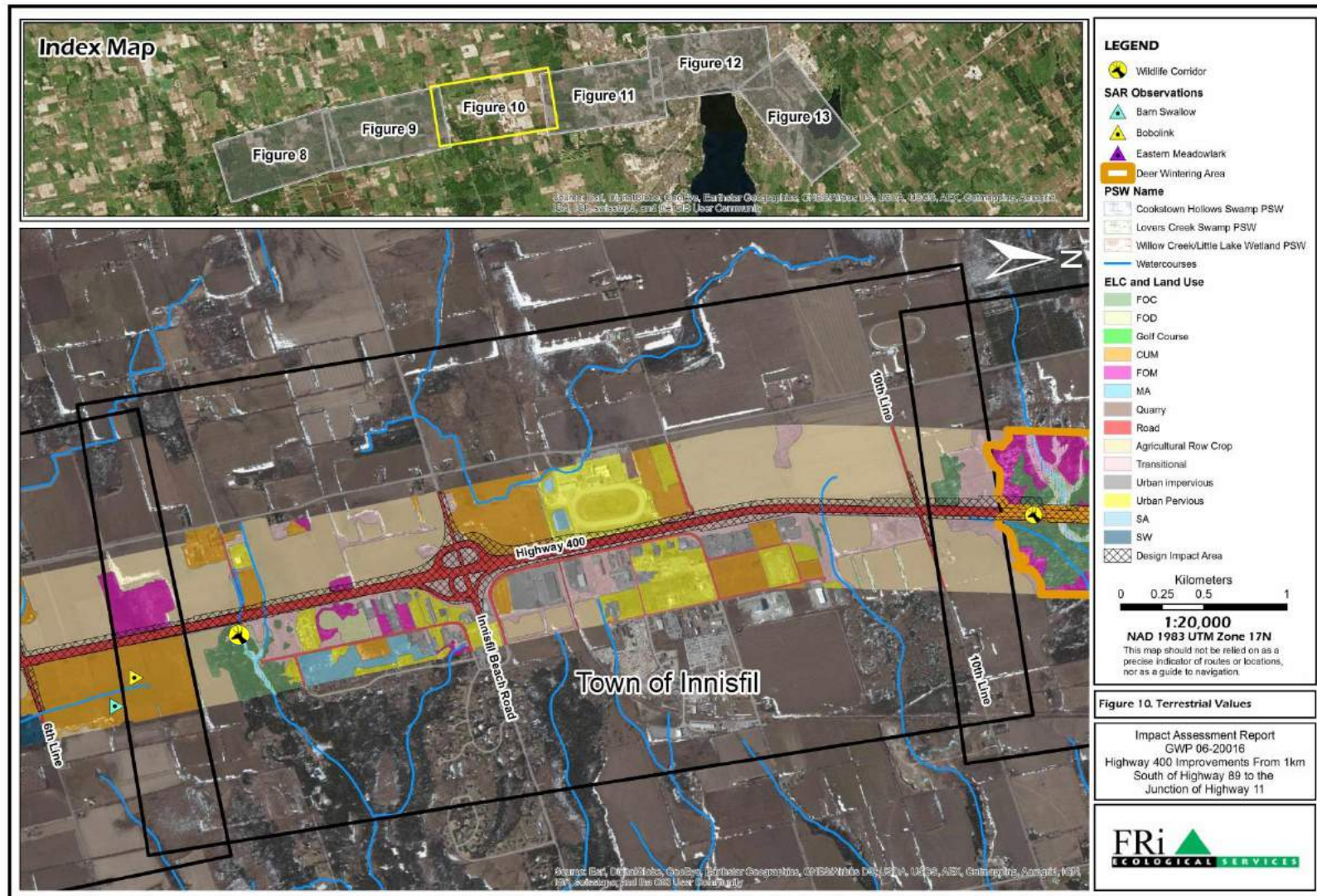
# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Figure 9: Ecological Land Classifications and Land Use in the Study Area**



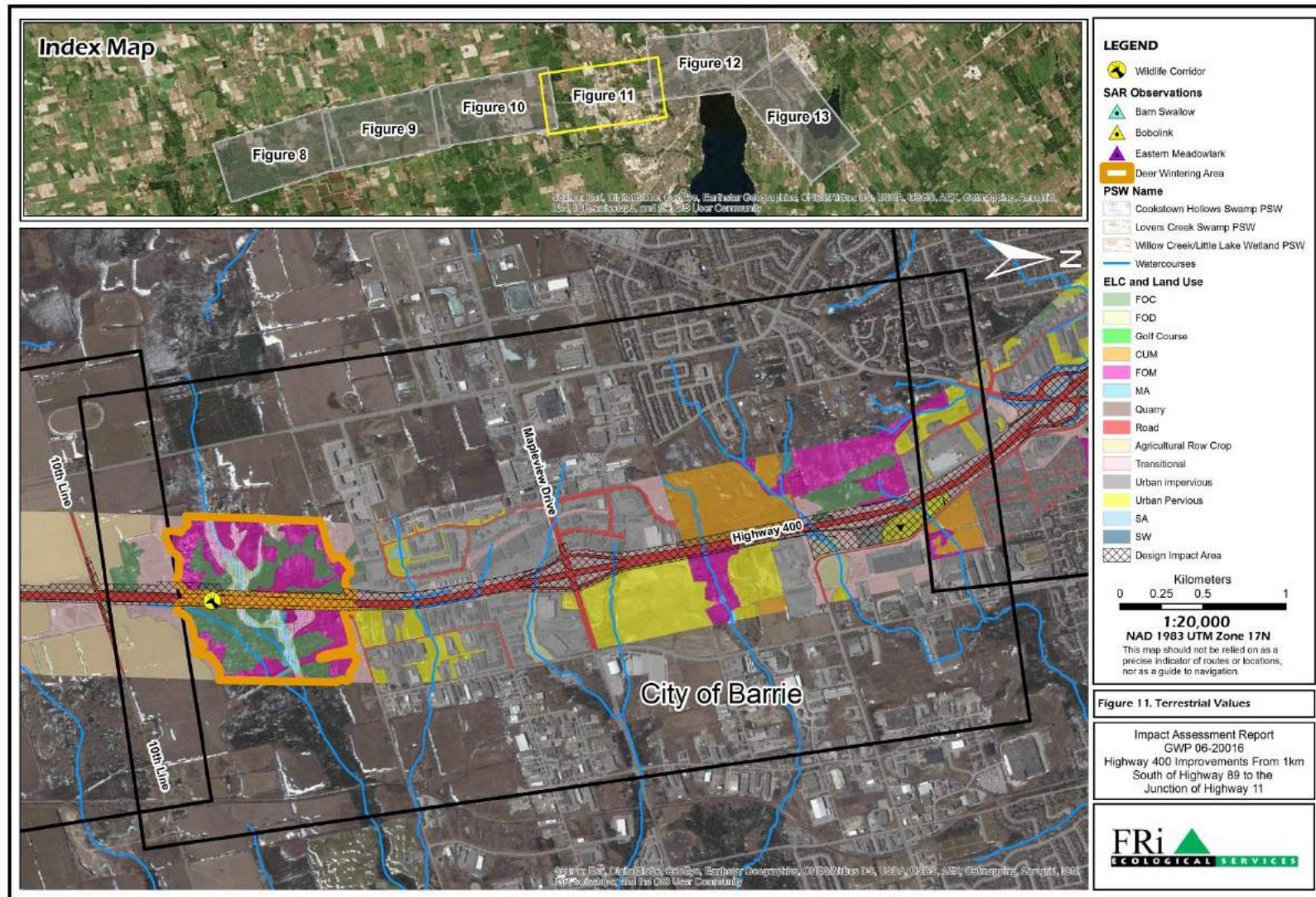
# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Figure 10: Ecological Land Classifications and Land Use in the Study Area**



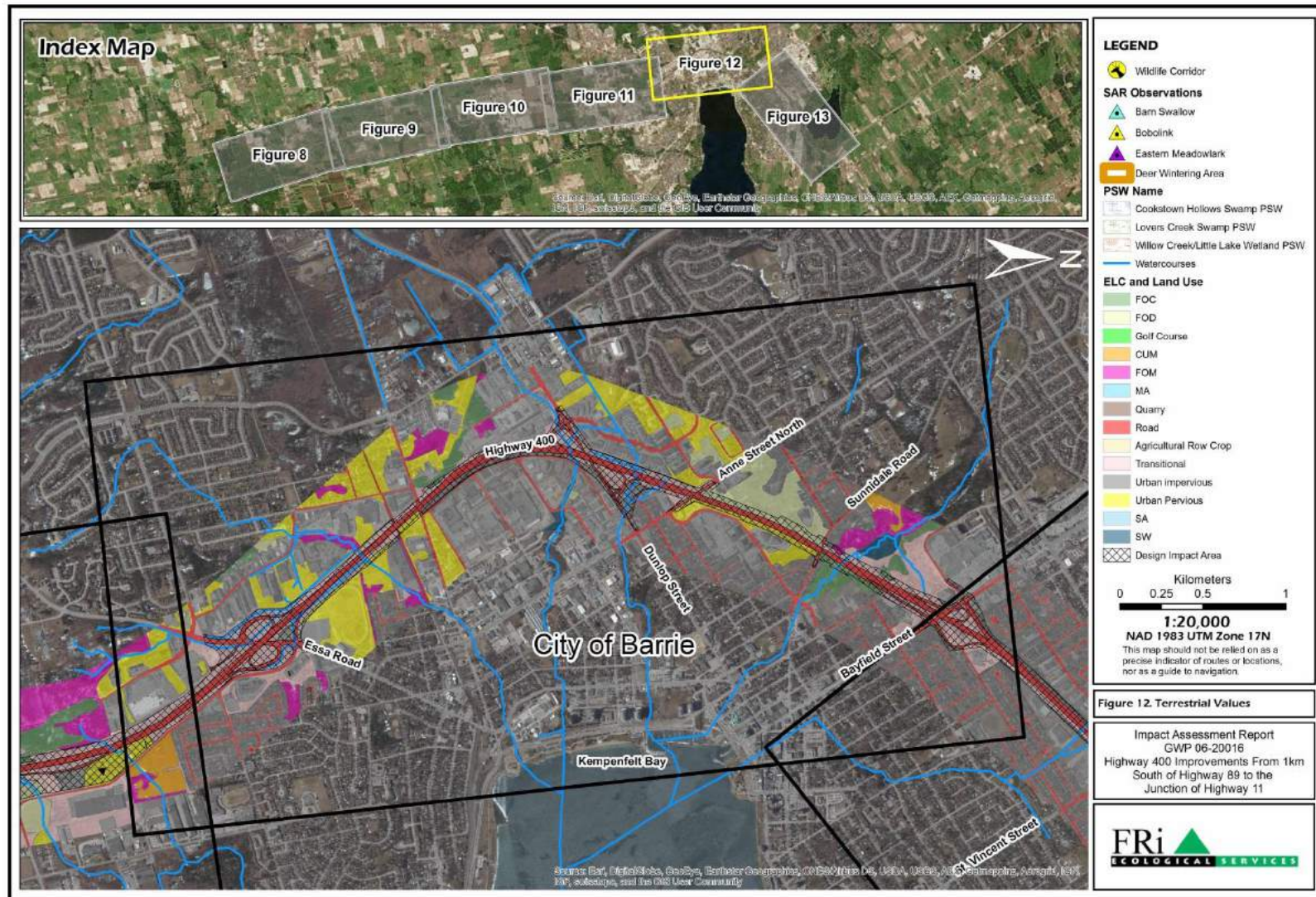
## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Figure 11: Ecological Land Classifications and Land Use in the Study Area**



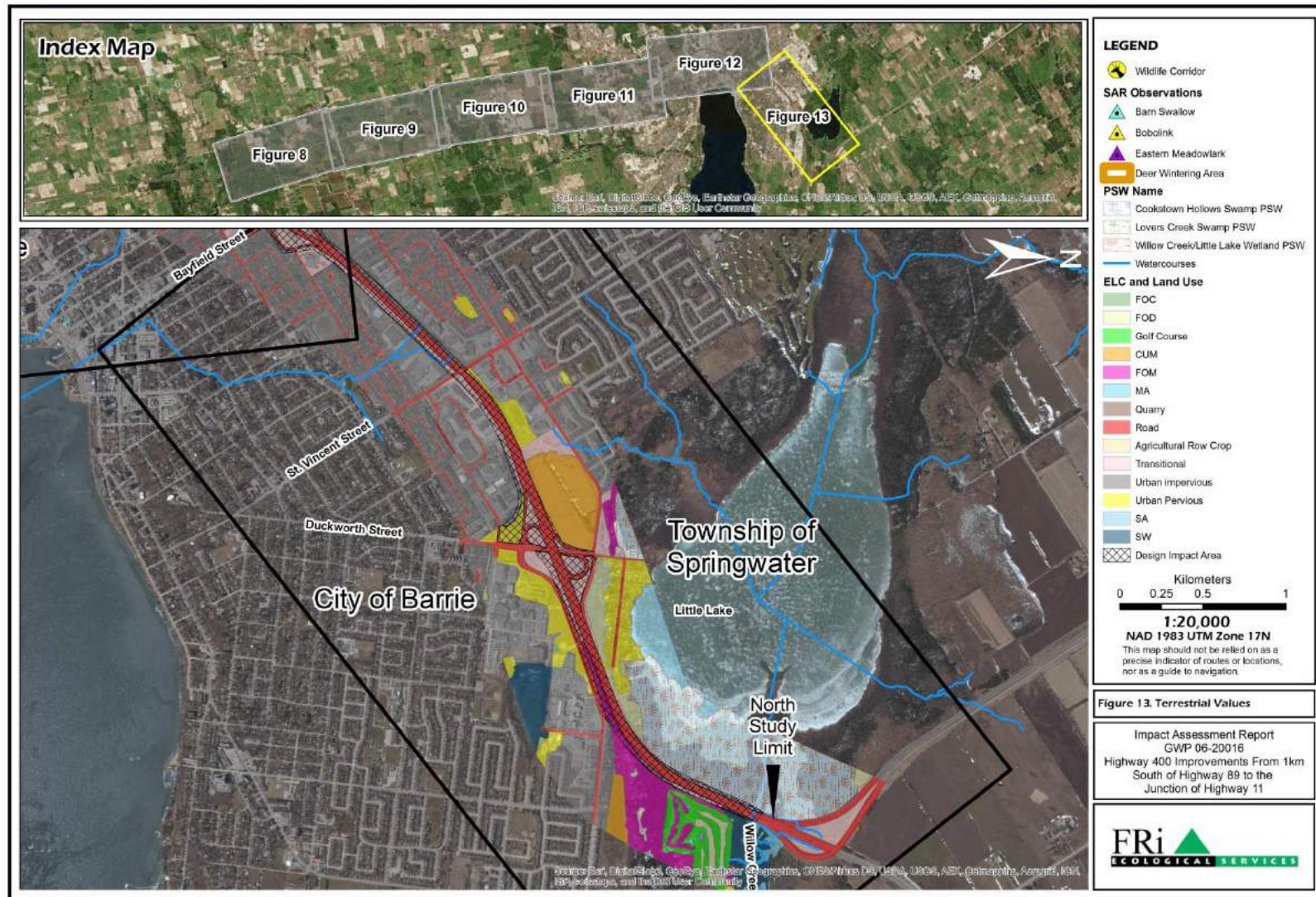
# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Figure 12: Ecological Land Classifications and Land Use in the Study Area**



# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Figure 13: Ecological Land Classifications and Land Use in the Study Area**



### 3.1.3 Species at Risk

A list of potential threatened and endangered species for all of the County of Simcoe was provided by MNRF which contains 31 species (refer to **Table 3**). MNRF did not provide any specific known observations for the study area; however, the Natural Heritage Information Center database did have observation records for three (3) threatened or endangered species. It should be noted that observations that are 20 years old or less should be considered current and any observations older than this should be considered historic. All three records were over 40 years old.

**Table 3: Potential Threatened and Endangered Species for the County of Simcoe as of November 2013**

| Common Name<br>Scientific Name                          | Status     | Habitat<br>Protection<br>Under ESA,<br>2007 | Confirmed<br>During Field<br>Investigations | Potential for the<br>Study Area |
|---|------------|---|---|---------------------------------|
| Jefferson Salamander<br><i>Ambystoma jeffersonianum</i> | Threatened | Regulated                                   | No  | None                            |
| Barn Swallow<br><i>Hirundo rustica</i>                  | Threatened | General                                     | Yes   | Confirmed                       |
| Bobolink<br><i>Dolichonyx oryzivorus</i>                | Threatened | General                                     | Yes   | Confirmed                       |
| Cerulean Warbler<br><i>Setophaga cerulea</i>            | Threatened | General                                     | No  | Low                             |
| Chimney Swift<br><i>Chaetura pelagica</i>               | Threatened | General                                     | No  | Moderate                        |
| Eastern Meadowlark<br><i>Sturnella magna</i>            | Threatened | General                                     | Yes   | Confirmed                       |
| Henslow's Sparrow<br><i>Ammodramus henslowii</i>        | Endangered | General                                     | No  | Low                             |
| King Rail<br><i>Rallus elegans</i>                      | Endangered | General                                     | No  | Low                             |
| Least Bittern<br><i>Ixobrychus exilis</i>               | Threatened | General                                     | No  | Low                             |
| Loggerhead Shrike<br><i>Lanius ludovicianus</i>         | Endangered | General                                     | No  | None                            |
| Piping Plover<br><i>Charadrius melodus</i>              | Endangered | General                                     | No  | None                            |
| Whip-poor-will<br><i>Antrostomus vociferous</i>         | Threatened | General                                     | No  | None                            |
| American Eel<br><i>Anguilla rostrata</i>                | Endangered | General                                     | No  | None                            |

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| <b>Common Name<br/>Scientific Name</b>   | <b>Status</b> | <b>Habitat<br/>Protection<br/>Under ESA,<br/>2007</b> | <b>Confirmed<br/>During Field<br/>Investigations</b> | <b>Potential for the<br/>Study Area</b> |
|--|---------------|---|--|---|
| Lake Sturgeon<br><i>Accipenser fulvescens</i>                                  | Threatened    | General   | No   | None                                    |
| Hine's Emerald<br><i>Somatochlora hineana</i>                                  | Endangered    | General   | No   | None                                    |
| Little Brown Myotis<br><i>Myotis lucifugus</i>                                 | Endangered    | General   | No   | Moderate                                |
| Northern Myotis<br><i>Myotis septentrionalis</i>                               | Endangered    | General   | No   | Moderate                                |
| American Ginseng<br><i>Panax quinquefolious</i>                                | Endangered    | General   | No   | Low                                     |
| Butternut<br><i>Juglans cinerea</i>  | Endangered    | General   | No   | Low                                     |
| Eastern Prairie-fringed<br>Orchid<br><i>Platanthera<br/>leucophaea</i>         | Endangered    | Regulated   | No   | Low                                     |
| Engelmann's Quillwort<br><i>Isoetes engelmannii</i>                            | Endangered    | Regulated   | No   | None                                    |
| Forked Three-awned<br>Grass<br><i>Aristida basiramea</i>                       | Endangered    | General   | No   | None                                    |
| Hill's Thistle<br><i>Cirsium hillii</i>  | Threatened    | General   | No   | None                                    |
| Spotted Wintergreen<br><i>Chimiphila maculata</i>                              | Endangered    | General   | No   | None                                    |
| Blanding's turtle<br><i>Emydoidea blandingii</i>                               | Threatened    | General   | No   | Low                                     |
| Eastern Foxsnake<br>(Georgian Bay<br>Population)<br><i>Pantherophis gloydi</i> | Threatened    | Regulated   | No   | None                                    |
| Eastern Hog-nosed<br>Snake<br><i>Heterodon platirhinos</i>                     | Threatened    | General   | No   | Moderate                                |
| Massasauga<br><i>Sistrurus catenatus</i>                                       | Threatened    | General   | No   | None                                    |
| Spotted Turtle<br><i>Clemmys guttata</i>                                       | Endangered    | General   | No   | None                                    |
| Wood Turtle<br><i>Glyptemys insculpta</i>                                      | Endangered    | Regulated   | No   | None                                    |

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Only three (3) SAR were confirmed in the study area during site visits but no site specific surveys were conducted at this stage for Preliminary Design. The species that were confirmed to be present were Barn Swallow, Bobolink and Eastern Meadowlark. There are no aquatic species at risk as confirmed by Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Maps. Each of the species with some potential for the study area is discussed in the *Natural Heritage Existing Impact Assessment Report* (FRi Ecological Services, February 2017),

### 3.1.4 Hydrogeology and Groundwater

A Preliminary Hydrogeological Assessment was undertaken as part of this study in 2015 to evaluate and document the existing geological and hydrogeological conditions within the study area. The assessment included a windshield survey of the study area and a desktop review of the well records available from the Ontario Ministry of Environment and Climate Change (MOECC), geological / hydrogeological maps and reports available from secondary sources.

The depths and static water levels of the wells noted below and further details on the hydrogeological features and their locations in the study area are available in the *Preliminary Hydrogeological Assessment* (URS, February 2015).

#### 3.1.4.1 Groundwater Recharge and Discharge Conditions

Significant groundwater recharge areas within the study area have been delineated as part of the *Assessment Reports* for the South Georgian Bay Lake Simcoe (SGBLS) Source Protection Region (SPR) (July 2014). The average annual groundwater recharge rate for the Lake Simcoe watershed (consisting of 18 sub-watersheds including the Barrie Creek and Lovers Creek sub-watersheds) is 164 mm/year, while the average annual groundwater recharge rate for the Nottawasaga Valley and Severn Sound watersheds is 202 mm/day. The Nottawasaga Valley watershed includes Willow Creek, Middle Nottawasaga River and Innisfil Creek sub-watersheds which are located in the vicinity of the study area.

Significant groundwater recharge areas (SGRAs) are general found at the northern end of the study area south of the Highway 11 interchange in the vicinity of Willow Creek, in isolated areas throughout the middle section of the study area from approximately north of Dunlop Street in the City of Barrie southerly to the south of 6<sup>th</sup> Line, and at the southern end (south of 2<sup>nd</sup> Line).

Groundwater discharge occurs in the areas adjacent to watercourses, ponds, and associated wetlands.

#### 3.1.4.2 Wellhead Protection Areas

According to the Wellhead Protection Area (WPA) maps available from the SGBLS SPR *Assessment Reports* and as confirmed by the County of Simcoe online land use mapping system, there are four municipal water supply wells and portions of their associated well protection areas located within the study area. All four municipal wells are located in the City of Barrie along the Highway 400 corridor between Dunlop Street

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

West and Tiffin Street, with three being on the east side of Highway 400, and one being on the west side.

In addition, there are a number of municipal water supply wells located outside of the study area limits in close proximity; some portions of their wellhead protection areas are located within the study area.

The well information collected from reviewing the *Assessment Reports* for the SGBLS SPR is consistent with the MOECC well records.

### 3.1.4.3 Aquifer Vulnerability

Vulnerability refers to the sensitivity of groundwater to contamination. The level of aquifer susceptibility is determined by the intrinsic characteristics of the aquifer, which include the depth to water table, the thickness of the aquifer and the presence / absence of fine-textured material above the aquifer.

According to the aquifer / groundwater vulnerability and vulnerability score maps generated as part of the regional groundwater modelling results for the SGLBS SPR *Assessment Reports*, the aquifers underlying the majority of the study area have been rated as having high or medium vulnerability. According to these maps, high aquifer vulnerability is present at the following areas:

- At the northern end of the study area in the vicinity of Willow Creek and its associated wetlands;
- An area in the vicinity of Dunlop Street West and Essa Road, in the City of Barrie;
- A large section of the study area from south of Salem Road / Lockhart Road southern to the south side of 5<sup>th</sup> Line, measuring approximately 9 km; and,
- From north of 3<sup>rd</sup> Line to the southern end of the study area.

In addition, highly vulnerable aquifers of limited sizes are also present in isolated areas adjacent to streams and wetlands across the study area.

### 3.1.4.4 MOECC Well Record Review

A review of the MOECC well records was completed as part of this study. This technical review identified 109 existing water supply wells within the study area. The primary uses for the existing water wells are: domestic (71), commercial (12), industrial (6), municipal (6), livestock (4), irrigation (2) and cooling / AC (1).

### 3.1.5 Stormwater Management

A *Draft Drainage and Hydrology Report* (AECOM, July 2017) was completed as part of this study to assess existing drainage conditions in the study area, identify the potential drainage impacts associated with the proposed improvements, and recommend a stormwater management plan to mitigate impacts associated with the proposed improvements.

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

During the study a total of forty-five (45) culvert crossings and one (1) bridge crossing along the Highway 400 mainline were investigated, including major crossings of the Innisfil Creek, Lovers Creek, Whiskey Creek, Hotchkiss Creek, Dyments Creek, Bunkers Creek, Kidd's Creek, Sophia Creek and Willow Creek.

The existing Highway 400 is designated as a "Freeway" under the jurisdiction of MTO, with a design speed of 110 km/h and a posted speed of 100 km/h through the project limits. According to MTO's *Drainage and Design Standards* (January 2008), under the designation of Freeway, all cross culverts of watercourses greater than 6 m in span are to be designed to convey the 100-year storm and the structures with a span less than 6.0 m to convey the 50-year storm, hereafter referred to as the design storm.

A hydrologic and hydraulic assessment was conducted on the existing culvert crossings. The results indicated that under existing condition, of the 45 existing culvert crossings, 16 culverts (C47, C51, C60, C64, C65, C66, C68, C72, C73, C74, C75, C76, C79, C80, C82, C83) could not satisfy MTO's freeboard criteria and a design storm would flood eight of them (C64, C66, C72, C73, C74, C75, C79, C80) to Highway 400 travelling lanes (refer to **Figures 2 to 7** for details regarding the culvert locations).

Inter-watershed spill conditions were identified to occur along the Highway 400 corridor for Regional Storm (Hurricane Hazel for the LSRCA boundaries, Timmins Regulatory Flow for the NVCA boundaries) within the City of Barrie's jurisdiction. The proposed development would not result in an increase to the upstream regulatory flood elevation.

Refer to the *Draft Drainage and Hydrology Report* (AECOM, July 2017), available under separate cover, for further details.

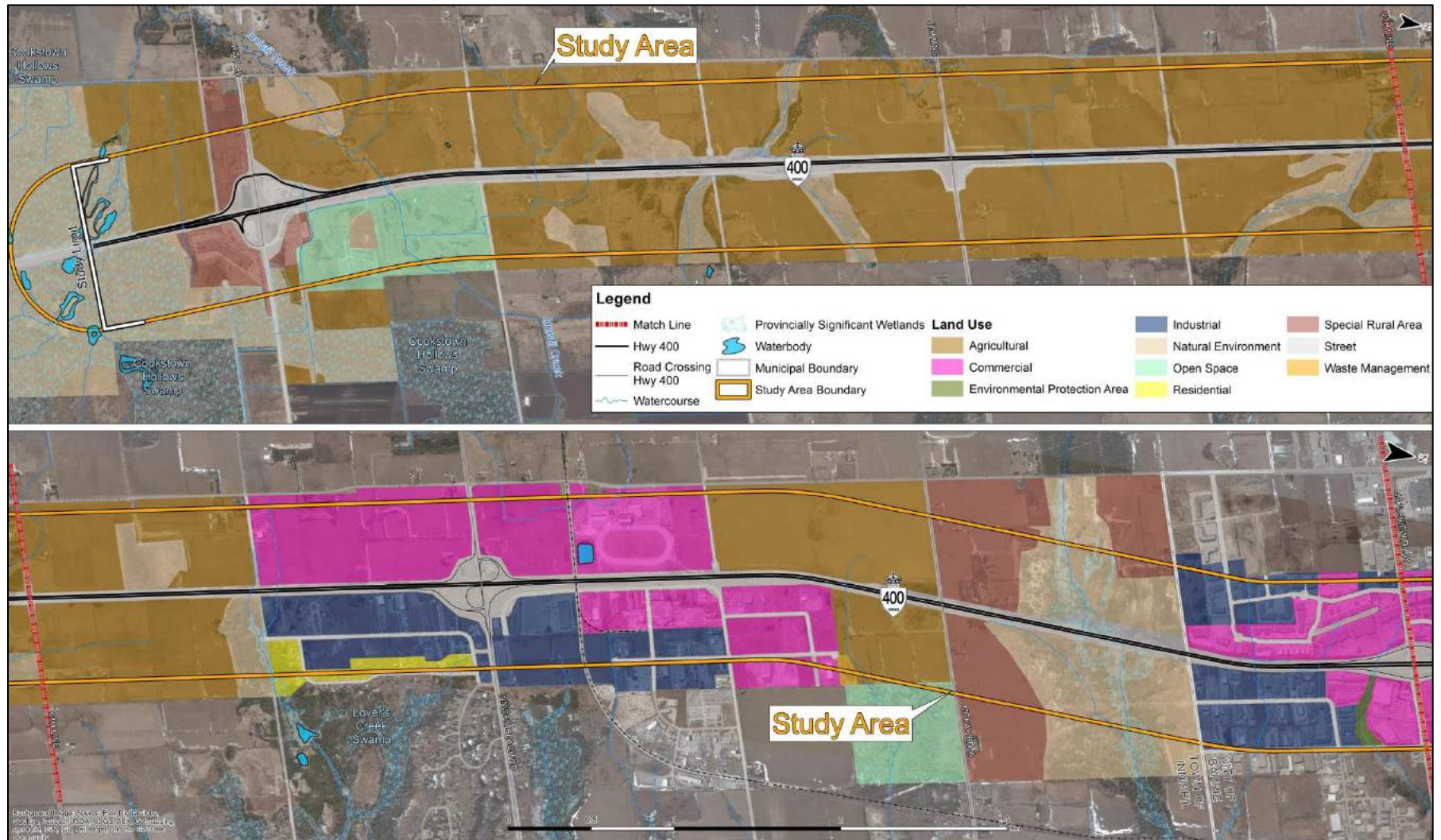
### 3.2 Socio-Economic Environment

The existing socio-economic environment conditions outlined in the previous 2004 TESR (G.W.P. 30-95-00) were examined and they generally mirror the conditions that currently exist within the study area. Key changes to socio-economic features and the existing socio-economic features are discussed below.

#### 3.2.1 Land Use

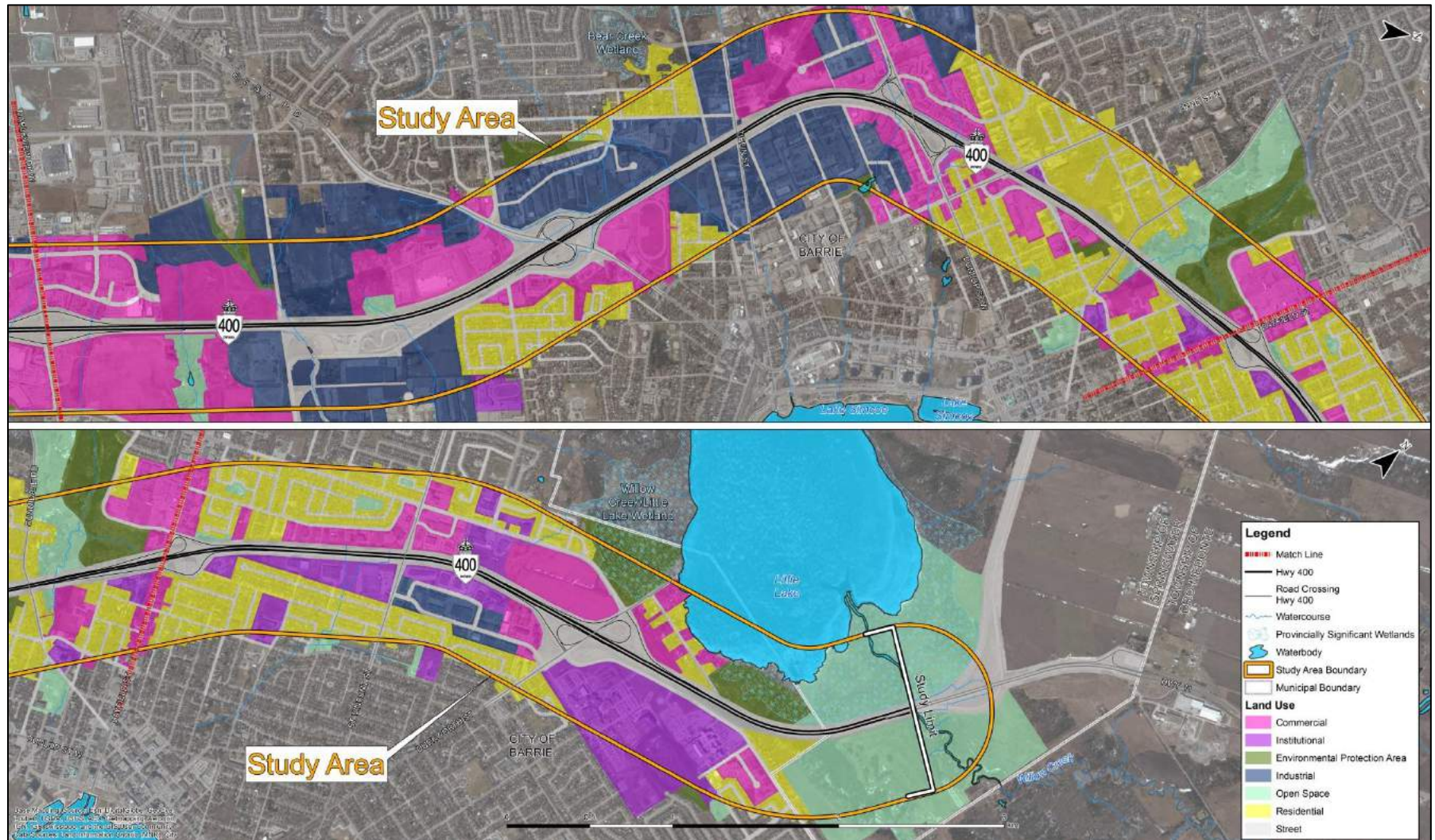
The study area is located within the Town of Innisfil, the City of Barrie, and the Township of Springwater within the County of Simcoe. The land surrounding the interchange is a mix of agricultural, natural environment, special rural area, open space, commercial, industrial, institutional, environmentally protected land, and residential. The *Overview of Existing and Planned Land Use Report* (URS, October 2014), available under separate cover, outlines the various land use designations within the study area, the current and existing land use features and how they have changed since 2004 and the future planned land use and developments in and adjacent to the study area (refer to **Figures 14 and 15** for mapping of land use in the study area).

**Figure 14: Land Use in the Study Area - Highway 89 to Maplevue Drive**



# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 15: Land Use in the Study Area - Mapleview Drive to Highway 11



### 3.2.2 Noise

A noise analysis was undertaken as part of this study and identified 30 Noise Sensitive Areas (NSAs) within the study area which contained a total of 729 modeled receivers. NSAs are defined as the following land uses with Outdoor Living Areas (OLAs) assigned to them:

- Private homes such as single family residences (owned or rented);
- Townhouses (owned or rented);
- Multiple unit buildings, such as apartments with OLAs (i.e. swimming pool or playground equipment); and,
- Hospitals, nursing homes for the aged, where there are OLAs for the patients.

In order for an NSA to exist it must contain an OLA. An OLA is defined as an area at ground level adjacent to an NSA where outdoor living activities would take place (i.e. back yard of a residence or a pool). There is no minimum number of land uses that define an NSA. Therefore, all noise sensitive land uses, regardless of size or location (urban or rural), have been assessed for application of noise control measures. For a continuous development of NSAs of a similar nature (i.e. residential subdivision), representative receiver locations were identified. For isolated NSAs, individual receiver locations are applicable. Land uses that by themselves do not qualify as NSAs include churches, cemeteries, parks, all commercial, all industrial, and schools (except in the case of a new highway corridor or route); however, these land uses were incorporated into existing NSAs when geographically proximal to the above-listed noise sensitive land uses.

Predicted noise levels for the future ambient (without the undertaking) are outlined in **Table 4**.

Further details can be found in the *Noise Study Report* (AECOM, March 2017), available under separate cover.

Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Table 4: Predicted Noise Levels without the Highway 400 Widening and Improvements (Future Ambient)**

| NSA | Location  | Modeled Receivers     | Future Ambient (2031) |                              |
|-----|---|-----------------------|-----------------------|------------------------------|
|     |   |                       | Range (Leq, dBA)      | # of Impacted Dwelling Units |
| 1   | West of Highway 400, south of Highway 89  | R01-01                | 60 - 60               | 0                            |
| 2   | West of Highway 400, north of Highway 89  | R02-01 & R02-02       | 59 - 60               | 0                            |
| 3   | East of Highway 400, north of Highway 89; KOA campground                          | R03-01 & R03-02       | 55 - 56               | 0                            |
| 4   | East of Highway 400, north of 2 Line  | R04-01 & R04-02       | 60 - 64               | 0                            |
| 5   | East of Highway 400, south of 3 Line  | R05-01 through R05-05 | 62 - 68               | 2                            |
| 6   | West of Highway 400, north of 3 Line  | R06-01                | 53 - 53               | 0                            |
| 7   | West of Highway 400, south of 4 Line  | R07-01 through R07-05 | 51 - 56               | 0                            |
| 8   | West of Highway 400, north of 4 Line  | R08-01 & R08-02       | 52 - 56               | 0                            |
| 9   | East of Highway 400, north of 4 Line  | R09-01 & R09-02       | 51 - 55               | 0                            |
| 10  | East of Highway 400, north and south of 5 Line                                    | R10-01 & R10-02       | 56 - 58               | 0                            |
| 11  | West of Highway 400, south of 6th Line  | R11-01 & R11-02       | 54 - 57               | 0                            |
| 12  | East of Highway 400 and south of Innisfil Beach Road                              | R12-01 through R12-23 | 51 - 55               | 0                            |
| 13  | East of Highway 400 and south of 9 Line Road                                      | R13-01                | 58 - 58               | 0                            |
| 14  | East of Highway 400, north of McKay Road (10 <sup>th</sup> Line)                  | R14-01                | 58 - 58               | 0                            |
| 15  | East of Highway 400, south of Essa Road   | R15-01 through R15-63 | 49 - 65               | 2                            |
| 16  | East of Highway 400, at the western terminus of Campbell Avenue and Wood Street   | R16-01 through R16-05 | 59 - 63               | 0                            |
| 17  | West of Highway 400, west of Patterson Road; at Phillips Street and Tiffin Street | R17-01 through R17-06 | 53 - 69               | 1                            |
| 18  | East of Highway 400, at Tiffin Street   | R18-01 through R18-07 | 60 - 68               | 4                            |
| 19  | East of Highway 400, south of Anne Street   | R19-01 through R19-11 | 59 - 70               | 4                            |
| 20  | West of Highway 400, south of Anne Street   | R20-01 through R20-28 | 44 - 71               | 6                            |
| 21  | West of Highway 400, north of Anne Street   | R21-01 through R21-34 | 48 - 75               | 13                           |

Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

| NSA | Location  | Modeled Receivers       | Future Ambient (2031) |                              |
|-----|---|-------------------------|-----------------------|------------------------------|
|     |   |                         | Range (Leq, dBA)      | # of Impacted Dwelling Units |
| 22  | East of Highway 400, between Anne Street and Sunnidale Road             | R22-01 through R22-46   | 48 - 75               | 3                            |
| 23  | West of Highway 400, north of Sunnidale Road                            | R23-01 through R23-08   | 58 - 73               | 4                            |
| 24  | East of Highway 400, between Sunnidale Road and Bayfield Street         | R24-01 through R24-52   | 50 - 73               | 8                            |
| 25  | West of Highway 400, north of Bayfield Street                           | R25-001 through R25-151 | 42 - 74               | 53                           |
| 26  | East of Highway 400, north of Bayfield Street                           | R26-001 through R26-123 | 49 - 71               | 20                           |
| 27  | West of Highway 400, north of St Vincent Street                         | R27-01 through R27-11   | 51 - 66               | 0                            |
| 28  | East of Highway 400, north of St Vincent Street                         | R28-01 through R28-20   | 49 - 72               | 0                            |
| 29  | West of Highway 400, north of Duckworth Street, along Little Lake Drive | R29-01 through R29-53   | 53 - 74               | 3                            |
| 30  | East of Highway 400, north of Duckworth Street                          | R30-01 through R30-34   | 33 - 73               | 18                           |

Leq: Equivalent Sound Level

dBA: A- Weighted Decibels

### 3.2.3 Waste and Contamination

A *Contamination Overview Study* (URS, February 2015) was undertaken as part of this study update based on the property requirements from the 2004 TESR. To update the Contamination Overview Study, preliminary site screenings were undertaken to determine areas of potential environmental concern.

## 3.3 Cultural Environment

### 3.3.1 Archaeology

As outlined in the 2004 TESR, a Stage 1 Archaeological Assessment was undertaken. It was concluded that no archaeological sites were documented within the study area; however, based on the extent of settlement in the vicinity of the study area, there is potential for the identification of historic archaeological material within the subject properties. The 2004 TESR recommended that prior to any land disturbance a Stage 2 Archaeological Assessment be conducted in accordance with the technical guidelines provided by the Ministry of Tourism, Culture and Sport (MTCS).

As part of the Preliminary Design Study Update, a Stage 2 Archaeological Assessment was carried out on all potentially impacted properties where Permission to Enter was granted within the study area. Additional Stage 2 Archaeological Assessments will be required in areas where Permission to Enter was not granted for property required for the improvements and further investigations (i.e. Stage 3 and/or Stage 4 Archaeological Assessments) may be required as recommended. The archaeological study results are documented in the *Stage 1-2 Archaeological Assessment Report for the Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11* (AECOM, February 2017).

### 3.3.2 Built Heritage

The following structures are considered to have heritage value:

- Highway 89;
- Anne Street;
- Sunnidale Road; and,
- Bayfield Street.

As outlined in the 2004 TESR a built heritage and cultural landscape assessment was undertaken in September 2000. A later study was completed in 2009 that identified heritage treatments along the entire Highway 400 corridor from Major Mackenzie Drive to Highway 11 (*Highway 400 Major Mackenzie Drive to Highway 11 Heritage Bridge Replacement Design Concept Study, 2009*, under separate cover). The assessments and investigations indicate that the above noted structures are considered built heritage features due to their age (i.e. over 40 years old), cultural affiliation and design attributes.

## 3.4 Transportation

This section discusses the existing conditions within the transportation network of the study area including the road network, any ongoing studies for changes to the road network being undertaken and utilities present within the ROW or proposed ROW. Refer to **Section 2.3** for further details on the existing operations of Highway 400.

### 3.4.1 Road Network

Highway 400 is a Controlled Access Highway under the jurisdiction of MTO. This section of Highway 400 is a 6-lane divided freeway with a current posted speed of 100 km/h.

Highway 400 is considered regionally and provincially significant as it serves as an important link between the Greater Toronto Area and the City of Barrie. Highway 400 also connects Highway 401 in Southern Ontario to Central and Northern Ontario / Western Canada via Highway 69 and Highway 11.

The following municipal roads currently cross / intersect Highway 400 within the study area:

- Highway 89 (interchange);
- 4<sup>th</sup> Line;
- 6<sup>th</sup> Line;
- Innisfil Beach Road (interchange);
- 10<sup>th</sup> Line (McKay Road);
- Mapleview Drive (interchange);
- Essa Road (interchange);
- Tiffin Street;
- Dunlop Street (interchange);
- Anne Street;
- Sunnidale Road;
- Bayfield Street (interchange);
- St. Vincent Street; and,
- Duckworth Street (interchange).

### 3.4.2 Related Studies

The ongoing and completed studies for improvements along the Highway 400 corridor being undertaken by the municipalities include:

- Highway 400 / 6th Line Interchange (Town of Innisfil);

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

- County Road 21 (Innisfil Beach Road) Improvements – County Road 27 to County Road 39 (Simcoe County);
- McKay Rd East (10th Line) / Highway 400 Interchange (City of Barrie);
- McKay Rd East Widening to 4 lanes (City of Barrie);
- Lockhart Road / Salem Road Highway 400 4 Lane Crossing (City of Barrie);
- Harvie Road / Big Bay Point Road Highway 400 4 Lane Crossing (City of Barrie);
- Widening of Essa Road to 6 lanes (City of Barrie);
- Widening of Tiffin Street to 4 Lanes (City of Barrie);
- Widening of Dunlop Street to 6 Lanes (City of Barrie);
- Widening of Anne Street to 4 Lanes (City of Barrie);
- Widening of Bayfield Street to 6 lanes (City of Barrie); and,
- Widening of St. Vincent Street to 4 Lanes (City of Barrie).

The Project Team has been working with the municipalities to not preclude future municipal plans.

Municipal studies that affect Highway 400 are subject to MTO approval for both technical engineering design standards and traffic impacts to the highway network, prior to the commencement of construction. The municipal studies listed above follow a Municipal Class EA process with consultation that is conducted by the municipality. MTO participates in these studies either through a technical review, as part of an external project team with other stakeholders (i.e. the County or other municipalities), or through a joint project with the municipality.

### 3.4.3 Utilities

The following utilities are located within or adjacent to the Highway 400 ROW:

- Bell Canada;
- Barrie Hydro;
- Innisfil Hydro;
- Hydro One;
- Town of Innisfil (water);
- City of Barrie (water);
- County of Simcoe Area Network;
- Rogers Cable; and
- Enbridge Consumers Gas.

## 4. Alternatives and Evaluation

The Project Team examined alternatives to address the capacity requirements associated with future (2031) traffic projects and changes to existing conditions throughout the corridor since the 2004 TESR.

The study area was divided into three sections for the purposes of evaluating the highway widening alternatives:

- Highway 400 from 1 km south of Highway 89 to Maplevue Drive;
- Maplevue Drive to Duckworth Street; and,
- Duckworth Street to the junction of Highway 11.

The division of the study area into three sections to examine highway widening alternatives was necessary to address the different needs and unique conditions within each section of the study area:

- The land use from Highway 89 to Maplevue Drive is predominately rural with only some new development since the 2004 study. The 2004 TESR recommended widening to the west in this section of the corridor, as such, development since the 2004 TESR has been minimal on the west side of Highway 400 and impacts associated with widening to the west would be less than widening about the centreline.
- The section from Maplevue Drive to Duckworth Street consists predominantly of urban land use and has seen an increase in development adjacent to the Highway 400 right-of-way since 2004. Widening about the centreline was recommended through this section in 2004 given the development through this section.
- The third section of the corridor (north of Duckworth Street) was identified as a separate segment from the rest of the study because the traffic analysis did not show a great need for improvements to address the projected capacity needs (refer to **Section 2.3**). This section was considered a transition from the recommended improvements to the existing conditions at Highway 11.

### 4.1 Review of the Previous 2004 TESR (G.W.P. 30-95-00)

The 2004 TESR included an analysis and evaluation for the Highway 400 widening alternatives as well as an analysis and evaluation of various interchange configurations for each of the interchanges along the corridor. As part of this current study update, a review of the Technically Preferred Plan from 2004 was undertaken to confirm that the 2004 recommendations will address future (2031) traffic projections, and associated capacity, operational and safety needs. The traffic analysis was completed with a planning horizon year of 2031 and indicated that Highway 400 within the study area needed to be widened to 10 lanes throughout the majority of the corridor (refer to **Section 2.3** for further information).

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

As part of the review and assessment and evaluation of alternatives the project team completed a screening of the Highway 400 widening alternatives and determined that:

- The 2004 approved plan for the section from Highway 89 to Maplevue Drive is still valid and was carried forward (widening to five (5) lanes in each direction (Four (4) general purpose lanes and one (1) HOV lane);
- The section from Maplevue Drive to Duckworth Street was revisited; and,
- The recommendation of four (4) general purpose lanes and one (1) HOV lane in each direction on Highway 400 from south of the Duckworth Street Interchange will be gradually reduced to match the existing number of lanes north of Duckworth Street. The HOV lane will transition to a General Purpose Lane before Duckworth Street on Highway 400 northbound and the number of lanes will then be reduced to match the existing configuration at the junction at Highway 11. The number of lanes on Highway 400 southbound from Highway 11 will gradually increase, with the HOV lane (the 5<sup>th</sup> lane) developing just north of Duckworth Street.

A long list of Highway 400 widening alternatives from Maplevue Drive to Duckworth Street was subjected to a screening-level assessment. This screening led to the identification of a short list of alternatives which were evaluated based on the criteria in the **Table 5** using a Reasoned Argument (trade-off) method of evaluation.

Once the Technically Preferred Alternative for the Highway 400 was determined, the assessment and evaluation of the interchange configuration alternatives was conducted. This involved evaluating the interchange alternatives using a Reasoned Argument (trade-off) method of evaluation with the criteria in **Table 5**.

**Table 5: Evaluation Criteria**

| Evaluation Component                            | Criteria   |
|---|--|
| <b>Transportation and Engineering</b>           | <ul style="list-style-type: none"><li>• Traffic operations and safety;</li><li>• Operations and maintenance;</li><li>• Drainage;</li><li>• Staging;</li><li>• Cost</li></ul>   |
| <b>Natural Environment</b>                      | <ul style="list-style-type: none"><li>• Terrestrial ecosystems (vegetation, wildlife, etc.);</li><li>• Fish and fish habitat;</li><li>• Wetlands;</li><li>• Designated natural areas;</li><li>• Groundwater;</li><li>• Species at Risk</li></ul> |
| <b>Socio-Economic and Cultural Environments</b> | <ul style="list-style-type: none"><li>• Community effects (residential, commercial, institutional property impacts, etc.)</li><li>• Noise</li></ul>  |

# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

| Evaluation Component | Criteria   |
|----------------------|--|
|                      | <ul style="list-style-type: none"> <li>• Agricultural;</li> <li>• Contamination and waste;</li> <li>• Future planned land use;</li> <li>• Aesthetics;</li> <li>• Snow drift assessment / prevention</li> <li>• Archaeological resources;</li> <li>• Built heritage resources.</li> </ul> |

## 4.2 Highway 400 Widening – Mapleview Drive to Duckworth Street

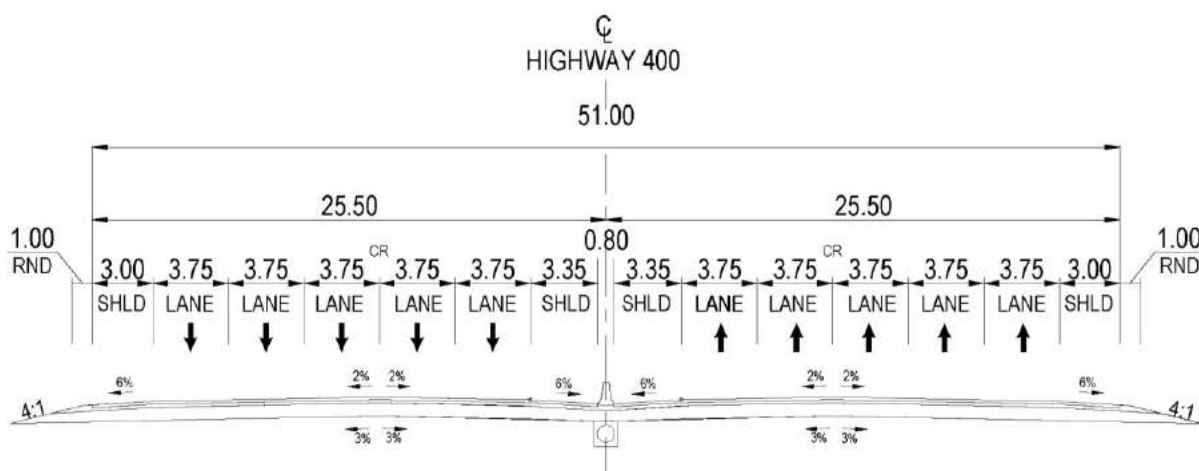
Three alternatives were carried forward for further assessment from Mapleview Drive to Duckworth Street including the following (refer to **Figures 16, 17 and 18** for the proposed cross-sections of each alternative):

**Alternative 1:** Widen about the centreline from six (6) to 10 lanes (five (5) general purpose lanes in each direction);

**Alternative 2:** Widen about the centreline from six (6) to 10 lanes (four (4) general purpose lanes with one (1) HOV lane in each direction); and

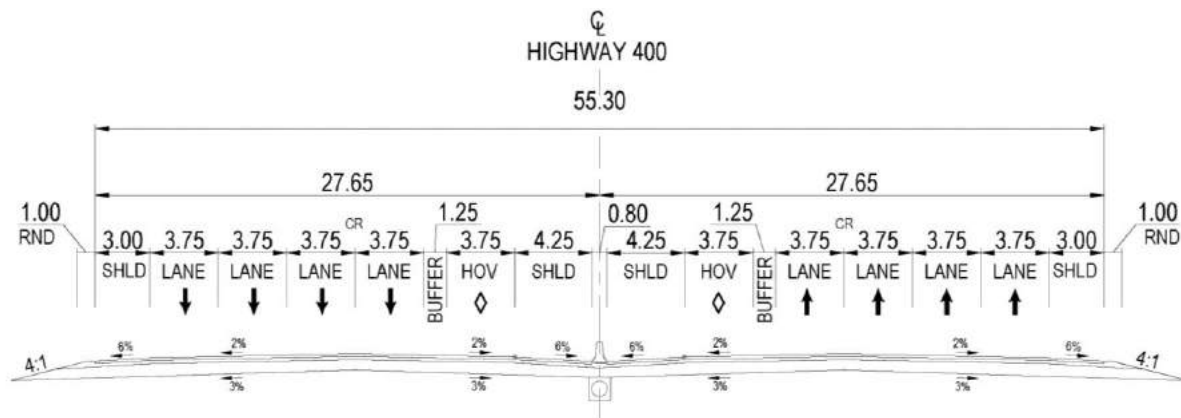
**Alternative 3:** Widen about the centreline from six (6) to 10 lanes (two (2) express lanes and three (3) collector lanes in each direction).

**Figure 16: Highway 400 Widening Alternative 1: Five (5) General Purpose Lanes in Each Direction**

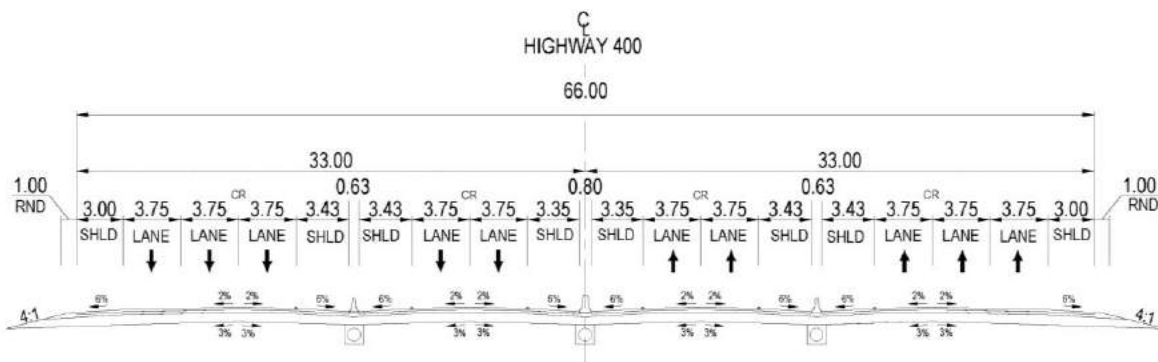


# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Figure 17: Highway 400 Widening Alternative 2: Four (4) General Purpose Lanes and One (1) High Occupancy Vehicle Lane in Each Direction**



**Figure 18: Highway 400 Widening Alternative 4: Two (2) Express Lanes and Three (3) Collector Lanes in Each Direction**



Alternative 1 was screened out because it did not include provision for future HOV lanes which is inconsistent with MTO's current policies (i.e. encouraging carpooling, increasing carrying capacity, etc.).

The assessment and evaluation of alternatives is outlined in **Table 6** and is summarized as follows:

- Alternative 3 results in slightly greater potential impacts to the natural and cultural environments than Alternative 2, however, these impacts can be minimized through mitigation measures.
- In terms of impacts to the socio-economic environment, the core-collector alternative (Alternative 3) requires a greater footprint which results in greater impacts relative to the 10-lane widening with HOV lanes (Alternative 2), and will also result in greater impacts to traffic during construction than Alternative 2.

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

- Both alternatives will accommodate acceptable traffic operations to the horizon year of 2031; and each alternative has advantages and disadvantages to the highway operations.
- Alternative 3 is approximately 20% more expensive to construct than Alternative 2 and requires approximately 60% more property than Alternative 2.
- Alternative 3 will also have a slightly higher cost to maintain due to the additional highway infrastructure.

Therefore Alternative 2, maintaining the approved plan from the 2004 TESR, is the preferred alternative.

**Table 6: Highway 400 Widening from Mapleview Drive to Duckworth Street Evaluation Summary**

| Factor  | Alternative 2 – Four (4) General Purpose Lanes and One (1) HOV Lane | Alternative 3 – Two(2)-Express / Three (3) Collector Lanes |
|---|---|--|
| Transportation and Engineering / Traffic Operations | ●   | ◐  |
| Natural Environment                                 | ●   | ◑  |
| Socio-Economic and Cultural Environments            | ●   | ◐  |
| Cost  | ●   | ◐  |
| <b>Most preferred ● → ◐ Least preferred</b>         |   |  |

For a more detailed evaluation summary table refer to **Appendix C**.

### 4.3 Highway 400 / Highway 89

It was determined that the 2004 approved plan of a Parclo A4 with the realignment of Reive Blvd is still valid for the Highway 400 / Highway 89 interchange. A Parclo A4 provides additional traffic capacity required in the long-term and replaces left turns with direct on-ramps to Highway 400. The realignment of Reive Blvd moves the intersection of County Road 89 and Reive Blvd to meet the vicinity of the intersection of County Road 89 and the outlet mall (located in the southeast quadrant).

### 4.4 Highway 400 / Innisfil Beach Road

It was determined that the 2004 approved plan of a Parclo A4 interchange is still valid for the Highway 400 / Innisfil Beach Road Interchange. The traffic projections at Innisfil Beach Road with four (4) lanes (two (2) lanes in each direction) along Innisfil Beach

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Road operate acceptably to the 2031 traffic horizon and meet current MTO standards. A more detailed assessment of grading requirements was considered during this update study which resulted in updates to the grading design throughout the corridor. Additional property beyond the 2004 approved plan is required in the southwest quadrant to accommodate the grading for the on-ramp from Innisfil Beach Road eastbound to Highway 400 southbound.

### 4.5 Highway 400 / Maplevue Drive

The approved 2004TESR included a proposed Diamond Interchange configuration, which is the existing configuration widened to accommodate the Highway 400 widening. This interchange is located in a busy part of the City of Barrie where there are many commercial businesses located very close to the interchange. In order to improve the traffic operations at this interchange to the 2031 planning horizon the following alternatives were considered:

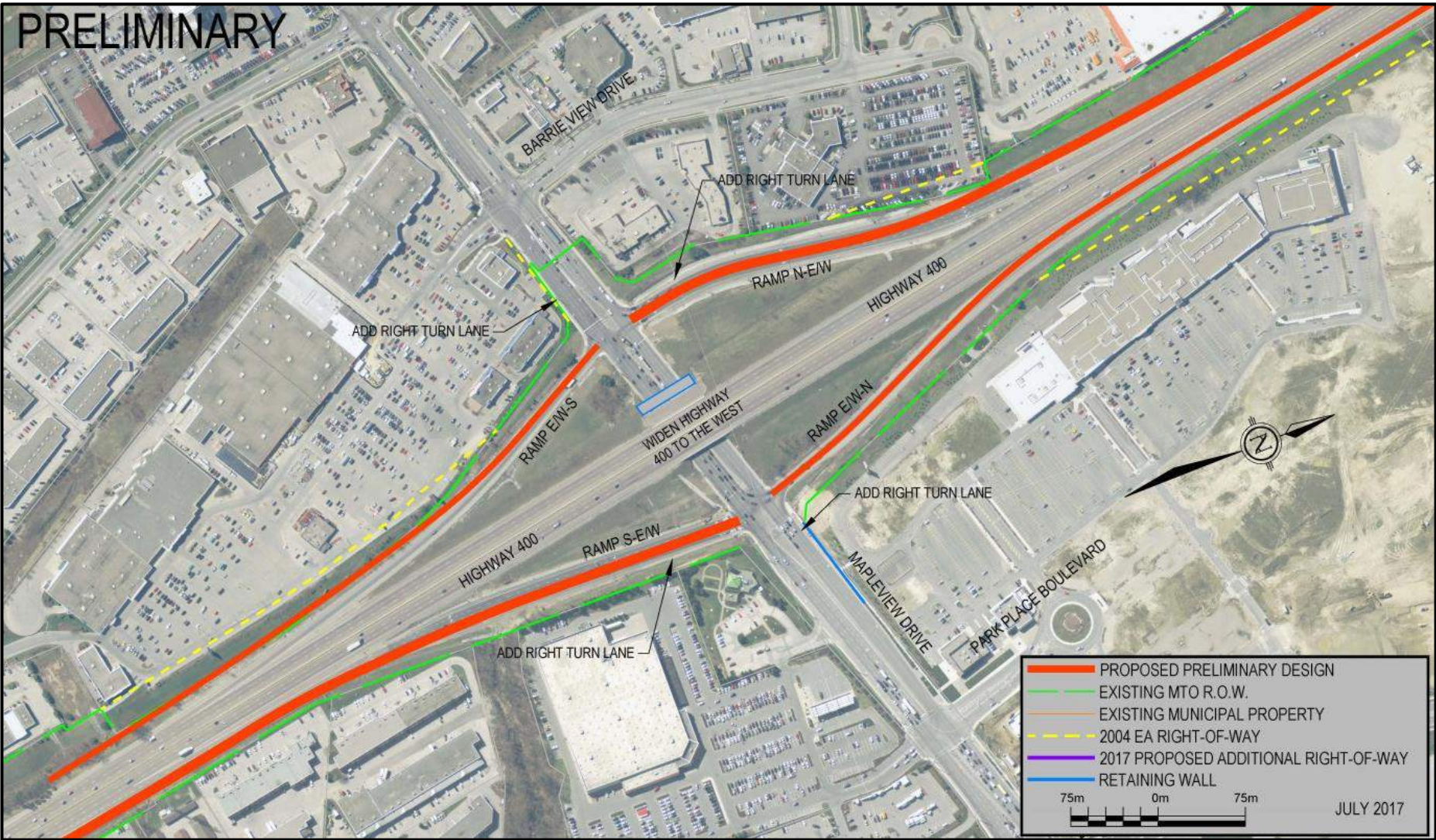
**Alternative 1:** Diamond Interchange

**Alternative 2:** Diverging Diamond Interchange

Refer to **Figure 19** and **Figure 20** below for images of the interchange configurations that were subject to the assessment and evaluation.

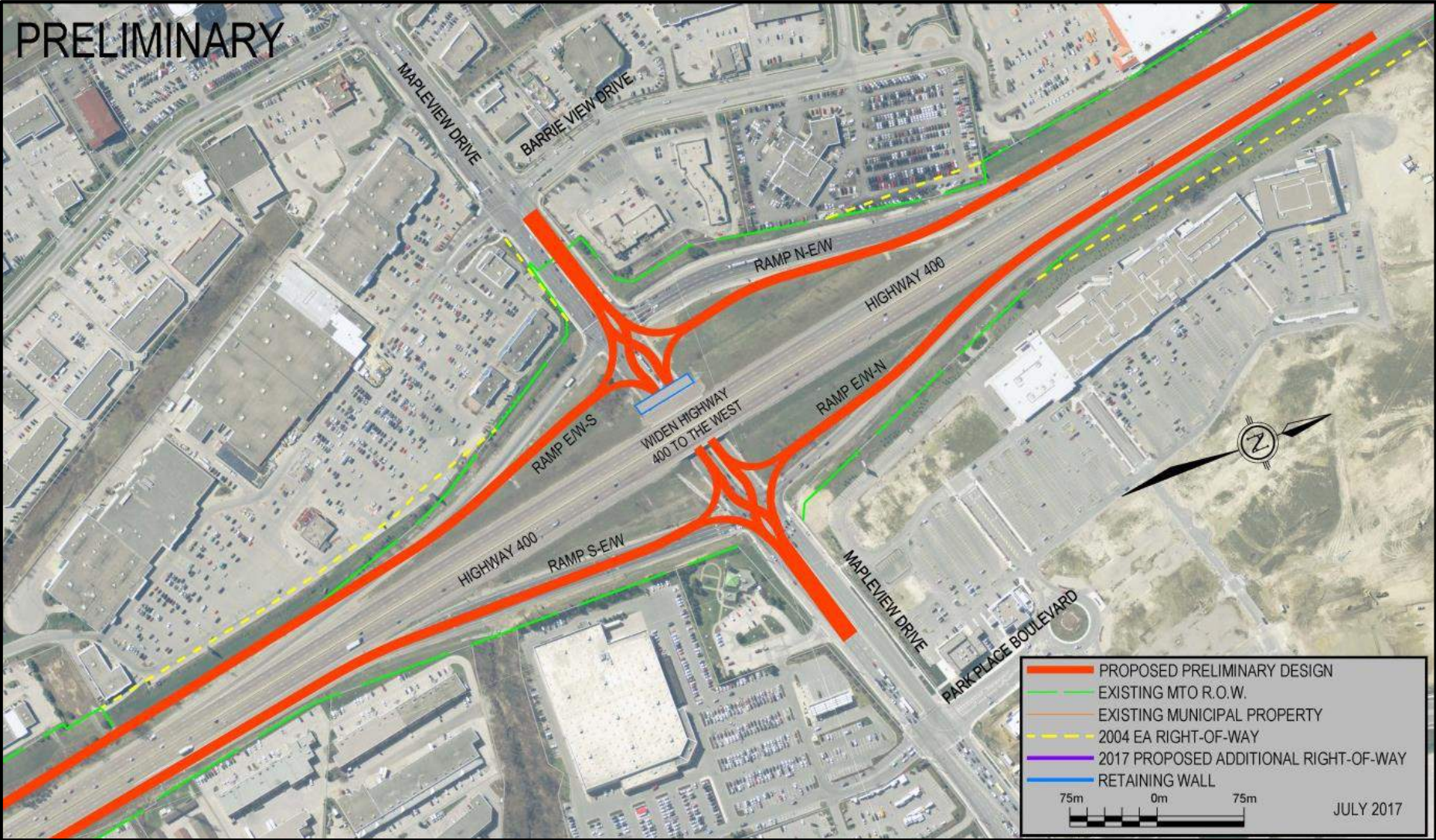
Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 19: Highway 400 / Maplevue Drive Interchange Alternative 1 – Diamond Interchange



Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 20: Figure 19: Highway 400 / Mapleview Drive Interchange Alternative 2 – Diverging Diamond Interchange



## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

The assessment and evaluation of alternatives is outlined in **Table 7** and is summarized as follows:

- Both alternatives result in similar slight impacts to the natural, socio-economic, and cultural environments.
- Although Alternative 2 is a more expensive alternative to construct, Alternative 2 operates at a high level of service and results in a significant improvement in traffic operations and safety at the ramp terminals.
- Although the Diverging Diamond is a change from the 2004 TESR approved plan, no additional property beyond the footprint of the 2004 approved plan is required.

As such, Alternative 2, the Diverging Diamond, is preferred at Mapleview Drive.

**Table 7: Highway 400 / Mapleview Drive Interchange Evaluation Summary**

| Factor  | Alternative 1<br>Diamond | Alternative 2<br>Diverging Diamond |
|---|--------------------------|------------------------------------|
| Transportation and Engineering / Traffic Operations | ◐                        | ●                                  |
| Natural Environment                                 | ●                        | ●                                  |
| Socio-Economic and Cultural Environments            | ◐                        | ●                                  |
| Cost  | ●                        | ◐                                  |
| Most preferred ● → ◐ Least preferred                |                          |                                    |

For a more detailed evaluation summary table refer to **Appendix C**.

Diverging Diamond interchanges are an innovative type of interchange where the two directions of traffic on the secondary road (Mapleview Drive), cross to the opposite side of the road, under the bridge, to improve entering and exiting the Highway above. Diverging Diamond interchanges although relatively new in Canada, are being considered in various projects across the province and have been designed and constructed in multiple locations in the United States. They are often desirable interchanges especially suited for tight urban areas with high volumes of traffic (similar to the Highway 400 / Mapleview Drive interchange) for the following reasons:

- They require less property and impacts to the surrounding area than most other types of interchanges;

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

- They can significantly improve traffic from diamond interchanges as they offer free-flow movements;
- They improve operational safety throughout the interchanges as they minimize conflict points (left-turn movements); and,
- They can provide pedestrian access throughout the interchange.

### 4.6 Highway 400 / Essa Road

The approved 2004 TESR included a Parclo A4 interchange at Essa Road which is the existing configuration with improvements to accommodate capacity requirements and the Highway 400 widening. This study considered the following two interchange configurations to address the 2031 planning horizon traffic capacity:

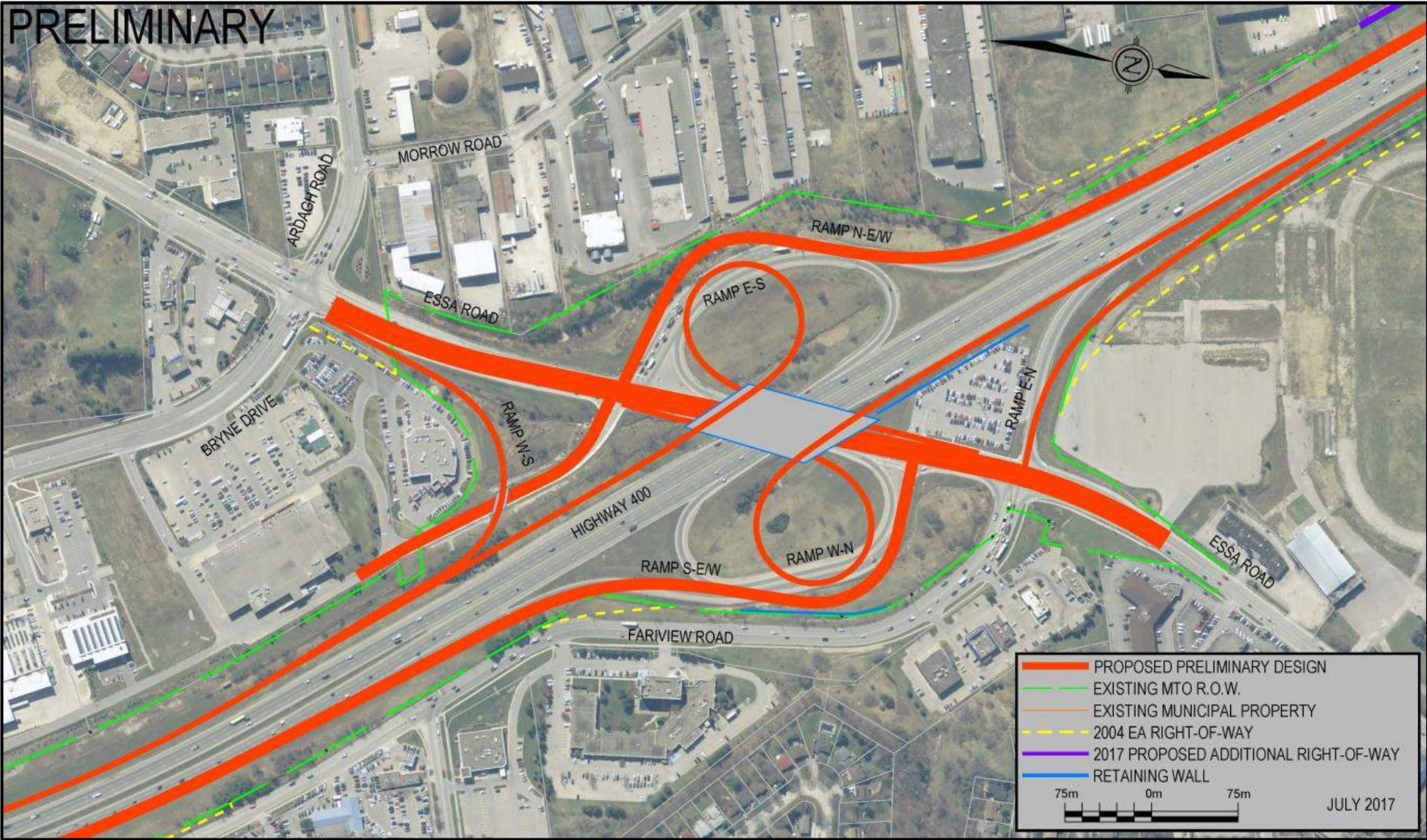
**Alternative 1:** Parclo A4

**Alternative 2:** Parclo A / Diamond with Roundabouts

Refer to **Figure 21** and **Figure 22** below for images of the interchange configurations that were subject to the assessment and evaluation.

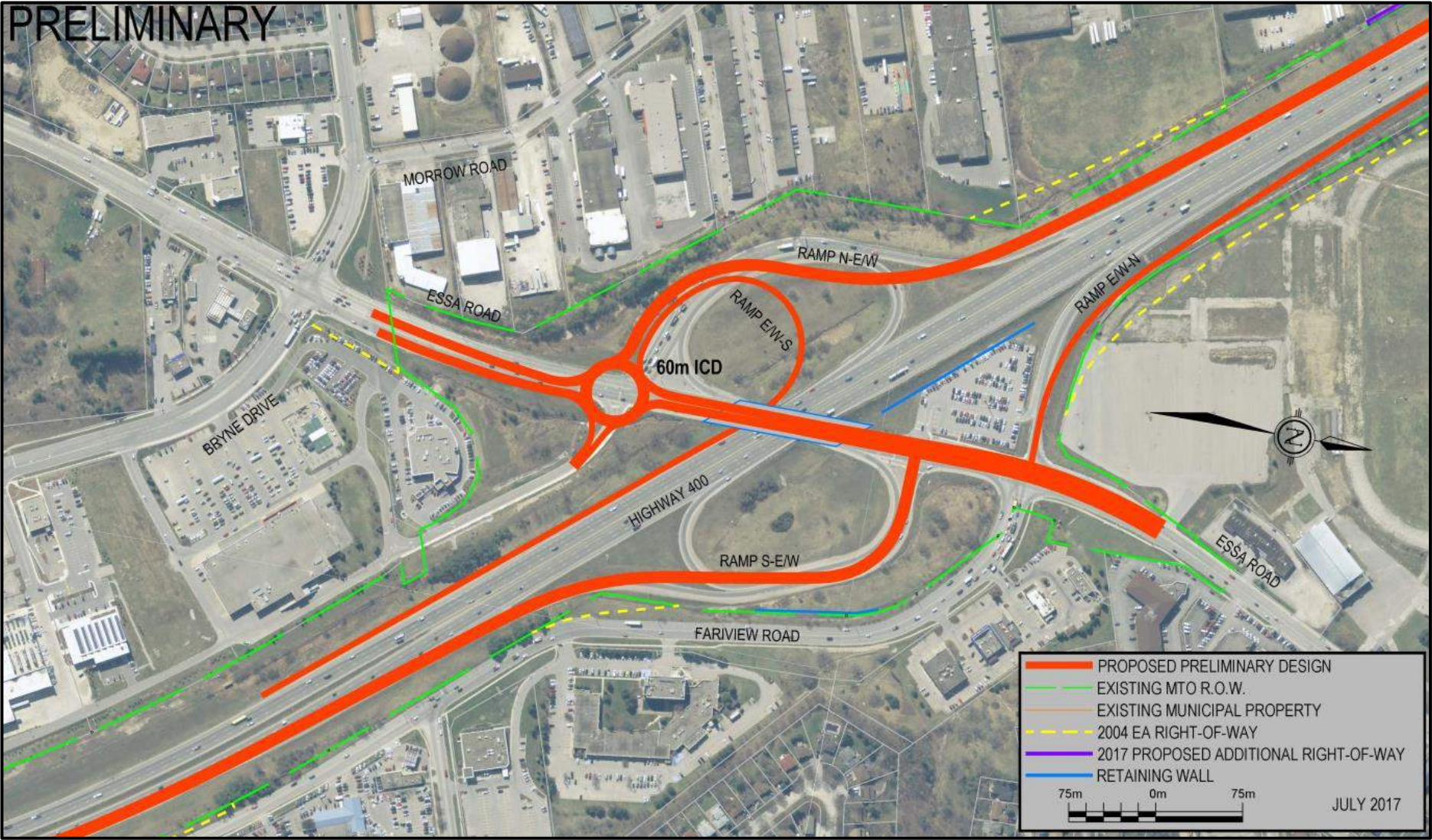
Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 21: Highway 400 / Essa Road Interchange Alternative 1 – Parclo A4



Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

Figure 22: Highway 400 / Essa Road Interchange Alternative 2 – Parclo A / Diamond with Roundabouts



## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

The assessment and evaluation of alternatives is outlined in **Table 8** and is summarized as follows:

- Alternative 2 will operate at a very low level of service because a two-lane roundabout is not sufficient to accommodate future traffic volumes at the west ramp terminal resulting in unacceptable traffic operations;
- The area around the Essa Road interchange is urban in nature and therefore both alternatives result in similar minor potential impacts to the natural environment. Although Alternative 1 results in slightly greater impacts to future development lands and impacts to commercial property than Alternative 2, the difference between these impacts is relatively minor and can be addressed through mitigation; and,
- The superior traffic operations of Alternative 1 outweigh the lower costs, constructability advantages, and reduced footprint impacts associated with Alternative 2.

As such, Alternative 1, the Parclo A4 configuration, is preferred at Essa Road.

**Table 8: Highway 400 / Essa Road Interchange Evaluation Summary**

| Factor  | Alternative 1<br>Parclo A4 | Alternative 2<br>Parclo A / Diamond with Roundabouts |
|---|----------------------------|--|
| Transportation and Engineering / Traffic Operations | ●                          | ○  |
| Natural Environment                                 | ●                          | ●  |
| Socio-Economic and Cultural Environments            | ◐                          | ●  |
| Cost  | ◐                          | ●  |
| Most preferred ● → ○ Least preferred                |                            |  |

For a more detailed evaluation summary table refer to **Appendix C**.

### 4.7 Highway 400 / Dunlop Street

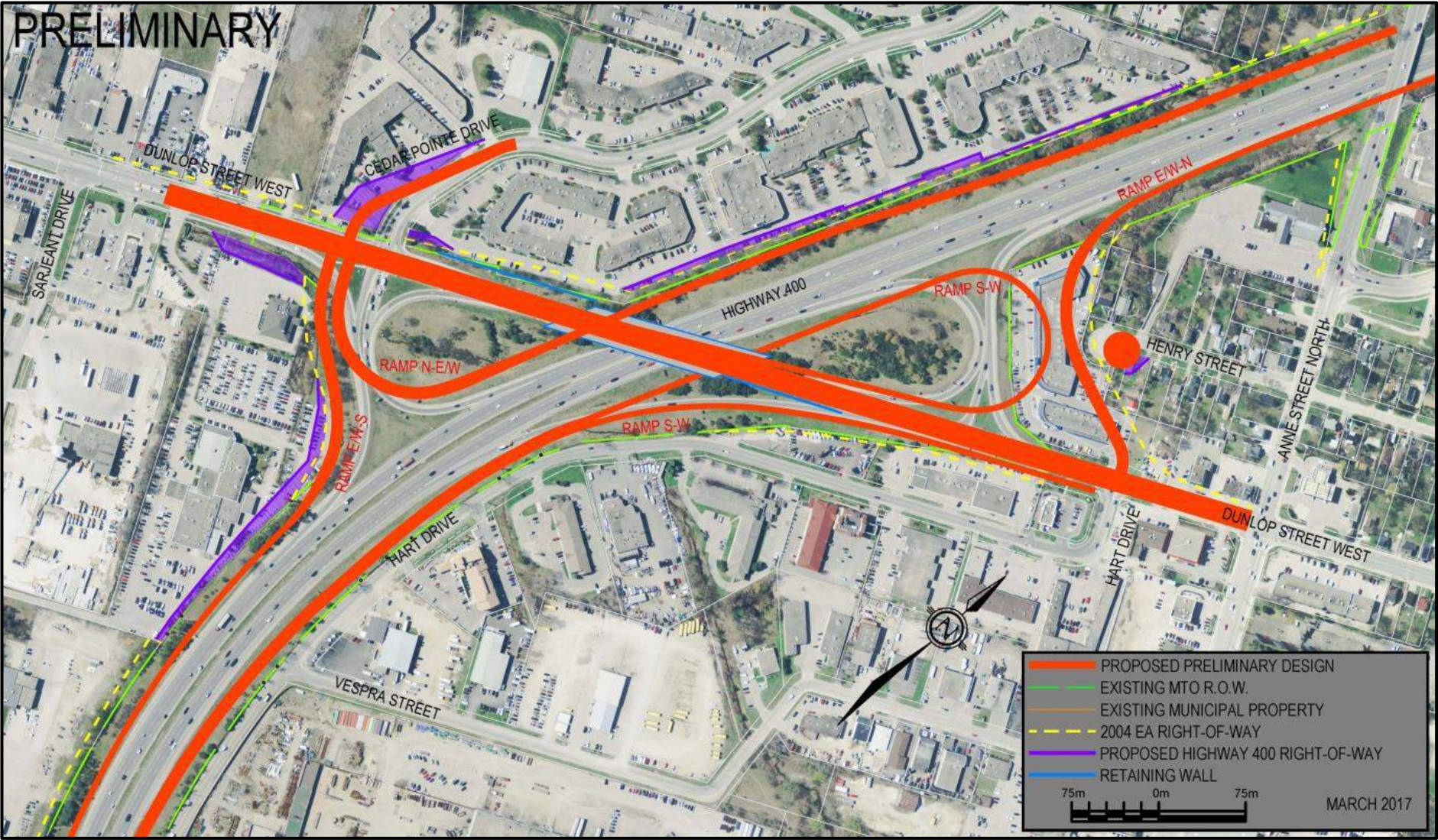
The approved 2004 TESR included a Parclo B3 interchange at Dunlop Street Interchange which is the existing configuration with minor improvements to accommodate the Highway 400 widening. This study considered the following two interchange configurations to address the traffic capacity of the 2031 planning horizon:

**Alternative 1:** Parclo B3

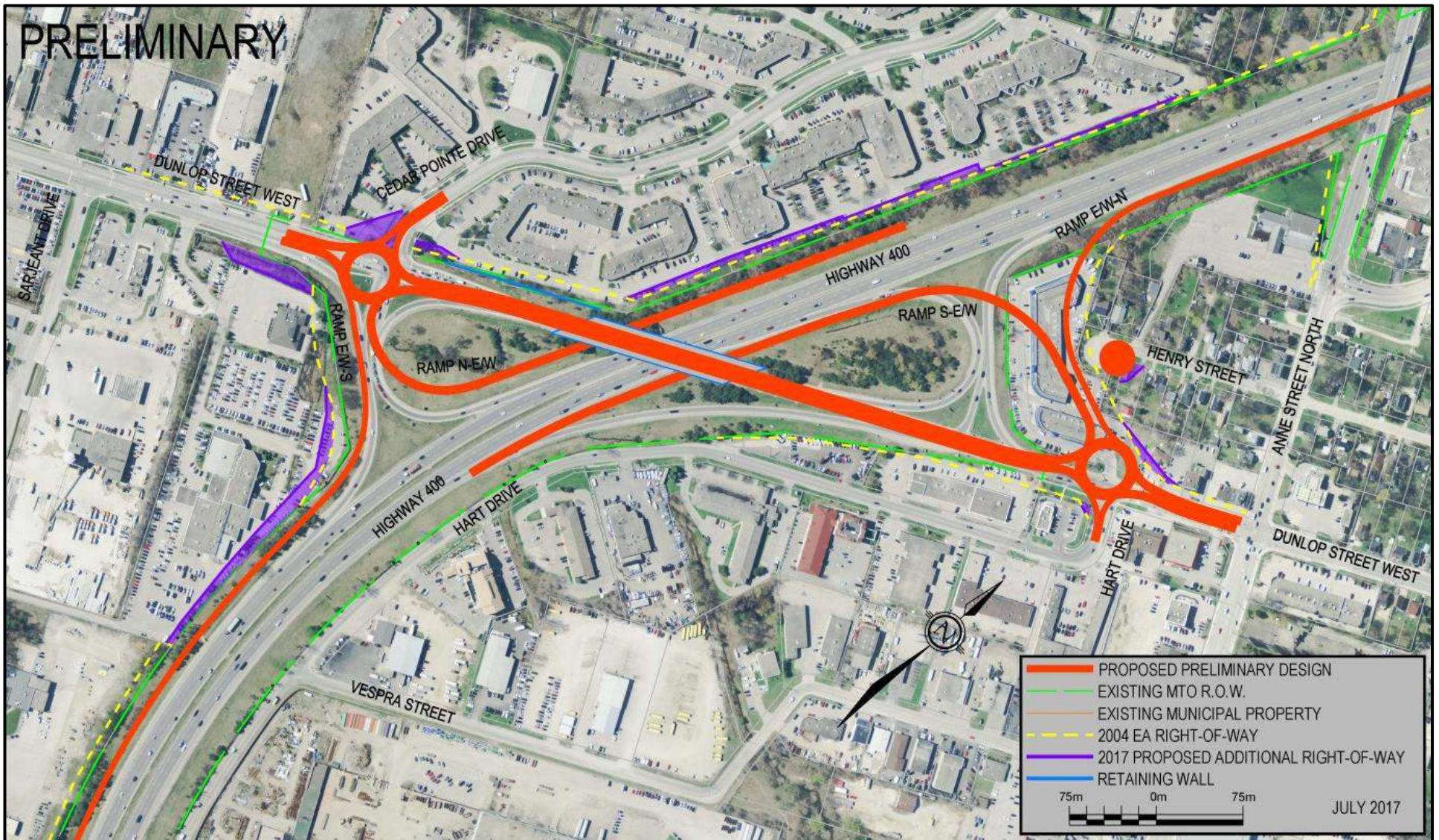
**Alternative 2:** Parclo B with Roundabout Ramp Terminals

Refer to **Figure 23** and **Figure 24** for images of the interchange configurations that were subject to the assessment and evaluation.

Figure 23: Highway 400 / Dunlop Street Interchange Alternative 1 – Parclo B3



**Figure 24: Highway 400 / Dunlop Street Interchange Alternative 2 – Parclo B with Roundabout Ramp Terminals**



## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

The assessment and evaluation of alternatives is outlined in **Table 9** and is summarized as follows:

- Alternative 2 has a slightly smaller property footprint than Alternative 1 resulting in slightly less property impacts than Alternative 1;
- Alternative 2 is less expensive to construct and has lower maintenance and property costs than Alternative 1;
- Although Alternative 2 is more desirable in terms of minimizing impacts to adjacent properties and is less costly to implement, these advantages are outweighed by the significant disadvantages of Alternative 2 from a transportation and engineering perspective;
- Alternative 2, with two-lane ramp terminals will not be sufficient to accommodate future traffic volumes at the Dunlop Street interchange and fails to improve traffic flow and congestion. A three lane roundabout is not preferable from a traffic perspective; and,
- Given that incremental impacts with Alternative 1 can be addressed through mitigation, the cost difference is not significant between the two alternatives, and Alternative 1 can provide enhanced operations relative to the existing interchange configuration, Alternative 1 is preferred.

As such, Alternative 1, the Parclo B3 configuration, is preferred at Dunlop Street.

**Table 9: Highway 400 / Dunlop Street Interchange Evaluation Summary**

| Factor  | Alternative 1<br>Parclo B3 | Alternative 2<br>Parclo B with Roundabout Ramp Terminals |
|---|----------------------------|--|
| Transportation and Engineering / Traffic Operations | ●                          | ◐  |
| Natural Environment                                 | ●                          | ●  |
| Socio-Economic and Cultural Environments            | ◐                          | ●  |
| Cost  | ◐                          | ●  |
| <b>Most preferred ● → ◐ Least preferred</b>         |                            |  |

For a more detailed evaluation summary table refer to **Appendix C**.

Subsequent to the evaluation of the preferred alternative, additional modifications to the 2004 Approved Plan were considered to optimize the preliminary design including the following:

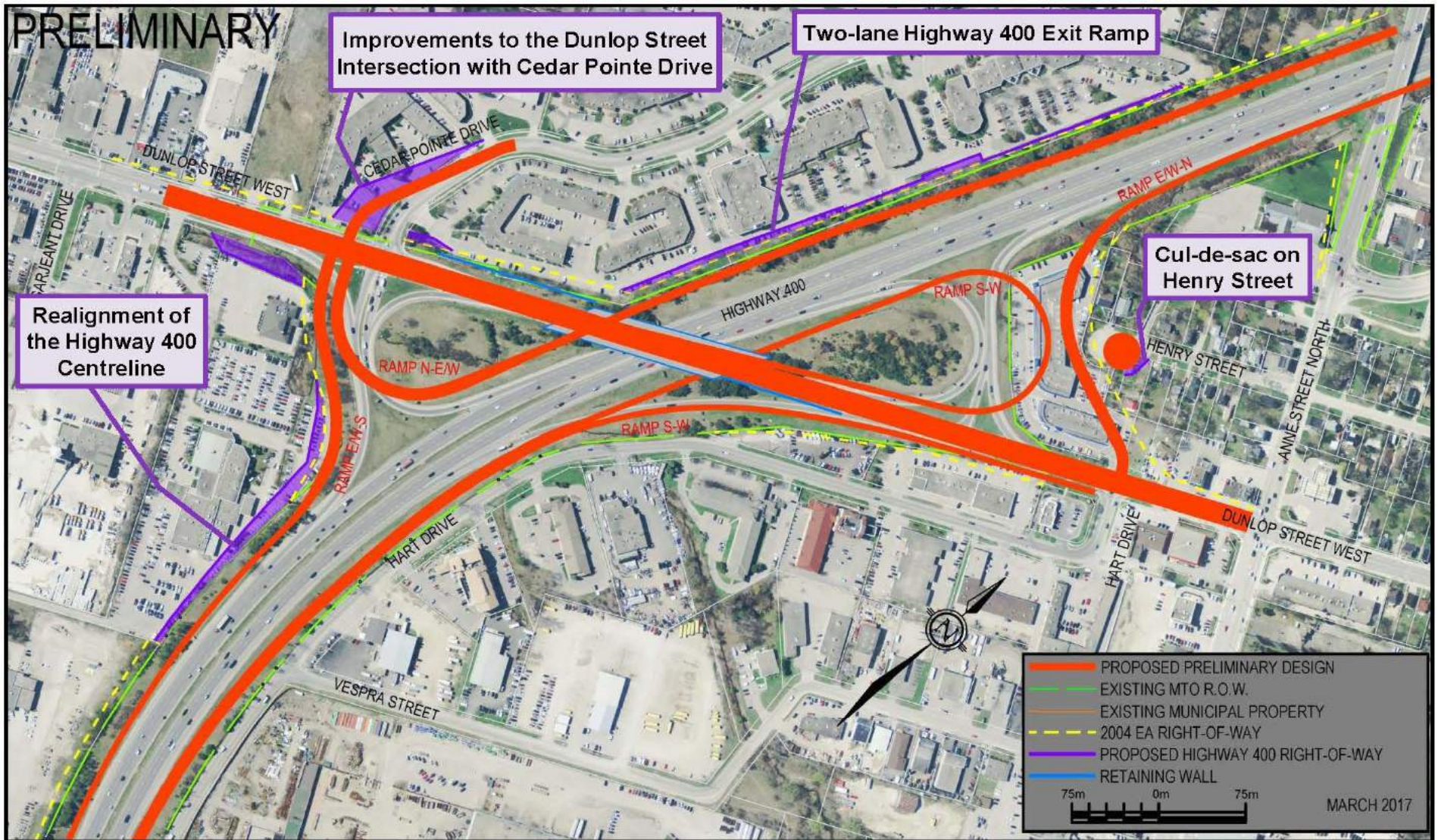
- Maintain the existing Highway 400 centreline which will provide flexibility in keeping Dunlop Street open during construction;

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- The Highway 400 southbound exit ramp to Dunlop Street eastbound / westbound has been upgraded to a two-lane sub-collector exit ramp;
- The free-flow westbound to northbound ramp proposed in 2004 has been eliminated to improve pedestrian safety and accessibility;
- Improvements to the Dunlop Street intersection with Cedar Pointe Drive; and,
- Improvements to the geometrics of the cul-de-sac on Henry Street in the northeast quadrant.

The property requirements associated with the changes are noted in **Figure 25**.

Figure 25: Changes to the 2004 Approved Plan at Dunlop Street



## 4.8 Highway 400 / Bayfield Street

The approved 2004 TESR included a Parclo A / Diamond interchange at the Highway 400 / Bayfield Street Interchange which is the existing configuration with minor improvements to accommodate the Highway 400 widening. This study considered the following three interchange configurations to address the 2031 planning horizon traffic capacity:

**Alternative 1:** Parclo A / Diamond

**Alternative 2:** Parclo / Diamond with Roundabouts

**Alternative 3:** Diverging Diamond

Refer to **Figure 26**, **Figure 27** and **Figure 28** for images of the interchange configurations that were subject to the assessment and evaluation.

Figure 26: Highway 400 / Bayfield Street Interchange Alternative 1 – Parclo B3

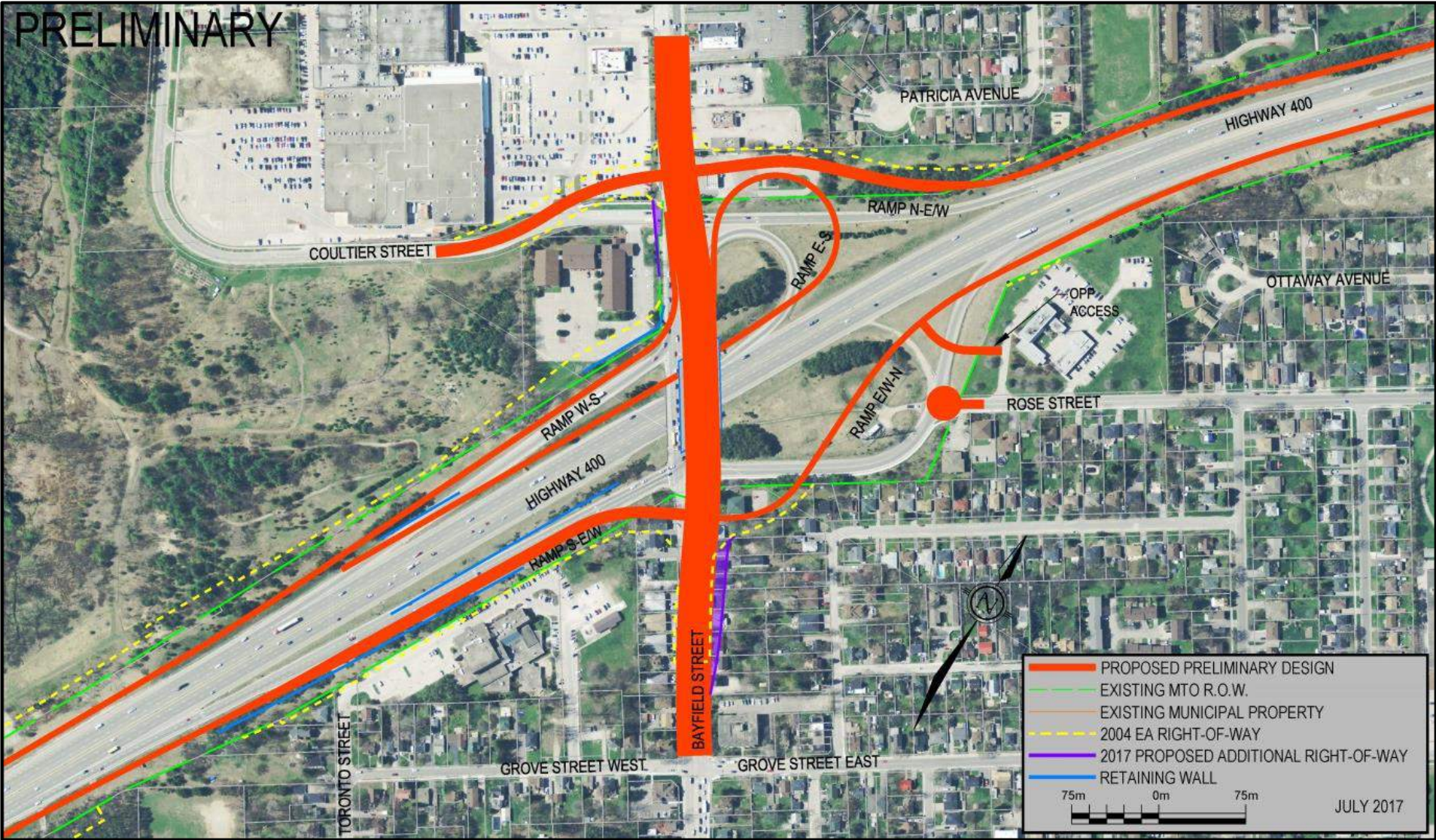


Figure 27: Highway 400 / Bayfield Street Interchange Alternative 2 – Parclo B with Roundabout Ramp Terminals

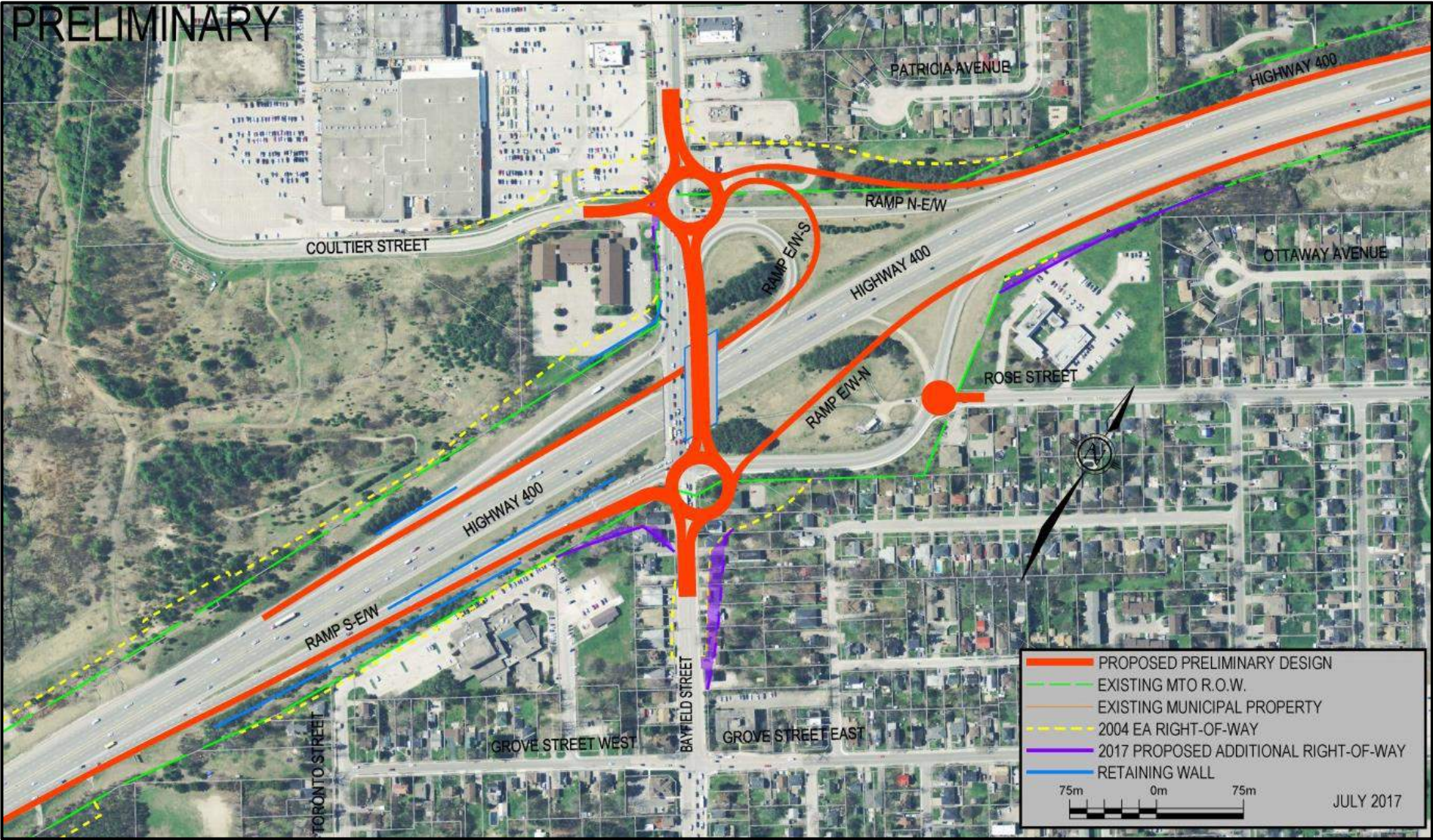
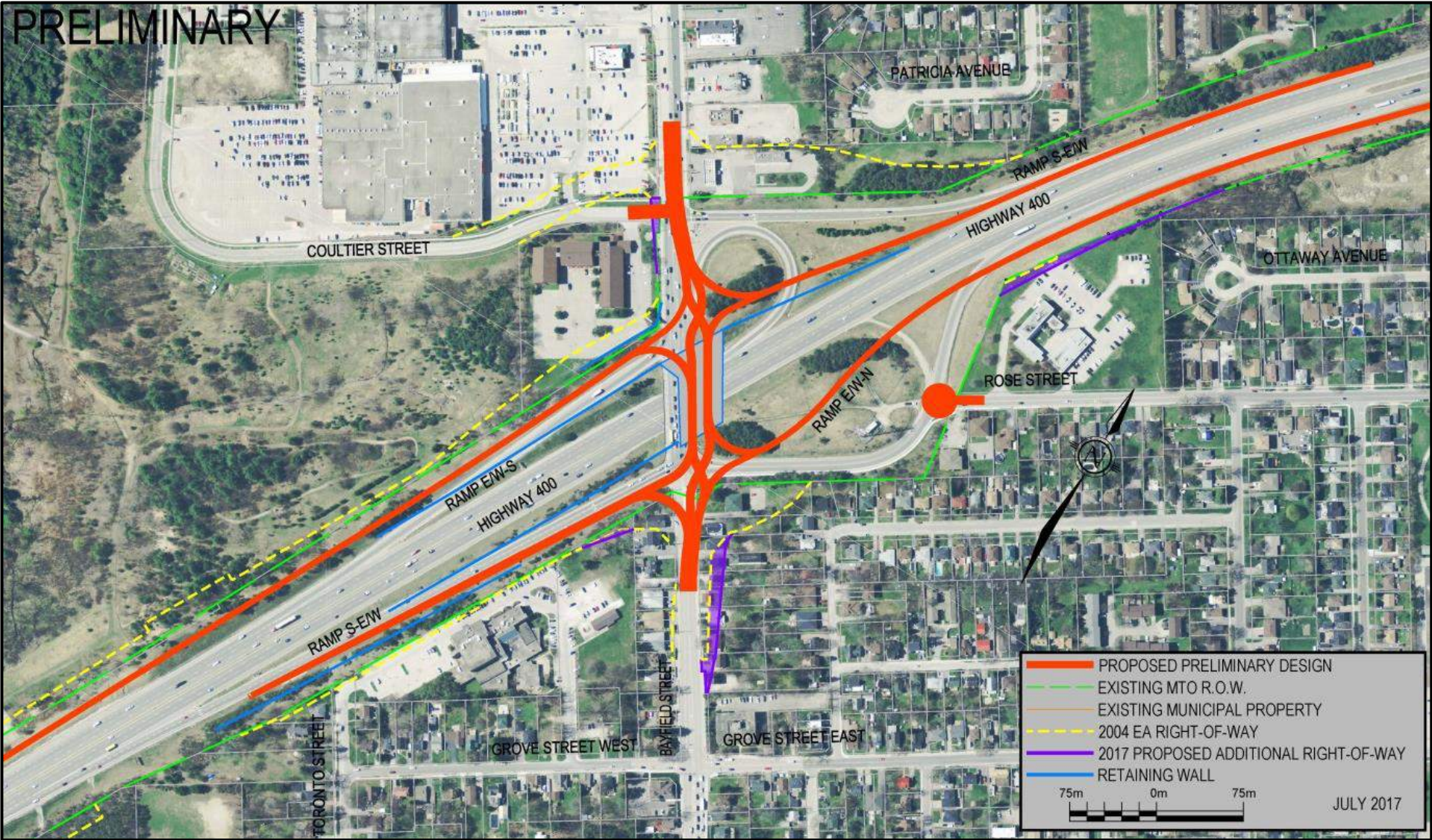


Figure 28: Highway 400 / Bayfield Street Interchange Alternative 3 – Diverging Diamond



## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

The assessment and evaluation of alternatives are outlined in **Table 10** and are summarized as follows:

- Although Alternative 2 has a small footprint which minimizes impacts to adjacent commercial, residential, institutional land uses and natural features, and is the least costly alternative to implement (approximately 25% less), this alternative provides unacceptable levels of traffic operations as roundabouts are not sufficient to address the 2031 traffic volumes;
- Although Alternative 1 results in greater property impacts (residential and commercial / industrial property), Alternative 1 is consistent with the long-term planning throughout the corridor as it was part of the approved plan from the 2004 TESR;
- Both Alternatives 1 and 3 result in acceptable traffic operations for the 2031 horizon year, and although Alternative 3 operates slightly better at the Bayfield Street interchange ramp terminals, when considered within the context of traffic conditions beyond the interchange along Bayfield Street, the benefit to traffic operations is negligible; and,
- Given that Alternative 1 is a conventional interchange configuration that is projected to operate well at a relatively lower construction cost, and mitigation strategies can be considered to reduce property impacts wherever possible, Alternative 1 is the preferred alternative for interchange improvements at Bayfield Street.

As such, Alternative 1, the Parclo A / Diamond configuration, is preferred at Bayfield Street.

**Table 10: Highway 400 / Bayfield Street Interchange Evaluation Summary**

| Factor  | Alternative 1<br>Parclo A /<br>Diamond | Alternative 2<br>Parclo / Diamond with<br>Roundabouts | Alternative 3<br>Diverging Diamond |
|---|--|---|------------------------------------|
| Transportation and<br>Engineering / Traffic<br>Operations | ●                                      | ◐   | ◑                                  |
| Natural<br>Environment                                    | ●                                      | ●   | ●                                  |
| Socio-Economic<br>and Cultural<br>Environments            | ◑                                      | ◑   | ◐                                  |
| Cost  | ◑                                      | ●   | ◑                                  |
| <b>Most preferred ● → ○ Least preferred</b>               |  |   |                                    |

For a more detailed evaluation summary table refer to **Appendix C**.

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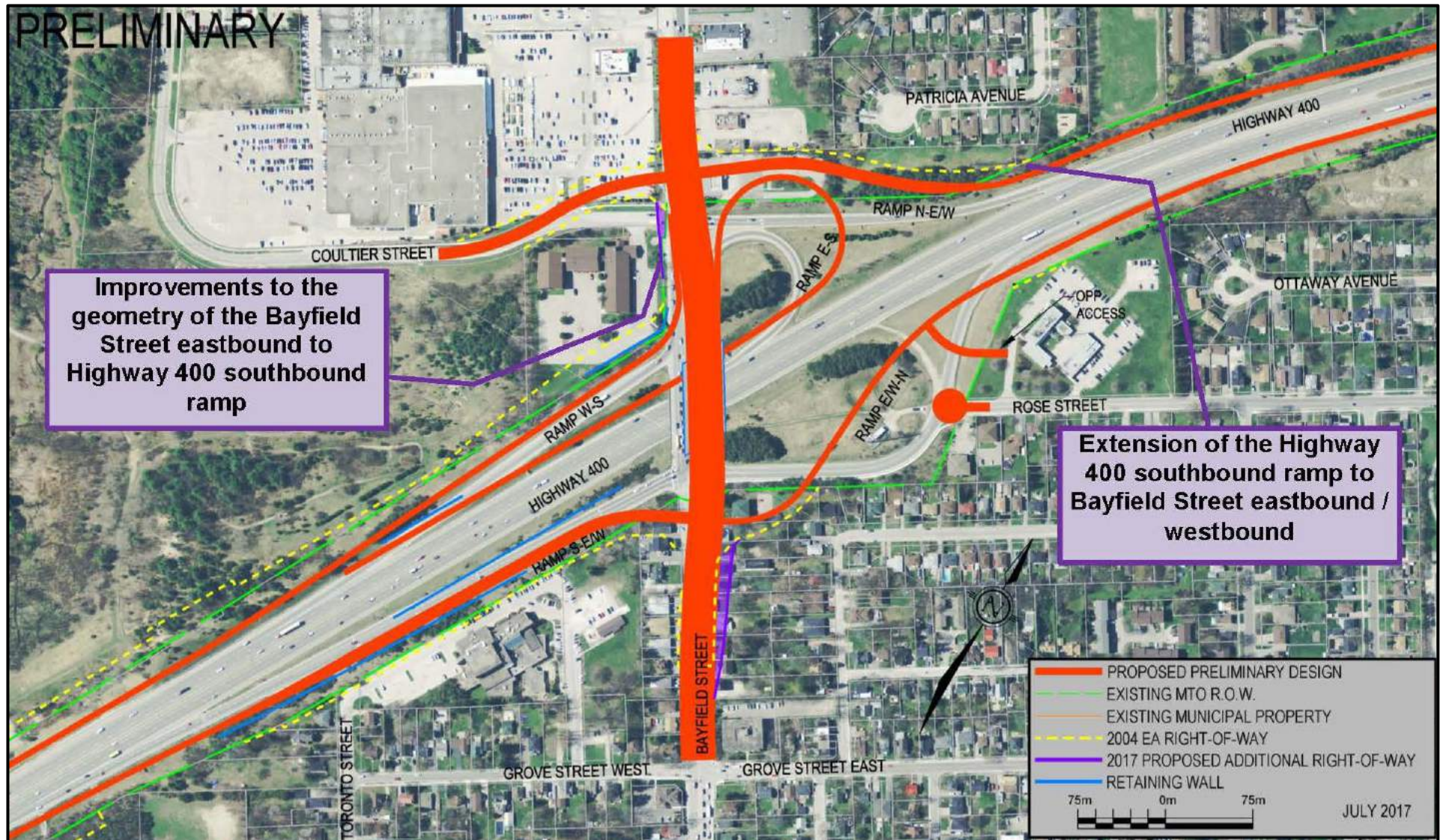
Subsequent to the evaluation of the preferred alternative, additional modifications to the 2004 approved plan were considered to optimize the preliminary design including the following:

- Improvements to the geometry of the Bayfield Street eastbound to Highway 400 southbound ramp including a larger horizontal alignment radius near the Bayfield Street bullnose; and,
- The Highway 400 southbound ramp to Bayfield Street eastbound / westbound was extended with the bullnose relocated further north to improve sight distance.

The property requirements associated with the changes are noted in **Figure 29**.

As noted in **Section 2.4**, Bayfield Street will be widened to six (6) lanes within the MTO right-of-way to match the City of Barrie's planned future cross-section of Bayfield Street (three (3) lanes in each direction).

**Figure 29: Changes to the 2004 Approved Plan at Bayfield Street**



## 4.9 Highway 400 / Duckworth Street

The improvements to the Highway 400 / Duckworth Street interchange were completed in June 2017 as part of a municipal undertaking. The new bridge will be widened into the median as part of this study update to accommodate the ultimate Highway 400 widening.

## 5. Consultation Process

The following summarizes the consultation undertaken as part of this study. Relevant correspondence is included in **Appendix D** of this document.

### 5.1 Notice of Study Commencement

A Notice of Study Commencement was published in local newspapers to inform the public of this study update on April 2 and April 3, 2014. The notice was placed in the following newspapers:

- *Innisfil Scope*;
- *Alliston Herald*;
- *Barrie Examiner*; and
- *Barrie Advance*.

Notification letters advising of the study were also mailed and/or emailed to everyone on the study contact list (635 contacts) which included:

- First Nations and Métis Communities;
- Members of Parliament and Members of Provincial Parliament;
- External Government Agencies;
- Emergency Services;
- Utility Services;
- Interest Groups; and,
- Members of the public.

### 5.2 Public Information Centres (PICs)

#### 5.2.1 Public Information Centre #1

A Public Information Centre (PIC #1) was held on November 25, 2014. The PIC presented and sought input on the following:

- Study process;
- Background;
- Need for highway improvements;
- Alternatives evaluation process and criteria;
- Highway and interchange alternatives; and,
- Existing conditions.

A Notice of PIC #1 was published in local newspapers to inform the public of the PIC on November 13, 2014. The notice was placed in the following newspapers:

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

- *Innisfil Journal*;
- *Alliston Herald*;
- *Barrie Examiner*; and,
- *Barrie Advance*.

In order to reach a larger population in the study area who may not be familiar with the study, a copy of the notice was inserted as a flyer into the *Barrie Examiner* (20,010 flyers) and the *Innisfil Examiner* (13,869 flyers) newspapers on blue paper for publication on November 13, 2014.

Notification letters advising of the PIC were also mailed and/or emailed to everyone on the study contact list (4,128 contacts).

A total of 181 stakeholders attended PIC #1 and 111 comments were received at or just after the PIC. Feedback received at and after PIC #1 included the following:

- Questions or comments regarding specific improvement alternatives;
- Questions or comments regarding property impacts / requirements;
- Questions or comments regarding noise impacts and mitigation;
- Inquiries regarding the schedule (property impacts, study completion and construction);
- Support and concern for the addition of roundabouts;
- Inquiries regarding related studies; and
- Requests for PIC displays.

### 5.2.2 Public Information Centre #2

A second Public Information Centre (PIC #2) was held on April 25, 2017. The purpose of PIC #2 was to present the following:

- Study process (TESR Addendum to address modifications to the approved plan identified in the 2004 Study);
- Summary of PIC #1;
- Assessment and evaluation of Highway 400 widening and interchange improvement alternatives;
- Technically preferred alternatives;
- Potential mitigation strategies to minimize environmental / community impacts; and,
- Proposed modifications to the approved plan identified in the 2004 TESR.

The Project Team sought input on the proposed modifications to the approved plan identified in the 2004 TESR at PIC #2.

A Notice of PIC #2 was published in local newspapers to inform the public of the PIC on April 13, 2017. The notice was placed in the following newspapers:

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- *Innisfil Journal*;
- *Alliston Herald*;
- *Barrie Examiner*; and,
- *Barrie Advance*.

As with PIC #1, in order to reach a larger population in the study area who may not be familiar with the study, a copy of the notice was inserted as a flyer into the *Barrie Examiner* (40,819 flyers) newspaper on blue paper for publication on April 20, 2017

Notification letters advising of the PIC were also mailed and/or emailed to everyone on the study contact list (4,251 contacts).

A total of 166 stakeholders attended PIC #2 and 47 comments were received at or just after the PIC. Feedback received at and after PIC #2 included the following:

- Questions or comments regarding noise mitigation;
- Questions or comments regarding property impacts / requirements;
- Support for various alternatives;
- Inquiries regarding related studies; and,
- Inquiries regarding property negotiations and compensation.

Prior to PIC #2, all potentially impacted property owners were sent a letter indicating that their property is potentially impacted by the recommended plan and that they were invited to attend PIC #2 to meet with the Project Team or could request to meet at another date. The Project Team discussed property impacts with various property owners at the PIC to answer any questions directly relating to their property and discuss the study process.

Copies of the PIC display materials are available in **Appendix E**.

## 5.3 Additional Consultation

### 5.3.1 Permission to Enter

In September 2014, the Project Team sent out Permission to Enter Request letters to all properties adjacent to Highway 400 within the study area. The potential property impacts were not known at the time therefore letters were sent to a larger number of properties than where permission was later determined to be required. These letters also functioned as a method to inform the owners of property adjacent to the highway of the study and provide them with a method of contacting the Project Team.

### 5.3.2 Consultation with Municipalities and Emergency Services

The Project Team met with the Town of Innisfil, City of Barrie, County of Simcoe, and emergency services throughout the study to discuss ongoing municipal plans and undertakings, the Highway 400 alternatives assessment and evaluation, the

## Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

recommended improvements including the proposed changes to the approved plan from the 2004 TESR, and the drainage recommendations. The Project Team met with the municipalities prior to both PICs.

The following is a summary of the feedback received by the municipalities and emergency services:

- The municipalities noted the ongoing and planned municipal EAs within the study area;
- Discussions regarding cost-sharing to not preclude future municipal corridor expansions where applicable;
- Discussions regarding the potential impacts to the municipal drainage systems with the City of Barrie and the Town of Innisfil. Additional discussions between the municipalities and MTO are ongoing;
- Questions regarding the noise analysis and recommendations;
- Questions regarding the traffic analysis and recommendations;
- Questions regarding various alternatives at interchanges and the associated potential impacts;
- Support for the Diverging Diamond interchange at Mapleview Drive;
- Comments regarding consideration of Emergency Detour Routes;
- Discussion regarding access to the OPP station at Bayfield Street with the closure of Rose Street;
- Comments regarding schedule; and,
- Support for the Recommended Plan.

### 5.3.3 Consultation with First Nations Communities

The Project Team consulted with the following First Nations Communities and agencies at key milestones throughout the study (i.e Study Commencement, PIC #1, PIC #2, TESR Addendum):

- Métis Nation of Ontario
- Mississaugas of Scugog Island First Nation;
- Chippewas of Georgina Island First Nation;
- Chippewas of Rama First Nation;
- Williams Treaties First Nation;
- Hiawatha First Nation;
- Beausoleil First Nation;
- Alderville First Nation;
- Curve Lake First Nation;

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- Mississaugas of New Credit First Nation;
- Mississaugas of Scugog Island First Nation;
- Haudenosaunee Confederacy;
- Six Nations of the Grand River Territory;
- Ontario Native Affairs Secretariat;
- Ministry of Indigenous Relations and Reconciliation; and,
- Indigenous and Northern Affairs Canada.

### 5.3.4 Consultation with External Agencies

The Project Team consulted with the following external agencies at key milestones throughout the study (i.e Study Commencement, PIC #1, PIC #2, TESR Addendum):

- Ministry of Tourism, Culture and Sport (MTCS);
- Ministry of the Environment and Climate Change (MOECC);
- Ministry of Agriculture, Food and Rural Affairs (OMAFRA);
- Ministry of Natural Resources and Forestry (MNRF);
- Ministry of Municipal Affairs and Housing (MAH);
- Ministry of Economic Development and Trade;
- Infrastructure Ontario;
- Ministry of Energy;
- Ministry of Health and Long-Term Care;
- Canadian Environmental Assessment Agency (CEEA);
- Lake Simcoe Region Conservation Authority (LSRCA);
- Nottawasaga Valley Conservation Authority (NVCA);
- Metrolinx;
- Simcoe County District School Board;
- Simcoe County Roman Catholic Separate School Board;
- Simcoe Muskoka Catholic District School Board; and,
- Ontario Realty Corporation.

MNRF, LSRCA, and NVCA were engaged early on in the study process during natural sciences data collection efforts, SAR data and drainage issues. A meeting was held with LSRCA in October 2014 to introduce the project and provide an overview of the drainage analysis being completed as part of this study. The Project Team and LSRCA discussed the design standards that were being used, and design opportunities and constraints.

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Copies of the *Draft Drainage and Hydrology Report* were provided to both of the Conservation Authorities within the study area (LSRCA and NVCA) for their review and comment. Both Conservation Authorities provided comments in Spring 2017 for the Project Team's consideration. The following is a summary of their comments:

- Comments noting that volume control measures should be implemented wherever feasible;
- Comments regarding design considerations for potential impacts to downstream flooding and erosion of the receiving watercourses. It may be necessary to install a lower and upper culvert such that the more frequent upstream water levels are maintained;
- Comments regarding watercourse crossings at specific culverts and naming;
- Comments regarding maintaining floodplain storage needs for all proposed works within the floodplain;
- Comments that the hydraulic modeling of the regional storm should include any impacts associated with the proposed solid safety barrier and the raising of the road profile if proposed;
- Comments regarding the inter-watershed spills;
- Comments regarding municipal review and ongoing municipal work; and,
- Requests for clarification and confirmation on specific details.

The Project Team followed up with the Conservation Authorities to provide further clarification where requested. MTO is continuing to meet with the Conservation Authorities regarding ongoing drainage works throughout the corridor. Further consultation shall occur during Detail Design.

### 5.4 TESR Addendum

Details regarding the purpose of this TESR Addendum, the review process and notification are outlined in **Section 1.3**.

An additional TESR Addendum was completed in March 2017 which included the changes to the area and interchange of Highway 400 and Highway 89. Notices regarding the submission of the TESR Addendum were advertised in local newspapers on Thursday March 23, 2017. Notification letters with details on the TESR Addendum Review Period were mailed to everyone on the study contact list. The TESR Addendum for the interchange of Highway 400 and Highway 89 was completed in advance of this TESR Addendum to address more immediate improvements at the Highway 400 and Highway 89 interchange.

### 5.5 Website

A study website (<http://highway400improvements89to11.ca>) was made available throughout the study process. All public notices, PIC information, as well as the TESR Addendums have been made available on this website for the public to view. The website includes the Project Team contact information as well as an online form to submit comments directly to the Project Team.

## 6. Environmental Issues and Commitments

The following section documents the environmental effects and proposed mitigation measures pertaining to the natural, socio-economic and cultural environments as a result of the proposed changes to the approved plan for improvements to this section of the Highway 400 corridor. This section mirrors that of Section 6 of the 2004 TESR (G.W.P. 30-95-00) which discusses *Environmental Issues and Commitments*. Other items that were not previously covered in Section 6.0 of the 2004 TESR but are of importance are included in this section. Additional investigations have been undertaken to determine whether environmental conditions have changed and to assess the impacts as a result of the proposed design modifications. In addition to the sections below, further details can be found in related reports under separate cover as outlined in **Appendix G**.

### 6.1 Natural Environment

Details regarding potential impacts to the natural environment and recommended mitigation measures are described below. Further details regarding potential impacts to the natural environment (fish and fish habitat and terrestrial ecosystems) can be found in the *Natural Heritage Existing Impact Assessment Report* (FRi Ecological Services, February 2017), available under separate cover.

#### 6.1.1 Fish and Fish Habitat

##### *Potential Impacts*

There are a number of permanent impacts that will result from the current design simply based on the increased size of the highway footprint. Virtually all culverts will require extensions ranging from 9m to 48m in length. In addition to the direct impacts related to the footprint, stream realignments may be required as a result of the proposed culvert extensions. Culvert 49 (at 3<sup>rd</sup> Line) is a sensitive coldwater fishery and the proposed culvert may require a short realignment of about 20 m on the upstream side to meet the current stream alignment. Culvert 55 (south of 6<sup>th</sup> Line) is a warmwater baitfish system and may require a realignment upstream for a length of about 35m.

The 2004 TESR included the requirement of culvert extensions at all crossings to accommodate the Highway 400 widening. Additional condition surveys undertaken during this study update identified that in addition to the culvert extensions at all culverts, it was found that 24 culverts are also recommended for replacement because of their deteriorating condition including ten which are either fish habitat or contribute to fish habitat (C43, C44, C46, C49, C60, C62, C68, C71, C73, and C76) (refer to **Figures 2 to 7** for details regarding the culvert locations). Culvert 71 is being replaced under a separate MTO contract and therefore will only require an extension at the time of the Highway 400 widening. The replacement and/or improvement of these culverts may also provide an opportunity to improve fish passage.

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### *Proposed Mitigation Measures*

Proposed mitigation measures generally reflect the mitigation measures outlined in the 2004 TESR and have been updated to reflect best management practices for fisheries and watercourse protection.

The following mitigation measures are recommended:

- Contractor requires comprehensive erosion and sediment control plan;
- Contractor must capture and relocate any stranded fish within the work area;
- Temporary bypass or dam and pump system;
- Treatment of dewatering water;
- Limit access to banks;
- In-water work restriction for the warmwater watercourses from March 15 to July 15 (no in-water work during this time in any year);
- In-water work restriction for the coldwater watercourses from October 1 to July 15 (no in-water work during this time in any year);
- In-water work restriction for the coolwater/warmwater watercourses from March 15 to July 15 (no in-water work during this time in any year);
- Implement a work isolation plan;
- Remove fish from the isolated work area;
- Use of screens on intake pumps;
- Vehicle and equipment refueling away from watercourse;
- A spill containment plan and equipment on site; and,
- Low flow channels may be required on some box culverts.

Potential impacts may not be able to be avoided in some instances, however, during detail design there is potential to reduce impacts through the recommended mitigation measures listed above. The potential impacts and recommended mitigation measures will be confirmed during detail design once the exact extent of potential impacts is determined and details are finalized.

Opportunities to improve fish habitat and fish passage shall be incorporated at crossings where the culverts require replacement. Natural channel design will be utilized for any watercourse realignments.

### 6.1.2 Terrestrial Ecosystems

#### *Potential Impacts*

The impacted area was overlaid on the land use fabric to determine the footprint impacts to the various land use designations as outlined in **Section 3.1.2: Table 11** summarizes the area impacts:

**Table 11: Land Use and Vegetation Community Impacts**

| Land Use Designation     | Number of Locations Impacted | Area Impacted |
|--------------------------|------------------------------|---------------|
| Coniferous Forests (FOC) | 11                           | 5.67ha        |
| Deciduous Forests (FOD)  | 4                            | 5.03ha        |
| Mixed Forests (FOM)      | 19                           | 12.27ha       |
| Golf Course              | 1                            | 0.11ha        |
| Hay/Pasture (CUM)        | 20                           | 19.01ha       |
| Open Wetland (SA &MA)    | 5                            | 1.04ha        |
| Agricultural Row Crop    | 22                           | 23.98ha       |
| Transitional             | 148                          | 102.38ha      |
| Urban Impervious         | 52                           | 17.76ha       |
| Urban Pervious           | 33                           | 18.90ha       |

From a natural sciences perspective, the potential loss of forested (22.97ha) and wetland areas (1.04ha) is notable since much of these vegetation types have been reduced on the local landscape.

There are three Provincially Significant Wetlands (PSWs) within the study area, two of which are directly adjacent to the Highway 400 corridor including: Cookstown Hollows Swamp, Lovers Creek Swamp, and Willow Creek/Little Lake Wetland. The impacts (i.e. additional edge encroachment) into these features are consistent with that outlined in the 2004 TESR.

As noted in **Section 3.1.2.3**, two Stratum 1 core deer wintering areas are located within the study area. Minor edge impacts associated with the improvements will take place in these areas; however, the improvements are not anticipated to impact these areas.

**Table 12** includes the impacts to vegetation communities that are beyond the 2004 TESR footprint.

**Table 12: Newly Impacted Vegetation Communities and Natural Features Beyond the 2004 TESR Footprint**

| Vegetation Community / Natural Feature | Newly Impacted Locations beyond the 2004 TESR Footprint  |
|--|--|
| Cultural Meadow                        | <ul style="list-style-type: none"> <li>East of Reive Blvd, north of the Highway 89 Interchange;</li> <li>At Stormwater Management Ponds 1, 2, and 3;</li> <li>West of Highway 400, south of 9<sup>th</sup> Line for a dry detention cell;</li> </ul> |
| Mixed Forest                           | <ul style="list-style-type: none"> <li>At Stormwater Management Ponds 1 and 6;</li> </ul>  |
| Coniferous Forest                      | <ul style="list-style-type: none"> <li>West of Highway 400, north of Tiffin Street;</li> </ul>   |

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| <b>Vegetation Community / Natural Feature</b> | <b>Newly Impacted Locations beyond the 2004 TESR Footprint</b>   |
|---|--|
| Agricultural Row Crop                         | <ul style="list-style-type: none"> <li>• West of Highway 400, north of 6<sup>th</sup> Line;</li> <li>• At Stormwater Management Ponds 4 and 5;</li> <li>• West of Highway 400, south of Innisfil Beach Road;</li> </ul>  |
| Cookstown Hollows PSW                         | <ul style="list-style-type: none"> <li>• West of Highway 400 approximately 1 km south of Highway 89;</li> <li>• East of Reive Blvd, north of County Road 89;</li> </ul>  |
| Transitional                                  | <ul style="list-style-type: none"> <li>• East of Highway 400 south of Big Bay Point Road;</li> <li>• West of Highway 400, north and south of Tiffin Street;</li> <li>• In the northwest, southwest and northeast quadrants of the Highway 400 / Dunlop Street Interchange;</li> </ul>  |
| Urban Pervious                                | <ul style="list-style-type: none"> <li>• At Stormwater Management Pond 6;</li> <li>• West of Highway 400, north of Essa Road;</li> </ul>   |
| Urban Impervious                              | <ul style="list-style-type: none"> <li>• West of Highway 400, north of the Barrie-Collingwood Railway;</li> <li>• In the northwest, southwest and northeast quadrants of the Highway 400 / Dunlop Street Interchange;</li> <li>• West of Highway 400, south of Bayfield Street;</li> <li>• East of Highway 400, north of Bayfield Street.</li> </ul> |

Refer to **Appendix A** for Plates outlining the Recommended Plan and ROW requirements beyond those identified in the 2004 TESR.

*Proposed Mitigation Measures*

The following mitigation measures will be carried forward to detail design and construction as applicable for protection of species and habitat based on the existing conditions and anticipated potential impacts:

- Right-of-way (ROW) clearing shall be minimized wherever possible. Any additional property holdings or Excess Material Management Areas that are adjacent to forest or wetland areas should be rehabilitated to forested vegetation communities to further reduce impacts;
- There are no opportunities to create additional wetland areas other than typical stormwater retention areas. Opportunities to reduce the required ROW for the Highway 400 improvements within PSW areas will be investigated during detail design to reduce the overall impact to PSWs;
- There is an opportunity to create a wildlife passage at the Stratum 1, core deer wintering area at Lover's Creek Swamp PSW, either as an oversized culvert at

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the Culvert 62 location or as a separate dedicated wildlife passage culvert. This would allow for seasonal movements from various habitat types on either side of the highway corridor and should be sized appropriately to accommodate white-tailed deer as the largest species to use the culvert. Grade raises of the platform may be required to accommodate a larger culvert at this location, which will be investigated during detail design. A functional wildlife passage must also incorporate exclusion fencing to guide wildlife to the passage system. The fencing would likely span from 10<sup>th</sup> Line northerly for about 1500m to Salem Road on both sides of the highway to be functional. The details including the limits of wildlife fencing will be determined during detail design;

- Other wildlife corridors were also identified within the study area and may also benefit from a properly constructed wildlife passage culvert and exclusion fencing system. Candidate locations to be investigated during detail design include the vicinity of Culvert 49 (at 3<sup>rd</sup> Line) in the naturally wooded corridor. Ungulate exclusion fencing would be required to extend at least 500m north and south of the proposed crossing location to include appropriate wooded habitats. Another wildlife corridor was identified in the vicinity of Culvert 57 about 1km south of Innisfil Beach Road. The same requirements for fencing would apply to this location as well;
- All vegetation clearing and grubbing activities shall take place outside of the breeding bird window (April 1 to August 31 of any year). This will address the concern of construction-related activities complying with the *Migratory Birds Convention Act* (1994);
- Vegetation removals associated with construction related activities shall be minimized, and where required Environmentally Sensitive Areas shall be established to restrict access to sensitive areas during construction;
- Stockpiling of materials shall be kept away from adjacent natural features;
- Stormwater discharge during construction shall be directed away from adjacent natural areas;
- Erosion and sediment control plans shall be developed and implemented by the Contractor; and,
- In general, OPSS 805 will provide guidance for erosion and sediment control.

The proposed mitigation measures outlined above generally reflect the mitigation measures outlined in the 2004 TESR and have been updated to reflect best management practices for protection of terrestrial habitat and vegetation.

### 6.1.3 Species at Risk

#### *Potential Impacts*

The *Endangered Species Act* came into effect in 2006. Given that the 2004 TESR predates the *Endangered Species Act*, the potential impacts on species at risk (SAR) were not sufficiently addressed at that time. As noted in **Section 3.1.3**, a SAR screening was undertaken as part of this study and three species at risk were confirmed in the study area during site visits. The species that were identified as potentially occurring or

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impacted by the proposed improvements to the Highway 400 corridor include Barn Swallow, Bobolink and Eastern Meadowlark. The additional impacts beyond the 2004 TESR footprint to the Cultural Meadow vegetation community and agricultural row crops (as noted in **Table 12**) south of Maplevue Drive results in slightly greater potential to impact SAR and/or their habitat (to the increased property requirements in suitable habitat areas).

Further details on SAR potential within the study area can be found in the *Natural Heritage Existing Conditions and Impact Assessment Report* (FRi Ecological Services, February 2017).

### *Proposed Mitigation Measures*

Once design details are confirmed, more targeted surveys shall be performed in potential habitat for SAR with potential for the study area to confirm potential impacts to SAR. Targeted SAR screening for Barn Swallow, Bobolink and Eastern Meadowlark shall be undertaken during detail design to confirm whether avian SAR habitat will be impacted by the proposed works.

If impacts cannot be avoided through design, appropriate mitigation measures shall be developed as required in accordance with the most up to date legislation at that time, including any applicable approvals under the *Endangered Species Act*.

### 6.1.4 Hydrogeology and Groundwater

As noted in **Section 3.1.4**, 109 existing water wells were identified within the study area based on MOECC well records. The improvements have potential to impact water wells either directly or indirectly. A Pre-condition Water Well Survey shall be undertaken prior to construction to document the baseline conditions of water wells within the study area to ensure wells are not impacted by construction.

Significant groundwater recharge areas (SGRAs) are generally found at the northern end of the study area south of the Highway 11 interchange in the vicinity of Willow Creek. This area has also been identified as a vulnerable aquifer area. While the structures over Willow Creek are proposed to be replaced, there are no significant changes to the recommended plan in this area that would result in additional impacts to the hydrogeological function of Willow Creek or associated wetlands.

High aquifer vulnerability is also present at the following areas:

- An area in the vicinity of Dunlop Street West and Essa Road, in the City of Barrie;
- A large section of the study area from south of Salem Road / Lockhart Road southern to the south side of 5<sup>th</sup> Line, measuring approximately 9 km; and,
- From north of 3<sup>rd</sup> Line to the southern end of the study area.

The proposed changes to the recommended plan are not anticipated to result in an increased potential for adverse effects to these groundwater resources. During detail design, further geotechnical investigations will be undertaken to understand the potential for groundwater interaction in high aquifer vulnerability areas relative to the

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earthworks necessary to implement the proposed Highway 400 improvements. Opportunities to minimize deep excavations in high aquifer vulnerability areas will be examined at that time.

Should surface water and groundwater dewatering be anticipated to exceed the maximum MOECC daily allowance during construction a Permit to Take Water (PTTW) and/or Environmental Activity and Sector Registry (EASR) may be required.

In addition to the above requirements, the following general mitigation measures are recommended:

- No storage, maintenance or refuelling of equipment shall be permitted near any sensitive features;
- An emergency spill kit shall be available on site in case of fluid leaks or spills from machinery;
- Prepare and implement a spill prevention and control management plan; and,
- Appropriate notification shall be carried out (i.e. MOECC, MNRF) should any “spills” occur.

### 6.1.5 Stormwater Management

As noted in **Section 3.1.5** a *Draft Drainage and Hydrology Report* (AECOM, July 2017) was completed as part of this study to assess existing drainage conditions in the study area, identify the potential drainage impacts associated with the proposed improvements, and recommend a stormwater management plan to mitigate impacts associated with the proposed improvements.

#### *Potential Impacts*

The proposed Highway 400 improvements including highway widening and interchange improvements will result in an increase in pavement area of approximately 70 ha, approximately 80% of the overall existing pavement area.

Within the study area, the runoff from the proposed highway will discharge to a combination of intermittent and permanent watercourses or to the municipal sewer systems. In order to assess the potential impacts of the proposed Highway 400 improvements on the water, quality and quantity of downstream drainage systems, as well as the potential for erosion and fish habitat impacts, three types of critical areas were identified:

1. Highway areas draining into watercourses that support fish habitat adjacent to the highway; current areas where highway stormwater drains into the municipal sewer system;
2. Highway areas that result in a large increase in pavement area relative to their total upstream drainage area either because the upstream drainage area is relatively small or because the drainage area includes a large section of the highway. These result in a larger potential for erosion, floodrisk, and water quality degradation in these watercourses.

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To quantify the increase in peak flows to receiving drainage systems, a hydrologic analysis was completed at each outlet. Modelling outputs are provided in the *Draft Drainage and Hydrology Report*, available under separate cover.

A hydraulic assessment was completed for all crossings under proposed conditions to identify potential upstream impacts with respect to the increased water levels. For the majority of culvert crossing, the upstream water level could be maintained or even lowered than that of existing condition, or the increased headwater impacts would be limited within MTO's right-of-way. For three crossings, Culverts 45, 55 and 58, the increased headwater level will potentially extend beyond MTO's right-of-way. The increased headwater levels of C45, 55 and 58 are less than 0.1 m. Those culverts are located in rural areas or undeveloped woodland and there are no drainage concerns reported. In view of these considerations, Culvert 45, 55 and 58 were not considered for further upsizing.

Based on the findings of the culvert inspection, hydraulic capacity assessments and the requirements for the proposed roadway improvement, recommendations for existing drainage crossing improvements were established. A total of 24 crossings (C43, C44, C46, C49, C51, C56, C60, C62, C64, C65, C66, C68, C71, C72, C73, C74, C75, C76, C79, C80, C82, C83, C84, C85) are recommended for replacement (refer to **Figures 2 to 7** for details regarding the culvert locations). All of the existing structures would have to be lengthened to accommodate the proposed highway widening. Culverts C51, C71 and C72 will be upgraded under other MTO Contracts in the short-term therefore these culverts will only require extensions at the time of the Highway 400 widening. Detail Design of the new Harvie Road / Big Bay Point Road crossing over Highway 400 is being undertaken by the City of Barrie which proposed a replacement / relocation of Culvert C69 (Whiskey Creek).

Due to the poor physical condition, the existing Willow Creek Bridge on Highway 400 is being replaced. A separate Hydrology and Hydraulics Report has been by MTO to support the Detail Design of Willow Creek Bridge Replacement (G.W.P 2360-10-00). The proposed new bridge consists of two separated structures- southbound structure and northbound structure. Each structure has 3 spans with a total width of 50 m. Under the ultimate condition, the proposed Highway 400 widening requires the bridge widening toward the centerline accordingly. It is anticipated that the future modification would not change hydraulic performance of that bridge.

As noted in **Section 5.3.4**, the Project Team undertook extensive consultation with the City of Barrie and Town of Innisfil regarding stormwater management. The Conservation Authorities (LSRCA and NVCA) were also provided the opportunity to review and comment on the *Draft Drainage and Hydrology Report* (AECOM, July 2017).

### *Proposed Mitigation Measures*

A comprehensive stormwater management plan was developed by considering upstream/downstream impacts, the environmental sensitivity of the recipient drainage system, and maintenance. The proposed stormwater management strategy consists of a combination of culvert extensions, culvert replacements, wet ponds, dry detention facilities, flat-bottomed grassed swales and enhanced swales. All culverts will require extensions to accommodate the proposed highway widening and twenty-four (24) culverts are also recommended for replacement (C43, C44, C46, C49, C51, C56, C60,

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C62, C64, C65, C66, C68, C71, C72, C73, C74, C75, C76, C79, C80, C82, C83, C84, C85). Six (6) stormwater management wet ponds and fourteen (14) stormwater management dry detention facilities are proposed. Further consultation shall be undertaken with the City of Barrie, the Town of Innisfil, NVCA and LSRCA during further stages of design regarding stormwater management. Refer to **Appendix A** for the locations of the stormwater management facilities in the TESR Addendum Plates and refer the *Draft Drainage and Hydrology Report* (AECOM, July 2017) for further details.

## 6.2 Socio-Economic Environment

### 6.2.1 Land Use

The Highway 400 improvements will have impacts on land use throughout the corridor, with impacts to agricultural, special rural area, open space, residential, commercial, industrial, institutional, and environmentally protected land uses. The new impacts to land uses beyond the 2004 TESR footprint are outlined in **Table 13**.

**Table 13: Newly Impacted Land Use Beyond the 2004 TESR Footprint**

| Land Use Type         | Newly Impacted Locations beyond the 2004 TESR Footprint  |
|-----------------------|--|
| Agricultural Land Use | <ul style="list-style-type: none"><li>• West of Highway 400 approximately 1 km south of Highway 89;</li><li>• East of Reive Blvd, north of County Road 89;</li><li>• East of Reive Blvd, north of the Highway 89 Interchange;</li><li>• West of Highway 400, north of 6<sup>th</sup> Line;</li><li>• At Stormwater Management Ponds 1, 2, 3, and 4;</li></ul>  |
| Commercial Land Use   | <ul style="list-style-type: none"><li>• West of Highway 400, south of Innisfil Beach Road;</li><li>• At Stormwater Management Ponds 5 and 6;</li><li>• West of Highway 400, south of 9<sup>th</sup> Line for a stormwater management facility;</li><li>• West of Highway 400, north of Tiffin Street;</li><li>• In the northwest, southwest and northeast quadrants of the Highway 400 and Dunlop Street Interchange;</li><li>• West of Highway 400, south of Bayfield Street;</li></ul> |
| Industrial Land Use   | <ul style="list-style-type: none"><li>• West of Highway 400, north of Essa Road;</li><li>• West of Highway 400, north of the Barrie-Collingwood Railway;</li><li>• West of Highway 400, south of Tiffin Street;</li></ul>  |
| Residential Land Use  | <ul style="list-style-type: none"><li>• In the northeast quadrant of the Highway 400 / Dunlop Street interchange at Henry Street;</li><li>• East of Highway 400, north of Bayfield Street;</li></ul>   |

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| Land Use Type | Newly Impacted Locations beyond the 2004 TESR Footprint  |
|---------------|--|
| Open Space    | <ul style="list-style-type: none"><li>East of Highway 400 south of Big Bay Point Road;</li></ul> |

Opportunities to minimize impacts will be investigated during detail design and consultation will be undertaken with agricultural operations, institutions and local businesses to minimize impacts to their operations as much as feasible.

Refer to **Appendix A** for Plates outlining the Recommended Plan and ROW requirements beyond those identified in the 2004 TESR.

### 6.2.2 Property

The 2004 TESR included recommendations for property acquisition to accommodate the widening of Highway 400 and improvements to the interchanges throughout the corridor. The improvements require additional property beyond the 2004 TESR footprint as outlined in **Section 2.5** and in **Appendix A**.

Safe access to the commercial and private entrances shall be maintained at all times during construction. If there are impacts to signs, vegetation, landscaping or driveways of any of the commercial, private or municipal properties, the area of impact must be returned to the conditions of the land prior to construction or better.

### 6.2.3 Noise

#### 6.2.3.1 Operational Noise

As noted in **Section 3.2.3**, an updated noise analysis for this study was undertaken to reflect the 2031 planning horizon.

Noise impacts are determined by comparing future ambient (year 2031) noise levels without the project and future noise levels with the project using an MTO-approved traffic noise model. Noise levels must be compared for both future conditions (with and without the undertaking) 10 years from the completion of construction. Noise impacts occur when the future noise level with the project exceeds the future noise level without the project by 5 dBA or greater (relative impact) or when future with the project noise levels are equal to or greater than 65 dBA (absolute impact).

When noise levels at the Most Exposed Side (MES) of a dwelling unit for the future with undertaking condition are 5 dBA over the future ambient (year 2031) condition, or when the noise level is predicted to be equal to or greater than 65 dBA, the need to investigate mitigation is required. The future noise level must be predicted at the OLA to determine the true significance of the impact. If mitigation assessment was required the following was completed:

- Investigate noise control measures within the ROW; and,

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- If mitigation is found to achieve attenuation of 5 dBA or more averaged at the OLA over the first row of receivers, then measures for mitigation found within the ROW will be implemented.

The objective of any mitigation is to obtain levels close to or lower than predicted future ambient (year 2031) noise levels. Mitigation is reviewed based upon the following:

- Technical Feasibility – the constructability of the mitigation with regards to safety, topography, and the ability to achieve a 5 dBA reduction, among other concerns;
- Economic Feasibility – the cost/benefit analysis of the mitigation; and,
- Administrative Feasibility – the ability to locate the noise barrier on publically owned lands such as the MTO ROW.

The predicted noise levels for the future without undertaking and future with undertaking scenarios are in **Table 14** and the noise impacts and recommended mitigation is noted in **Table 15**.

A total of seven (7) locations throughout the corridor were found to have noise impacts associated with the recommended Highway 400 improvements. Noise mitigation (i.e. noise walls) is recommended at all seven (7) locations, five (5) of which were previously recommended as part of the 2004 approved plan. The newly recommended noise walls are south of Anne Street to the west of Highway 400 (along the Highway 400 southbound), and north of Duckworth Street and west of Highway 400 (along the highway 400 southbound). The locations can be viewed in **Figures 30 to 32** and in **Appendix A**.

The height, length, and exact location of all noise walls will be determined during future design stages, based on local topography.

Further details on the assessment of noise impacts and noise mitigation analysis are in the *Noise Study Report* (AECOM, March 2017), available under separate cover.

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**Table 14: Predicted Noise Levels with and without the Highway 400 Widening and Improvements (Future Ambient and Future with Undertaking)**

| NSA | Location   | Modeled Receivers     | Future Ambient (2031) |                              | Future with Undertaking (2031) |                              |
|-----|--|-----------------------|-----------------------|------------------------------|--------------------------------|------------------------------|
|     |  |                       | Range (Leq, dBA)      | # of Impacted Dwelling Units | Range (Leq, dBA)               | # of Impacted Dwelling Units |
| 1   | West of Highway 400, south of Highway 89                 | R01-01                | 60 - 60               | 0                            | 62 - 62                        | 0                            |
| 2   | West of Highway 400, north of Highway 89                 | R02-01 & R02-02       | 59 - 60               | 0                            | 60 - 61                        | 0                            |
| 3   | East of Highway 400, north of Highway 89; KOA campground | R03-01 & R03-02       | 55 - 56               | 0                            | 58 - 59                        | 0                            |
| 4   | East of Highway 400, north of 2 Line                     | R04-01 & R04-02       | 60 - 64               | 0                            | 61 - 63                        | 0                            |
| 5   | East of Highway 400, south of 3 Line                     | R05-01 through R05-05 | 62 - 68               | 2                            | 62 - 67                        | 1                            |
| 6   | West of Highway 400, north of 3 Line                     | R06-01                | 53 - 53               | 0                            | 54 - 54                        | 0                            |
| 7   | West of Highway 400, south of 4 Line                     | R07-01 through R07-05 | 51 - 56               | 0                            | 52 - 57                        | 0                            |
| 8   | West of Highway 400, north of 4 Line                     | R08-01 & R08-02       | 52 - 56               | 0                            | 53 - 58                        | 0                            |
| 9   | East of Highway 400, north of 4 Line                     | R09-01 & R09-02       | 51 - 55               | 0                            | 52 - 56                        | 0                            |
| 10  | East of Highway 400, north and south of 5 Line           | R10-01 & R10-02       | 56 - 58               | 0                            | 58 - 60                        | 0                            |
| 11  | West of Highway 400, south of 6th Line                   | R11-01 & R11-02       | 54 - 57               | 0                            | 55 - 59                        | 0                            |
| 12  | East of Highway 400 and south of Innisfil Beach Road     | R12-01 through R12-23 | 51 - 55               | 0                            | 52 - 57                        | 0                            |

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| NSA | Location  | Modeled Receivers     | Future Ambient (2031) |                              | Future with Undertaking (2031) |                              |
|-----|---|-----------------------|-----------------------|------------------------------|--------------------------------|------------------------------|
|     |   |                       | Range (Leq, dBA)      | # of Impacted Dwelling Units | Range (Leq, dBA)               | # of Impacted Dwelling Units |
| 13  | East of Highway 400 and south of 9 Line Road                                      | R13-01                | 58 - 58               | 0                            | 59 - 59                        | 0                            |
| 14  | East of Highway 400, north of McKay Road (10 <sup>th</sup> Line)                  | R14-01                | 58 - 58               | 0                            | 59 - 59                        | 0                            |
| 15  | East of Highway 400, south of Essa Road   | R15-01 through R15-63 | 49 - 65               | 2                            | 49 - 65                        | 4                            |
| 16  | East of Highway 400, at the western terminus of Campbell Avenue and Wood Street   | R16-01 through R16-05 | 59 - 63               | 0                            | 60 - 64                        | 0                            |
| 17  | West of Highway 400, west of Patterson Road; at Phillips Street and Tiffin Street | R17-01 through R17-06 | 53 - 69               | 1                            | 54 - 68                        | 1                            |
| 18  | East of Highway 400, at Tiffin Street   | R18-01 through R18-07 | 60 - 68               | 4                            | 60 - 67                        | 4                            |
| 19  | East of Highway 400, south of Anne Street   | R19-01 through R19-11 | 59 - 70               | 4                            | 61 - 70                        | 7                            |
| 20  | West of Highway 400, south of Anne Street   | R20-01 through R20-28 | 44 - 71               | 6                            | 45 - 71                        | 6                            |
| 21  | West of Highway 400, north of Anne Street   | R21-01 through R21-34 | 48 - 75               | 13                           | 48 - 75                        | 13                           |
| 22  | East of Highway 400 between Anne Street and Sunnidale Road                        | R22-01 through R22-46 | 48 - 75               | 3                            | 50 - 78                        | 3                            |
| 23  | West of Highway 400, north of Sunnidale Road                                      | R23-01 through R23-08 | 58 - 73               | 4                            | 59 - 77                        | 4                            |
| 24  | East of Highway 400, between Sunnidale Road and Bayfield Street                   | R24-01 through R24-52 | 50 - 73               | 8                            | 49 - 74                        | 8                            |

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| NSA | Location  | Modeled Receivers       | Future Ambient (2031) |                              | Future with Undertaking (2031) |                              |
|-----|---|-------------------------|-----------------------|------------------------------|--------------------------------|------------------------------|
|     |   |                         | Range (Leq, dBA)      | # of Impacted Dwelling Units | Range (Leq, dBA)               | # of Impacted Dwelling Units |
| 25  | West of Highway 400, north of Bayfield Street                           | R25-001 through R25-151 | 42 - 74               | 53                           | 43 - 75                        | 63                           |
| 26  | East of Highway 400, north of Bayfield Street                           | R26-001 through R26-123 | 49 - 71               | 20                           | 51 - 72                        | 22                           |
| 27  | West of Highway 400, north of St Vincent Street                         | R27-01 through R27-11   | 51 - 66               | 0                            | 51 - 66                        | 0                            |
| 28  | East of Highway 400, north of St Vincent Street                         | R28-01 through R28-20   | 49 - 72               | 0                            | 48 - 72                        | 0                            |
| 29  | West of Highway 400, north of Duckworth Street, along Little Lake Drive | R29-01 through R29-53   | 53 - 74               | 3                            | 53 - 75                        | 5                            |
| 30  | East of Highway 400, north of Duckworth Street                          | R30-01 through R30-34   | 33 - 73               | 18                           | 33 - 73                        | 18                           |

Leq: Equivalent Sound Level

dBA: A- Weighted Decibels

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**Table 15: Noise Impact and Mitigation Summary**

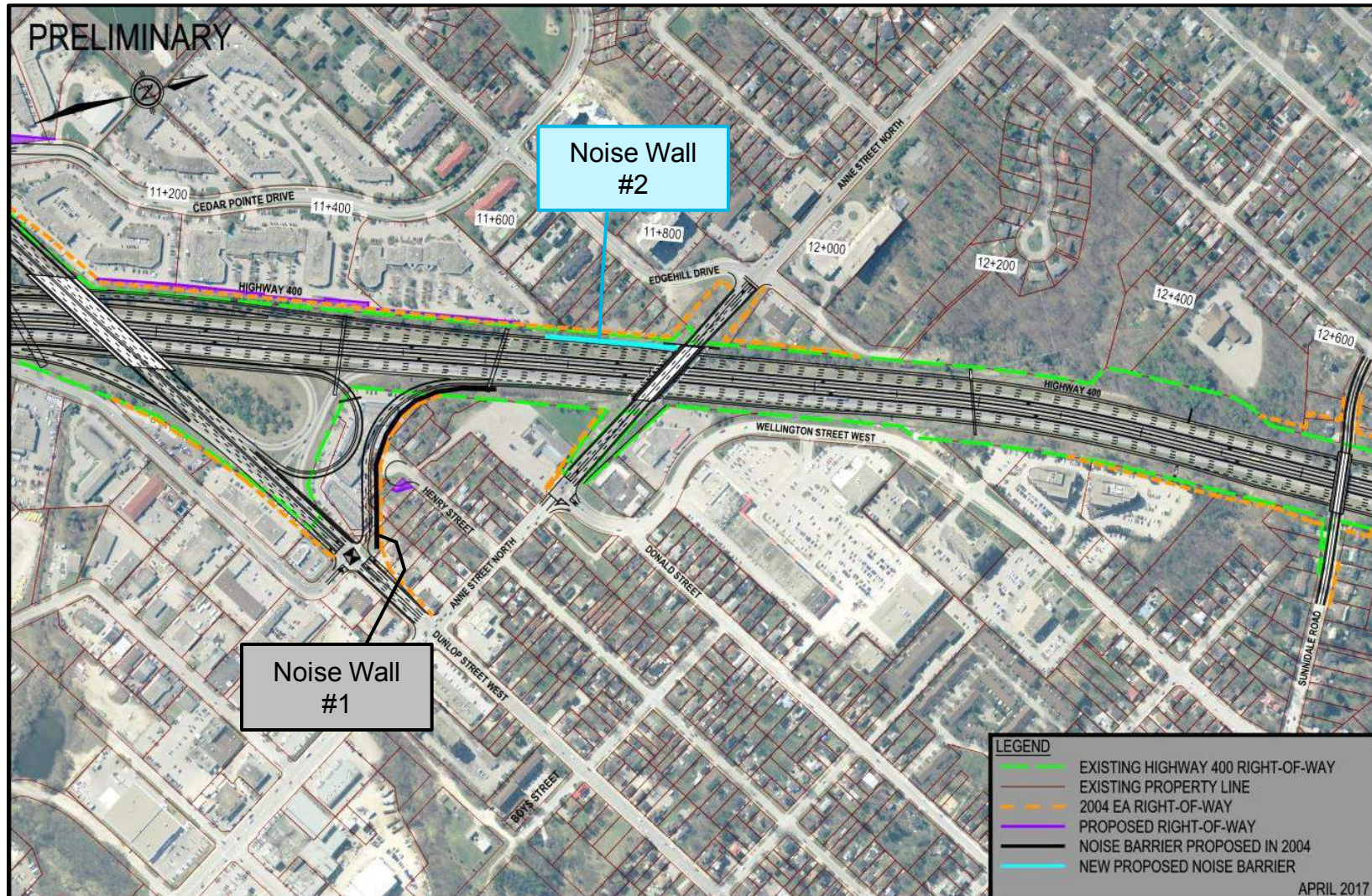
| NSA | Location  | Impacted Receivers  | Total Impacted Dwelling Units | Impact Type  | Mitigation Recommended?               |
|-----|---|---|-------------------------------|--|---------------------------------------|
| 5   | East of Highway 400, south of 3 Line  | R05-01  | 1                             | Absolute ( $\geq 65$ dBA)                              | No; Not Economically Feasible         |
| 15  | East of Highway 400, south of Essa Road   | R15-58, R15-61  | 4                             | Absolute ( $\geq 65$ dBA)                              | No; Not Technically Feasible          |
| 17  | West of Highway 400, west of Patterson Road; at Phillips Street and Tiffin Street | R17-06  | 1                             | Absolute ( $\geq 65$ dBA)                              | No; Not Economically Feasible         |
| 18  | East of Highway 400, at Tiffin Street   | R18-01, R18-03  | 4                             | Absolute ( $\geq 65$ dBA)                              | No, Not Economically Feasible         |
| 19  | East of Highway 400, south of Anne Street   | R19-01, R19-02, R19-03, R19-04, R19-05, R19-11                                    | 7                             | Absolute ( $\geq 65$ dBA) and Increase ( $\geq 5$ dBA) | Yes; Noise Barrier                    |
| 20  | West of Highway 400, south of Anne Street   | R20-13, R20-14, R20-15, R20-16  | 6                             | Absolute ( $\geq 65$ dBA)                              | Yes; Noise Barrier                    |
| 21  | West of Highway 400, north of Anne Street   | R21-01, R21-02(H), R21-03, R21-04, R21-06, R21-11, R21-12, R21-19, R21-23, R21-31 | 13                            | Absolute ( $\geq 65$ dBA)                              | No, Not Technically Feasible          |
| 22  | East of Highway 400, between Anne Street and Sunnidale Road                       | R22-18, R22-39, R22-44  | 3                             | Absolute ( $\geq 65$ dBA)                              | To be determined during Detail Design |
| 23  | West of Highway 400, north of Sunnidale Road                                      | R23-02, R23-03  | 4                             | Absolute ( $\geq 65$ dBA)                              | No; Not Economically Feasible         |
| 24  | East of Highway 400, between Sunnidale Road and Bayfield Street                   | R24-05, R24-06, R24-07, R24-14, R24-27, R24-28, R24-51, R24-52                    | 8                             | Absolute ( $\geq 65$ dBA) and Increase ( $\geq 5$ dBA) | Yes; Noise Barrier                    |

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| NSA | Location  | Impacted Receivers  | Total Impacted Dwelling Units | Impact Type  | Mitigation Recommended?      |
|-----|---|---|-------------------------------|--|------------------------------|
| 25  | West of Highway 400, north of Bayfield Street                           | R25-001, R25-002, R25-003, R25-011, R25-012, R25-013, R25-24, R25-25, R25-26, R25-39, R25-51, R25-52, R25-53, R25-54, R25-63, R25-64, R25-77, R25-78, R25-79, R25-136 | 63                            | Absolute ( $\geq 65$ dBA) and Increase ( $\geq 5$ dBA) | Yes; Noise Barrier           |
| 26  | East of Highway 400, north of Bayfield Street                           | R26-001, R26-002, R26-003, R26-005, R26-013, R26-016, R26-22, R26-23, R26-68, R26-69, R26-75  | 22                            | Absolute ( $\geq 65$ dBA) and Increase ( $\geq 5$ dBA) | Yes; Noise Barrier           |
| 27  | West of Highway 400, north of St Vincent Street                         | R27-06  | 0                             | Absolute ( $\geq 65$ dBA)                              | No; No Outdoor Use Area      |
| 28  | East of Highway 400, north of St Vincent Street                         | R28-02, R28-08, R28-09, R28-15, R28-16, R28-17  | 0                             | Absolute ( $\geq 65$ dBA)                              | No; No Outdoor Use Area      |
| 29  | West of Highway 400, north of Duckworth Street, along Little Lake Drive | R29-01, R29-37, R29-53  | 5                             | Absolute ( $\geq 65$ dBA)                              | Yes; Noise Barrier           |
| 30  | East of Highway 400, north of Duckworth Street                          | R30-01, R30-02, R30-27, R30-28, R30-29, R30-30, R30-31  | 18                            | Absolute ( $\geq 65$ dBA)                              | No; Not Technically Feasible |

# Highway 400 Improvements from 1 km South of Highway 89 to the Junction of Highway 11

**Figure 30: Recommended Noise Barriers - Locations 1 and 2**



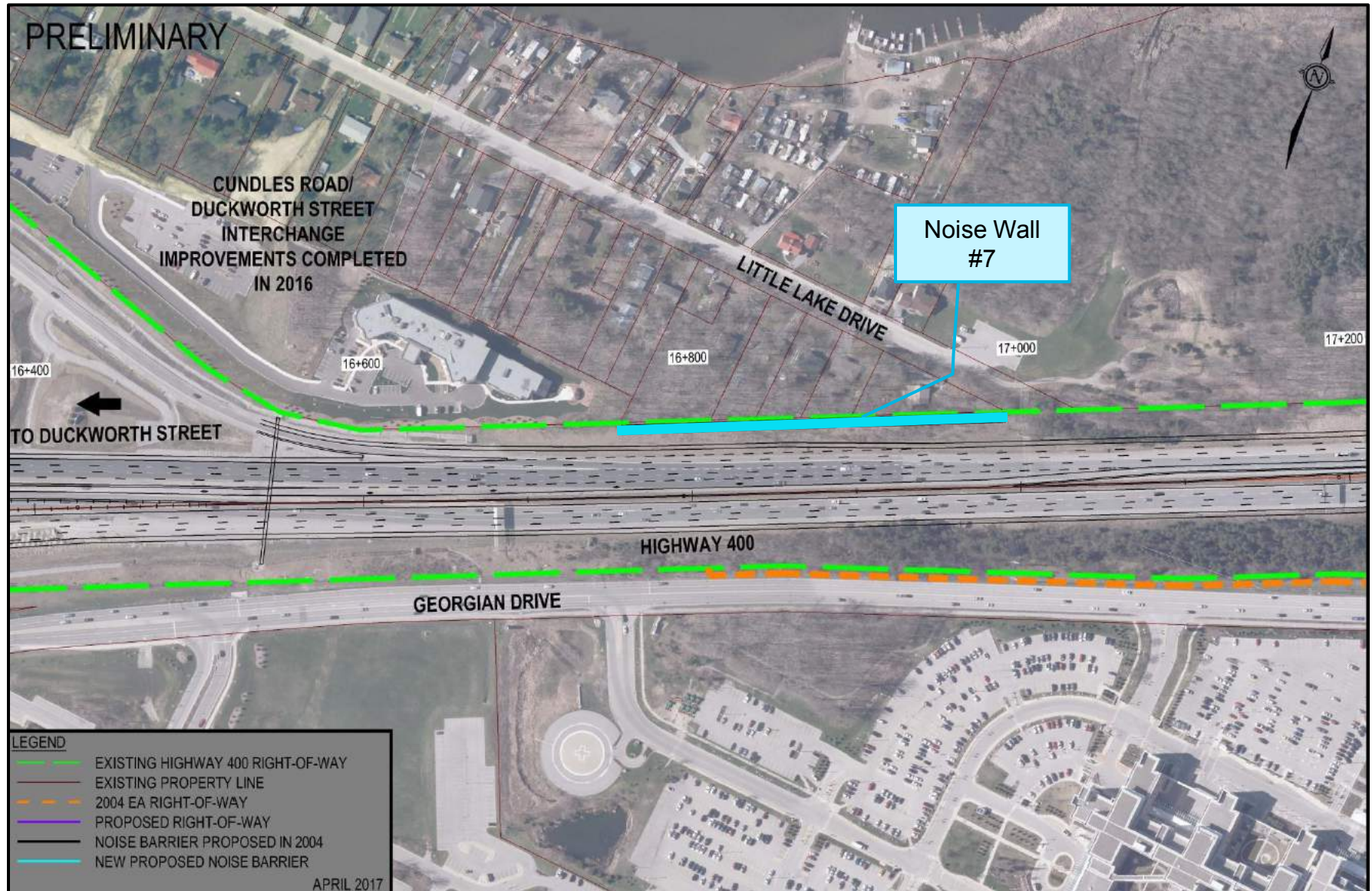
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**Figure 31: Recommended Noise Barriers - Locations 3, 4, 5 and 6**



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Figure 32: Recommended Noise Barriers – Location 7



#### 6.2.3.2 Construction Noise

##### *Potential Impacts*

Construction noise impacts for this project may potentially be expected at nearby NSAs. The potential for construction noise impacts will depend on the number and type of construction equipment and processes to be used and the time of day that they may occur.

##### *Proposed Mitigation Measures*

Best management practices for construction noise mitigation shall be employed including the following:

- Time Periods and Duration: Noisy equipment shall only be operated when necessary and switched off when not in use to minimize noise impacts.
- Storage Areas: Storage areas shall be designated in locations removed from sensitive receivers. Where this is not possible, the storage of earth and other supplies may potentially be positioned to function as a noise barrier.
- Concurrent Operations: Noisy operations shall be scheduled concurrently to take advantage of the fact that the combined noise levels produced may not be significantly greater than the level produced if the operations were performed separately.
- Alternative Construction Methods: Alternatives to standard construction techniques may also be available and determined to be more practical and/or cost-effective in dealing with construction noise impacts and perceptions. Examples associated with several operations are discussed below.
- Compressors: While most compressors are powered by diesel or gasoline engines, many are contained or have baffles to help abate noise levels. Electric compressors are significantly quieter than diesel or gasoline engine powered compressors.
- Less Noisy Equipment: Less noisy equipment shall be used wherever feasible.

During Detail Design, when construction activities and processes are better defined, potential noise impact issues shall be revisited and a Construction Noise Mitigation Report shall be prepared. The plan shall include a more accurate assessment of construction noise impacts, and identify construction noise impact criteria levels, mitigation elements and monitoring activities. The plan shall also establish an appropriate construction noise complaint process by which the public can register complaints triggered by unacceptably loud or objectionable construction activity.

A Noise Bylaw Exemption shall be obtained from the Town of Innisfil and the City of Barrie prior to construction.

## 6.2.4 Air Quality

An *Air Quality Assessment* (RWDI, August 2016) was completed as part of this study and is available under separate cover.

### *Potential Impacts*

The local air quality impact assessment indicated that predicted concentrations for all contaminants and averaging periods are less than the applicable thresholds, with the exception of 24-hour concentrations of PM<sub>2.5</sub> and PM<sub>10</sub> and annual concentrations of benzene for the overall Highway 400 improvements study area.

In the case of particulate matter, the background concentrations alone exceed the criteria some of the time, and the contribution from the highway is only about 10% of the total concentration at worst-case receptors. In addition, the frequency of exceedance is very small (0.5%).

In the case of benzene, the annual background concentration alone is the standard and the addition of the widened highway increases the concentration by about 10% at the worst-case receptor. Future concentrations are also likely to be lower than predicted due to decreasing background concentrations by 2031.

In general, the modelled concentrations are predicted to decrease between 2015 and 2031 at all receptors through the study area. This is due to expected ongoing improvement in average emissions per vehicle as older vehicles are gradually replaced by newer, lower emission vehicles. The decrease in predicted concentration occurs in spite of a projected increase in traffic volume in the 2031.

### *Proposed Mitigation Measures*

No mitigation measures are recommended with respect to local air quality for the operational phase of the project. During construction it is proposed that the best management practices include the following:

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

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- Covered stockpiles of soil, sand and aggregate as necessary; and;
- Compliance with posted speed limits and, as appropriate, further reductions in speeds when travelling sites on unpaved surfaces.

### 6.2.5 Landscape Composition

The recommended improvements will result in changes to the existing landscape due to edge impacts associated with the increased footprint and construction. A Landscape Opportunities Plan was developed to provide an overview of areas where landscaping shall be incorporated into the design. The plan includes recommendations for coniferous and deciduous plantings, native grass wildflower planting, MTO roadside seed mix, heritage bridge crest perennial accent planting, heritage bridge crest signature trees and shrubs, accent shrub planting at interchanges and noise walls, and signature plantings to enhance aesthetics throughout the corridor.

The Landscape Opportunities Plan is available in **Appendix F**.

A detailed Landscape Plan will be developed during further design stages and shall incorporate the recommendations outlined in this Landscape Opportunities Plan and in the *Highway Snow Drifting Consultation (RWDI, June 2016)* further described in **Section 6.2.6**.

### 6.2.6 Snow Drift

The 2004 TESR recommended snow drift mitigation in areas with potential for snow drift along the study area. A snow drift assessment was completed for this update study (*Highway Snow Drifting Consultation, RWDI, June 2016*), available under separate cover.

#### *Potential Impacts*

Snow drifting problems are related to two main factors: the snow transport and the local topography characteristics. **Table 16** summarizes the regions along Highway 400 that have the potential to be problematic.

**Table 16: Summary of Locations with Potential for Snow Drift**

| Priority Area | Location                      | Snow Transport Potential | Potential Drift Accumulation due to Topography | Notes on Topography and Terrain   |
|---------------|-------------------------------|--------------------------|--|---|
| 1             | South of 4 <sup>th</sup> Line | Moderate                 | High   | <ul style="list-style-type: none"><li>• Berms or “Cut” cross-sections to the west;</li><li>• Long stretches of fields to the west and southwest</li><li>• Existing problems as noted by “warning” signs along the highway</li></ul> |
|               | North of Highway 89           | Moderate/High            |  |   |
|               | South of 7 <sup>th</sup> Line | Moderate                 |  |   |

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| Priority Area | Location                       | Snow Transport Potential | Potential Drift Accumulation due to Topography | Notes on Topography and Terrain   |
|---------------|--------------------------------|--------------------------|--|---|
| 2             | North of 4 <sup>th</sup> Line  | High                     | Moderate                                       | <ul style="list-style-type: none"> <li>Long stretches of fields to the west and southwest</li> </ul>  |
|               | South of 10 <sup>th</sup> Line | High                     |  |   |
| 3             | South of Innisfil Beach Road   | Moderate                 | Moderate/High                                  | <ul style="list-style-type: none"> <li>Localized landscaped berms or “Cut” cross-sections to the west</li> <li>Long stretches of fields to the northwest, west and southwest</li> </ul> |

### *Proposed Mitigation Measures*

The *Highway Snow Drifting Consultation (RWDI, June 2016)* includes a discussion of potential mitigation approaches to reduce the severity of the snow drifting in problematic areas along Highway 400. It should be noted that snow mitigation will not prevent all available snow from reaching the Highway 400 corridor and instances of reduced visibility and snow drift formation are still expected to occur. However, it is expected that the strategies outlined in the above noted report will improve the conditions related to snow drift.

Snow drift mitigation is recommended in six locations. In general, the recommendations focus on avoiding berms or single lines of trees directly adjacent to the roadway, which can cause localized snow drifting and reduced visibility. Recommendations are given to limit the amount of snow that reaches the highway through the use of upwind snow fences and landscaping. Snow fences and rows of coniferous trees are similar in efficacy, however consideration should be given to their placement as outlined in the above noted report. The recommendations are summarized in **Table 17**.

The implementation of potential mitigation measures, as recommended in the *Highway Snow Drifting Consultation (RWDI, June 2016)* will be confirmed during detail design, based on updated land uses. Any snow fence or tree planning that is recommended off the ROW at that time will be discussed with adjacent land owners. .

**Table 17: Summary of Specific Snow Drift Mitigation Locations and Methods**

| Priority Area | Location                      | Mitigation Method                                     | Length<br>(h=height of tree or fence) |
|---------------|-------------------------------|---|---------------------------------------|
| 1             | South of 4 <sup>th</sup> Line | Remove berm;<br>Permanent snow fence (1.5 m) or trees | 550 m + 10*h                          |
|               | North of Highway 89           | Remove berm;<br>Permanent snow fence (1.8 m) or trees | 1650 m + 10*h                         |

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| Priority Area | Location                        | Mitigation Method  | Length<br>(h=height of tree or fence) |
|---------------|---------------------------------|--|---------------------------------------|
|               | South of 7 <sup>th</sup> Line   | Remove berm;<br>Permanent snow fence<br>(1.5 m) or trees | 450 m + 580                           |
| 2             | North of 4 <sup>th</sup> Line   | Remove berm;<br>Permanent snow fence<br>(1.8 m) or trees | 2000 m + 10*h                         |
|               | South of 10 <sup>th</sup> Line  | Temporary snow fence<br>(1.8 m) or trees                 | 500 m + 20*h                          |
| 3             | South of Innisfil<br>Beach Road | Remove berm;<br>Temporary snow fence<br>(1.5 m) or trees | 950 m + 20*h                          |

## 6.2.7 Waste and Contamination

### *Potential Impacts*

It is anticipated that there will be excess materials such as: natural wood, concrete, asphalt and earth. The Contractor will be responsible for properly storing and disposing excess material generated during construction in accordance with Ontario Provincial Standards and Specifications. The refinements to the 2004 Approved Plan are expected to result in a negligible change in the nature and extent of waste material generated by construction.

### *Proposed Mitigation Measures*

- Excess material will require proper management (removal, storage and disposal). Materials shall be managed in accordance with the Ontario Provincial Standard Specification (OPSS) 180 – General Specification for the Management of Excess Materials;
- A Designated Substance Survey shall be undertaken during Detail Design to confirm the presence of designated substances of all structures that will be rehabilitated or replaced;
- Preliminary Site Screenings (available under separate cover) have been undertaken on various properties throughout the study area. During Detail Design all additional site assessments and recommendations made in the PSSs shall be undertaken and additional PSSs shall be undertaken on any outstanding properties; and,
- All potential impacts and recommended mitigation measures shall be confirmed during detail design once design details are better known.

## 6.3 Cultural Environment

### 6.3.1 Archaeology

#### *Potential Impacts*

As noted in **Section 3.3.1** a Stage 2 Archaeological Assessment was carried out on all potentially impacted properties where Permission to Enter was granted. These properties can be considered clear of further archaeological concern.

#### *Proposed Mitigation Measures*

If permission to enter on the remaining properties, as indicated in the *Stage 2 Archaeological Assessment Report* (AECOM, February 2017) is obtained in the future, or once the properties are acquired by MTO, these properties must be subject to a Stage 2 archaeological assessment as per the *Standards and Guidelines for Consultant Archaeologists* (MTCS, 2011). The Contractor shall comply with all recommendations outlined in the Stage 2 Archaeological Assessment (AECOM, February 2017), once final, and any further assessments (i.e. Stage 3 and/or Stage 4 Archaeological Assessments) completed during Detail Design.

During construction there is the possibility of encountering deeply buried archaeological material. In the event the following situations are encountered during construction, the Contractor shall stop work immediately and undertake the actions as described below:

- Should previously undocumented archaeological resources be discovered, there may be a new archaeological site which would be subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licenced consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*. The Heritage Operations Unit of the Ministry of Tourism, Culture and Sport must be notified immediately.
- The *Cemeteries Act*, R.S.O. 1990, c.C 4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 20002, c33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.
- Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

### 6.3.2 Built Heritage

As noted in **Section 3.3.2**, the following structures are considered to have heritage value based on their vintage, cultural affiliation and design characteristics:

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- Highway 89;
- Anne Street;
- Sunnidale Road; and,
- Bayfield Street

The following heritage treatments are proposed for the replacement of the heritage structures along the corridor:

- Inclusion of the Ontario Coat of Arms on the abutments (where the existing bridge includes the Ontario Coat of Arms);
- Decorative railing;
- Curved soffit; and,
- Landscaping treatments as outlined in **Section 6.2.5** and the *Landscape Opportunities Plan* in **Appendix F**.

## 6.4 Transportation

### 6.4.1 Community Access & Out of Way Travel

Details regarding traffic management and community access shall be determined during detail design. Further consultation with the municipalities, emergency services, the agricultural community and the property owners adjacent to the interchange shall be undertaken with regards to potential out-of-way travel and temporary closures as required during construction.

#### *Closure of Rose Street*

As part of the improvements to the Highway 400 / Bayfield Street interchange and as outlined in the 2004 TESR, Rose Street will be closed and a cul-de-sac will be provided to remove direct access from Rose Street onto the Highway 400 northbound on-ramp to improve safety at the interchange. As Rose Street currently provides access to Highway 400 from the Ontario Provincial Police (OPP) Station in the northeast quadrant of Highway 400 and Bayfield Street, further discussions will take place with the OPP and Infrastructure Ontario concerning the provision of a direct on-ramp to Highway 400 from the station that would not be open for public access.

### 6.4.2 Utilities

As noted in **Section 3.4.2**, there are potential utility conflicts with Bell Canada, Barrie Hydro, Innisfil Hydro, Hydro One, Town of Innisfil (water), City of Barrie (water), County of Simcoe Area Network, Rogers Cable, and Enbridge Consumers Gas throughout the study area. The relocation of all utility conflicts shall be undertaken prior to construction.

## 6.5 Minister's Decision Letter – July 2006

In addition to the above proposed mitigation measures, the commitments outlined in the Minister's Decision Letter from July 2006 (refer to **Appendix B** for a copy of the letter) will be addressed as part of this project:

- During the Project's detail design stage and prior to the commencement of construction, MTO shall pre-consult with the Ministry of the Environment's Southwestern Region Office prior to the completion of the stormwater management plan(s), in order to identify issues of concern and to establish a procedural and analytic framework for completion of the stormwater management plan(s);
- The final stormwater management plan(s) shall be submitted to the Air, Pesticides, and Environmental Planning (APEP) Supervisor of the Ministry of the Environment's Southwestern Region Office, with a cover letter referencing the name of the Project and indicating that the plan is being submitted in accordance with this condition; and,
- Upon completion of the above conditions, MTO shall submit a written statement to the Director, Environmental Assessment and Approvals Branch, Ministry of the Environment, indicating when and how the above noted conditions have been fulfilled.

## 6.6 Summary of Environmental Concerns, Mitigation Measures and Commitments to Future Work

**Table 18** summarizes the environmental concerns, proposed mitigation measures and commitments to future work for the project outlined in the 2004 TESR and the status of those commitments in the current undertaking.

**Table 19** summarizes the environmental concerns and mitigation measures and commitments to future work to be undertaken and confirmed during detail design.

### Legend

MTO – Ministry of Transportation

MUN – Applicable municipalities (Town of Innisfil, City of Barrie, the County of Simcoe)

MNRF – Ministry of Natural Resources and Forestry

MOECC – Ministry of the Environment and Climate Change

MTCS – Ministry of Tourism, Culture and Sport

NVCA – Nottawasaga Valley Conservation Authority

LSRCA – Lake Simcoe Region Conservation Authority

Table 18: Summary of Environmental Concerns, Mitigation Measures, and Future Commitments Outlined in the 2004 TESR (G.W.P. 30-95-00)

| Summary of Environmental Concerns, Mitigation Measures and Future Commitments Outlined in the 2004 TESR (G.W.P. 30-95-00) |   |                                |     |  |  |
|---|---|--------------------------------|-----|--|--|
| ID #  | Environmental Element / Concern and Potential Impact                                      | Concerned Agencies             | ID# | Transportation Environmental Study Report (2004) Details / Mitigation  | Commitment Addressed in Detail Design (Yes / No / N/A)   |
| 1.0   | <b>Hydrogeology:</b> Impacts to existing wells and groundwater discharge / recharge areas | MNRF<br>MTO<br>Property Owners | 101 | <ul style="list-style-type: none"><li>A Stormwater Management Plan will be developed which includes the creation of ponds and ditches designed to promote infiltration that will address the minor impacts to groundwater recharge function in Vegetation Community 9 at Station 23+400, north of Tenth Line in the Town of Innisfil;</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>   |
|   |   |                                | 102 | <ul style="list-style-type: none"><li>A realignment of the stream channel between Sta. 12+295 and 13+080, south of Fourth Line in the Town of Innisfil will be constructed at the base of the drumlin features matching as closely as possible to the existing elevations to maintain groundwater discharges to the stream system;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>   |
|   |   |                                | 103 | <ul style="list-style-type: none"><li>A review of wells in the vicinity of significant earth cuts will be undertaken as appropriate during detail design to determine pre-construction well conditions (i.e. baseline water quality and quantity data);</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul>  |
|   |   |                                | 104 | <ul style="list-style-type: none"><li>It is anticipated that any recharge lost to impermeable surfaces will, in part, be mitigated by direction of runoff to ditches where some additional recharge, above what is currently occurring, can be anticipated. Impacts to sensitive recharge areas will be further examined during detail design and appropriate mitigation will be developed as necessary.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul>  |
|   |   |                                | 105 | <ul style="list-style-type: none"><li>Opportunities to address potential impacts associated with deicing salt application will be addressed as a part of the Ministry's ongoing review of environmental standards of practice; and</li></ul>   | <ul style="list-style-type: none"><li>N/A. MTO Continues to evaluate and test new technologies, methods and products that have the potential to reduce salt use.</li></ul> |
|   |   |                                | 106 | <ul style="list-style-type: none"><li>The risk of spillage will be minimized and managed through standard practices of not permitting contractors to refuel or maintain vehicles in a manner, which would permit entry of spilled fuels into permeable grounds surfaces or water sources. Refueling operations in proximity to shallow wells in areas of relatively high water table such as the northern and southern portions of the study area are potentially most susceptible to fuel impacts and will not be permitted. In addition, an emergency response plan must be in place to address accidental releases.</li></ul> | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul>  |
| 2.0   | <b>Aquatic Features:</b> Harmful alteration, disruption or destruction                    | NVCA<br>MNRF                   | 201 | <ul style="list-style-type: none"><li>No in-water work from March 15 to June 30 (warmwater);</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul>  |
|   |   |                                | 202 | <ul style="list-style-type: none"><li>No in-water work from September 1 to June 1 (coldwater);</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul>  |

| Summary of Environmental Concerns, Mitigation Measures and Future Commitments Outlined in the 2004 TESR (G.W.P. 30-95-00) |  |                                |     |  |   |
|---|--|--------------------------------|-----|--|---|
| ID #  | Environmental Element / Concern and Potential Impact   | Concerned Agencies             | ID# | Transportation Environmental Study Report (2004) Details / Mitigation  | Commitment Addressed in Detail Design (Yes / No / N/A)  |
|   | of fish habitat, culvert extensions and stream realignments  | MTO                            | 203 | <ul style="list-style-type: none"><li>Implement an erosion and sediment control plan with typical mitigation measures including sediment fences, check dams and/or straw bales in affected drainages and re-vegetation of exposed soils within a maximum of 45 days of the start of grading. On steeper slopes, geotextiles should be used to enhance slope stability and the growth of the vegetation. An Environmental Inspector will be employed to monitor the success of the sediment and erosion control methods used and to provide guidance on maintenance requirements. Sediment and erosion controls will remain in place and maintained until such time as the vegetation has taken sufficiently to provide adequate protection for the watercourses;</li></ul> | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 204 | <ul style="list-style-type: none"><li>Stockpiles will be located and isolated to ensure material will not enter any watercourse;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 205 | <ul style="list-style-type: none"><li>All culvert work will be isolated from stream flows;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 206 | <ul style="list-style-type: none"><li>All dewatering and flow diversion must be conducted in a manner that prevents sedimentation;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 207 | <ul style="list-style-type: none"><li>Areas for refueling of machinery will be located well away from any watercourse or drainage ditch</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 208 | <ul style="list-style-type: none"><li>All construction debris and litter will be removed frequently. Stockpiles will not be permitted within the regulatory floodplain. All stockpiles will be removed upon completion of the works and the site restored, as appropriate</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 209 | <ul style="list-style-type: none"><li>Where instream works are taking place, flows shall be maintained and without excessive sedimentation or erosion. Flows may be diverted by piping or damming and pumping for short duration. In the event temporary channel bypass measures are required in areas known to contain fish species, all fish would be removed and transplanted upstream of construction activities prior to channel dewatering;</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 210 | <ul style="list-style-type: none"><li>An Environmental Inspector with a natural channel or biological background and construction experience should be employed for all instream works on permanent watercourses to ensure that mitigation and compensation measures are implemented as designed;</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 211 | <ul style="list-style-type: none"><li>See details in Section 6.1.2 for details of specific mitigation measures at individual fish habitat crossings.</li></ul>   | <ul style="list-style-type: none"><li>N/A</li></ul>   |
| 3.0   | <b>Vegetation, Wetlands, Areas of Natural and Scientific Interest (ANSI):</b> Vegetation protection and restoration. | MNRF<br>MTO<br>Property Owners | 301 | <ul style="list-style-type: none"><li>Leave vegetation on newly acquired right-of-way wherever possible to reduce loss of native vegetation;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 302 | <ul style="list-style-type: none"><li>Use a selective vegetation removal strategy to ensure that the disturbed area is only as large as required to complete the platform widening;</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |  |                                | 303 | <ul style="list-style-type: none"><li>Any trees that must be cut that are suitable for fish habitat compensation measures will be stockpiled and used for such works;</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |

| Summary of Environmental Concerns, Mitigation Measures and Future Commitments Outlined in the 2004 TESR (G.W.P. 30-95-00) |   |                    |     |  |   |
|---|---|--------------------|-----|--|---|
| ID #  | Environmental Element / Concern and Potential Impact  | Concerned Agencies | ID# | Transportation Environmental Study Report (2004) Details / Mitigation  | Commitment Addressed in Detail Design (Yes / No / N/A)  |
|   |   |                    | 304 | <ul style="list-style-type: none"><li>Individual trees of significant value (i.e. Black Walnut) shall be marked for retention wherever possible;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |   |                    | 305 | <ul style="list-style-type: none"><li>All exposed soils will be re-vegetated immediately following the completion of the required work and the final grade has been established. All seeded areas shall be inspected at 30, 60 and 90 days after seeding to ensure success of the seed mix and cover application as per Seeding and Cover Quality Assurance Visual Inspection Field Guide (MTO 1999);</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |   |                    | 306 | <ul style="list-style-type: none"><li>Stockpiled soils and other materials will be located outside of vegetated areas;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |   |                    | 307 | <ul style="list-style-type: none"><li>Those areas not successfully meeting the performance measures will be re-seeded and subject to a further 90-day inspection cycle;</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |   |                    | 308 | <ul style="list-style-type: none"><li>Plant native trees and shrubs where possible to contribute to slope stabilization, naturalize right-of-way and provide linkage between isolated vegetation communities;</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |   |                    | 309 | <ul style="list-style-type: none"><li>Plant replacement Black Walnut trees to compensate for those lost.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
| 4.0   | <b>Significant wetlands:</b> loss of flood storage and attenuation areas                            | MNRF<br>MTO        | 401 | <ul style="list-style-type: none"><li>A Stormwater Management and Drainage Plan will address impacts related to lost flood storage areas, changes in drainage and impacts to fill-regulated areas by implementing stormwater management practices (SWMP's) such as wet ponds, dry ponds, constructed wetlands and underground storage tanks; infiltration SWMP's such as infiltration basins, infiltration trenches, sand filters and porous, vegetative SWMP's such as buffer strips, grassed swales and filter strips.</li></ul> | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design.</li></ul> |
|   |   |                    | 402 | <ul style="list-style-type: none"><li>To minimize direct impacts to wetland areas, mitigation measures may include, but not be limited to barrier fencing at the toe of fill embankments, careful placement of fill to minimize disturbance beyond the fill footprint and use of sediment and erosion control measures (i.e. silt fencing, straw bale etc.).</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |   |                    | 403 | <ul style="list-style-type: none"><li>Additional investigations will be undertaken in consultation with the Ministry of Natural Resources during later design stages to identify specific wetland habitat values impacted by the recommended plan.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
| 5.0   | <b>Significant Wildlife:</b> Wildlife Linkage/Corridor  | MNRF/MTO           | 501 | <ul style="list-style-type: none"><li>Use selective vegetation removal strategies to ensure the disturbed area is only as large as required to complete the platform widening;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |   |                    | 502 | <ul style="list-style-type: none"><li>Planting native conifers within the right-of-way, where possible to provide linkages between isolated forested deer wintering areas.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
| 6.0   | <b>Erosion Control:</b> To minimize the potential for erosion of newly exposed cut and fill slopes. | MNRF/MTO           | 601 | <ul style="list-style-type: none"><li>Limit the time slopes are exposed prior to stabilization to 45 days from commencement of grading. Use erosion blankets on steeper slopes to enhance slope stability; and</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |   |                    | 602 | <ul style="list-style-type: none"><li>Employ sediment fences and check dams where appropriate.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |

| Summary of Environmental Concerns, Mitigation Measures and Future Commitments Outlined in the 2004 TESR (G.W.P. 30-95-00) |  |                     |      |  |  |
|---|--|---------------------|------|--|--|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies  | ID#  | Transportation Environmental Study Report (2004) Details / Mitigation  | Commitment Addressed in Detail Design (Yes / No / N/A)   |
| 7.0   | Stormwater Management                                | MTO/MNRF            | 701  | • Flat-bottomed grassed swales where design criteria can be met;   | • Yes, commitment to be confirmed during Detail Design   |
|   |  |                     | 702  | • Plunge pools be placed at the downstream ends of all culverts with watercourses that support warmwater fish habitat;   | • Yes, commitment to be confirmed during Detail Design   |
|   |  |                     | 703  | • Storm sewers outlet to the highway ditches, instead of within culverts, with plunge pools placed at all storm sewer outlets;   | • Yes, commitment to be confirmed during Detail Design   |
|   |  |                     | 704  | • Additional enhanced ditches along critical highway areas;  | • Yes, commitment to be confirmed during Detail Design   |
|   |  |                     | 705  | • Seven water quality control wet ponds/wetlands;  | • Yes, commitment to be confirmed during Detail Design   |
|   |  |                     | 706  | • Localized erosion control measure; and   | • Yes, commitment to be carried forward to Detail Design   |
|   |  |                     | 707  | • As the Highway 400 improvements and the City's Master Drainage Plans advance to later design and construction stages, MTO will work with the City of Barrie to provide assistance to the extent possible under MTO's mandate in achieving the City's objectives pertaining to spills between watersheds. Achieving these objectives may require upgrades to the MTO conveyance structures above and beyond those that are identified in this Drainage and Hydrology Report.  | • Yes, commitment to be carried forward to Detail Design   |
| 8.0   | Air Quality  | MTO                 | 801  | • Open burning will not be permitted; and  | • Yes, commitment to be carried forward to Detail Design   |
|   |  |                     | 802  | • Application of calcium chloride flakes and/or water to reduce dust.  | • Yes, commitment to be carried forward to Detail Design   |
| 9.0   | Aesthetics: Impacts to vegetative screening          | MTO/Property Owners | 901  | • Keeping vegetation removal to a minimum;   | • Yes, commitment to be carried forward to Detail Design   |
|   |  |                     | 902  | • Undertaking post-construction landscape planning and berming where possible/appropriate;   | • Yes, commitment to be carried forward to Detail Design   |
|   |  |                     | 903  | • There are legal agreements between the City of Barrie and owners of private properties within the study area that include provisions for landscaped areas or plantings on the private lands. With involvement from the City of Barrie, the Ministry is committed to providing/replacing landscaping where possible. The provision of landscaping will depend on the right-of-way width as the existing and proposed Highway 400 right-of-way widths vary. A landscaping plan will be developed during detail design. | • Where vegetation removals and/or impacts to private properties occur, landscaping will take place to return the land to the original condition or as agreed upon with the owner. |
| 10.0  | Agricultural   | MTO                 | 1001 | • Replace fences removed during construction.  | • Yes, commitment to be carried forward to Detail Design   |
|   |  |                     | 1002 | • For areas that are used on a temporary basis for construction, all reasonable attempts will be made to restore the lands to current conditions in consultation with the affected agricultural operator.  | • Yes, commitment to be carried forward to Detail Design   |
|   |  |                     | 1003 | • Property impacts will be addressed as identified in Section 6.2.4 (refer to ID # 1201)   | • Yes, commitment to be carried forward to Detail Design   |
| 11.0  | Noise - Construction related noise.                  | MTO                 | 1101 | • Maintenance of mufflers and other noise reduction devices on heavy equipment.  | • Yes, commitment to be carried forward to Detail Design   |

| Summary of Environmental Concerns, Mitigation Measures and Future Commitments Outlined in the 2004 TESR (G.W.P. 30-95-00) |  |                       |      |   |  |
|---|--|-----------------------|------|---|--|
| ID #  | Environmental Element / Concern and Potential Impact   | Concerned Agencies    | ID#  | Transportation Environmental Study Report (2004) Details / Mitigation   | Commitment Addressed in Detail Design (Yes / No / N/A)   |
|   |  |                       | 1102 | <ul style="list-style-type: none"><li>Enforce construction codes of practice and local municipal noise by-laws and codes to provide means of limiting excessively noisy operations and equipment. If required, noise by-law exemptions will be obtained prior to construction.</li></ul>  | <ul style="list-style-type: none"><li>A noise by-law exemption shall be obtained from the Town of Innisfil and the City of Barrie.</li></ul> |
|   |  |                       | 1103 | <ul style="list-style-type: none"><li>Specify hours of operation during construction.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
|   |  |                       | 1104 | <ul style="list-style-type: none"><li>Monitor complaints on construction noise and investigate.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
| 12.0  | Property Requirements  | MTO / Property owner  | 1201 | <ul style="list-style-type: none"><li>Compensation will be provided for residential, commercial and agricultural property impacts. For permanent property taking, compensation will be provided at fair market value, which is determined at the time of purchase by a property appraisal report forming the basis for negotiations. Other ancillary costs are negotiated on a case-by-case basis. Compensation will also be provided with respect to temporary property requirements. Upon completion of construction, temporary property will be returned to the owner. All reasonable attempts will be made to restore the land to its original condition.</li></ul> | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
| 13.0  | Out-of-Way Travel - Realignment of Reive Road and closure of Rose Street to northbound Highway 400 will result in increased travel for vehicles destined to Highway 400.   | MTO / Local Residents | 1301 | <ul style="list-style-type: none"><li>The Ministry will consider signage improvements in the Highway 400 corridor to address the change in access at a later design stage.</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
|   |  |                       | 1302 | <ul style="list-style-type: none"><li>Rose Street services on an O.P.P. station, which is proposed to be relocated in the future. Rose Street is an emergency detour route, however Grove Street is a nearby parallel alternative, which could be designated to maintain the continuity of the emergency services. MTO will continue to consult with emergency service providers at subsequent design stages.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
| 14.0  | Snow Drift - Areas with potential for snowdrift occur at: 800 metres north of Highway 89; 4 <sup>TH</sup> Line Road (Killarney Beach Road); South of Innisfil Beach Road; North of Innisfil Beach Road; and South of 4 <sup>TH</sup> Line. | MTO                   | 1401 | <ul style="list-style-type: none"><li>Such measures include berms, fencing and/or tree plantings placed at a sufficient distance from the Highway 400 lanes to allow drifting snow to accumulate. Snow drift will be further assessed during detail design based on current land uses. Off right-of-way areas may be required along the west side of the highway for snow drift mitigation and discussions with adjacent land owners in high snowdrift areas will be undertaken.</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
| 15.0  | Future Development   | MTO / Local Residents | 1501 | <ul style="list-style-type: none"><li>Opportunities to minimize potential property impacts associated with the realignment of Reive Road.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
|   |  |                       | 1502 | <ul style="list-style-type: none"><li>Opportunities to minimize potential impacts to the future development proposed for the northwest and southwest quadrants of the Innisfil Beach Road interchange;</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
|   |  |                       | 1503 | <ul style="list-style-type: none"><li>Opportunities to minimize potential impacts to future developments proposed for the southwest quadrant of the Duckworth Street interchange</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
|   |  |                       | 1504 | <ul style="list-style-type: none"><li>Opportunities to minimize potential impacts to the developable lands of the former horse racing track in the northeast quadrant of the Essa Road interchange will be reviewed during detail design in consultation with affected parties and the appropriate municipality.</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |
| 16.0  | Management of Excess Material  | MTO                   | 1601 | <ul style="list-style-type: none"><li>Disposal of excess material is controlled by a special provision in the contract.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                                       |

| Summary of Environmental Concerns, Mitigation Measures and Future Commitments Outlined in the 2004 TESR (G.W.P. 30-95-00) |  |                    |      |   |   |
|---|--|--------------------|------|---|---|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies | ID#  | Transportation Environmental Study Report (2004) Details / Mitigation   | Commitment Addressed in Detail Design (Yes / No / N/A)  |
| 17.0  | Property Waste and Contamination                     | MTO                | 1701 | <ul style="list-style-type: none"><li>Property-specific Phase 1 Environmental Site Assessments and limited Phase 2 Environmental Site Assessments will be undertaken as necessary for lands to be acquired in areas of potential for contamination;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |  |                    | 1702 | <ul style="list-style-type: none"><li>Any future design and construction work near the Trichloroethylene (TCE) contamination (groundwater plume) identified within the highway right-of-way in the vicinity of Tiffin Street, must take account of this issue. The extent and nature of the TCE impacted groundwater plume will be specifically investigated during detail design, to address health and safety and the potential generation of soil and groundwater waste; and</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |  |                    | 1703 | <ul style="list-style-type: none"><li>With respect to active farming operations, where farm properties are to be acquired that include the farm buildings (as opposed to fields), then the properties will be assessed on a case-by-case basis.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
| 18.0  | Heritage Resources                                   | MTO                | 1801 | <ul style="list-style-type: none"><li>Bridge assessment forms will be completed during detail design for the heritage bridges to be replaced;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |  |                    | 1802 | <ul style="list-style-type: none"><li>Underpasses will be photographically documented before demolition. A heritage documentation report will be prepared for the appropriate municipality and the Ministry of Culture (MCL);</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
|   |  |                    | 1803 | <ul style="list-style-type: none"><li>Retaining the Coat of Arms panels structure on the overpass structures for use on the new bridge; and</li></ul>   | <ul style="list-style-type: none"><li>N/A, determined to not be feasible on other structures</li></ul>  |
|   |  |                    | 1804 | <ul style="list-style-type: none"><li>A landscape plan will be developed during the detail design phase to minimize impacts.</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |
| 19.0  | Archaeological Resources                             | MTO                | 1901 | <ul style="list-style-type: none"><li>Prior to any construction activities, all lands currently under or formerly under agricultural production should be subjected to a Stage 2 archaeological assessment in accordance with the Stage 1-3 archaeological technical guidelines provided by the Ministry of Tourism, Culture and Recreation (MTCR). All land should be ploughed and allowed to weather through at least one significant rainfall, then pedestrian surveyed at 5 metres intervals to facilitate the recovery of archaeological material;</li></ul> | <ul style="list-style-type: none"><li>Archaeological assessments have been completed on all properties where permission to enter has been obtained for this project. All areas without permission to enter will have an archaeological assessment completed in Detail Design.</li></ul> |
|   |  |                    | 1902 | <ul style="list-style-type: none"><li>Woodlots or areas containing scrub brush should be test pitted at 5 metres intervals. All test pits must be excavated to sub-soil and the material screened through 6-metre mesh to facilitate the recovery of small artifacts;</li></ul>   | <ul style="list-style-type: none"><li>Archaeological assessments have been completed on all properties where permission to enter has been obtained for this project. All areas without permission to enter will have an archaeological assessment completed in Detail Design.</li></ul> |
|   |  |                    | 1903 | <ul style="list-style-type: none"><li>Should deeply buried archaeological remains be found on the property during construction activities, the Heritage Operations Unit of the Ministry of Tourism, Culture and Recreation (MTCR) should be notified immediately;</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>  |

| Summary of Environmental Concerns, Mitigation Measures and Future Commitments Outlined in the 2004 TESR (G.W.P. 30-95-00) |  |                    |      |   |   |
|---|--|--------------------|------|---|---|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies | ID#  | Transportation Environmental Study Report (2004) Details / Mitigation   | Commitment Addressed in Detail Design (Yes / No / N/A)  |
|   |  |                    | 1904 | <ul style="list-style-type: none"><li>In the event that human remains are encountered during construction, the proponent should immediately contact both MTCR and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ministry of Consumer and Commercial Relations (416) 326-8392; and</li></ul>  | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                      |
|   |  |                    | 1905 | <ul style="list-style-type: none"><li>If additional lands beyond the proposed right-of-way are required for the construction of temporary facilities (staging areas, storage areas, access roads etc), these areas will be subject to archaeological assessment during detail design.</li></ul>   | <ul style="list-style-type: none"><li>Yes, commitment to be carried forward to Detail Design</li></ul>                      |
| 20.0  | Commuter Parking Lots                                | MTO                | 2001 | <ul style="list-style-type: none"><li>The Ministry of Transportation will continue to work with landowners as much as possible to identify and implement commuter parking lot locations along the entire corridor, which can be implemented with as little impact/disruption as possible, while meeting capacity and operational requirements. Specific locations to be investigated include the Highway 89 and Essa Road interchanges.</li></ul> | <ul style="list-style-type: none"><li>These commuter parking lots were constructed before this 2017 update study.</li></ul> |

Table 19: Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR Addendum to be confirmed during Detail Design

| Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR Addendum to be Confirmed during Detail Design |  |                                 |      |   |
|---|--|---------------------------------|------|---|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies              | ID#  | Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design  |
| Natural Environment   |  |                                 |      |   |
| 1.0   | Fish and Fish Habitat                                | MTO / MNRF / DFO / NVCA / LSRCA | 1.01 | <ul style="list-style-type: none"><li>A comprehensive erosion and sediment control plan will be completed during detail design;</li></ul>   |
|   |  |                                 | 1.02 | <ul style="list-style-type: none"><li>Any fish stranded within the work area will be captured and relocated;</li></ul>  |
|   |  |                                 | 1.03 | <ul style="list-style-type: none"><li>Temporary bypass or dam and pump system;</li></ul>  |
|   |  |                                 | 1.04 | <ul style="list-style-type: none"><li>Treatment of dewatering area;</li></ul>   |
|   |  |                                 | 1.05 | <ul style="list-style-type: none"><li>Access to the streams banks will be limited;</li></ul>  |
|   |  |                                 | 1.06 | <ul style="list-style-type: none"><li>Applicable in-water work restrictions for all watercourses</li></ul>  |
|   |  |                                 | 1.07 | <ul style="list-style-type: none"><li>An isolation plan will be implemented during construction;</li></ul>  |
|   |  |                                 | 1.08 | <ul style="list-style-type: none"><li>Fish will be removed from any isolated work area;</li></ul>   |
|   |  |                                 | 1.09 | <ul style="list-style-type: none"><li>Screens will be used on intake pumps;</li></ul>   |
|   |  |                                 | 1.10 | <ul style="list-style-type: none"><li>Vehicle and equipment refuelling away from watercourse;</li></ul>   |
|   |  |                                 | 1.11 | <ul style="list-style-type: none"><li>A spill containment plan and equipment on site;</li></ul>   |
|   |  |                                 | 1.12 | <ul style="list-style-type: none"><li>Low flow channels may be required on some box culverts;</li></ul>   |
|   |  |                                 | 1.13 | <ul style="list-style-type: none"><li>Potential impacts may not be able to be avoided in some instances, however, during detail design there is potential to reduce impacts through the recommended mitigation measures listed above. The potential impacts and recommended mitigation measures shall be confirmed during detail design in consultation with MNRF and DFO once the exact extent of potential impacts is determined and details are finalized;</li></ul> |
|   |  |                                 | 1.14 | <ul style="list-style-type: none"><li>Opportunities to improve fish habitat and fish passage shall be considered at crossings where the culverts require replacement;</li></ul>   |
| 2.0   | Terrestrial Ecosystems                               | MTO / MNRF /                    | 2.01 | <ul style="list-style-type: none"><li>Right-of-way (ROW) clearing shall be minimized wherever possible. Any additional property holdings or Excess Material Management Areas that are adjacent to forest or wetland areas should be rehabilitated to forested vegetation communities to further reduce impacts;</li></ul>   |

| Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR Addendum to be Confirmed during Detail Design |  |                      |      |   |
|---|--|----------------------|------|---|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies   | ID#  | Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design  |
|   |  | MOECC                | 2.02 | <ul style="list-style-type: none"><li>There are no opportunities to create additional wetland areas other than typical stormwater retention areas. Opportunities to reduce the required ROW for the Highway 400 improvements within PSW areas will be investigated during detail design to reduce the overall impact to PSWs;</li></ul>   |
|   |  |                      | 2.03 | <ul style="list-style-type: none"><li>There is an opportunity to create a wildlife passage at the Stratum 1, core deer wintering area at Lover’s Creek Swamp PSW, either as an oversized culvert at the Culvert 62 location or as a separate dedicated wildlife passage culvert. This would allow for seasonal movements from various habitat types on either side of the highway corridor and should be sized appropriately to accommodate white-tailed deer as the largest species to use the culvert. Grade raises of the platform may be required to accommodate a larger culvert at this location, which will be investigated during detail design. A functional wildlife passage must also incorporate exclusion fencing to guide wildlife to the passage system. The fencing would likely span from 10th Line northerly for about 1500m to Salem Road on both sides of the highway to be functional. The details including the limits of wildlife fencing will be determined during detail design;</li></ul> |
|   |  |                      | 2.04 | <ul style="list-style-type: none"><li>Other wildlife corridors were also identified within the study area and may also benefit from a properly constructed wildlife passage culvert and exclusion fencing system. Candidate locations to be investigated during detail design include the vicinity of Culvert 49 (at 3rd Line) in the naturally wooded corridor. Ungulate exclusion fencing would be required to extend at least 500m north and south of the proposed crossing location to include appropriate wooded habitats. Another wildlife corridor was identified in the vicinity of Culvert 57 about 1km south of Innisfil Beach Road. The same requirements for fencing would apply to this location as well;</li></ul>  |
|   |  |                      | 2.05 | <ul style="list-style-type: none"><li>All vegetation clearing and grubbing activities shall take place outside of the breeding bird window (April 1 to August 31 of any year). This will address the concern of construction-related activities will comply with the Migratory Birds Convention Act (1994);</li></ul>   |
|   |  |                      | 2.06 | <ul style="list-style-type: none"><li>Vegetation removals associated with construction related activities shall be minimized, and where required Environmentally Sensitive Areas shall be established to restrict access to sensitive areas during construction;</li></ul>  |
|   |  |                      | 2.07 | <ul style="list-style-type: none"><li>Stockpiling of materials shall be kept away from adjacent natural features;</li></ul>   |
|   |  |                      | 2.08 | <ul style="list-style-type: none"><li>Stormwater discharge during construction shall be directed away from adjacent natural areas;</li></ul>  |
|   |  |                      | 2.09 | <ul style="list-style-type: none"><li>Erosion and sediment control plans shall be developed and implemented by the Contractor;</li></ul>  |
|   |  |                      | 2.10 | <ul style="list-style-type: none"><li>In general, OPSS 805 will provide guidance for erosion and sediment control;</li></ul>  |
| 3.0   | Species at Risk (SAR)                                | MTO / MNRF           | 3.01 | <ul style="list-style-type: none"><li>Once design details are confirmed, more targeted surveys shall be performed in potential habitat for SAR with potential for the study area to confirm potential impacts to SAR. Targeted SAR screening for Barn Swallow, Bobolink and Eastern Meadowlark shall be undertaken during detail design to confirm whether avian SAR habitat will be impacted by the proposed works;</li></ul>  |
|   |  |                      | 3.02 | <ul style="list-style-type: none"><li>If impacts cannot be avoided through design, appropriate mitigation measures shall be developed as required in accordance with the most up to date legislation at that time, including any applicable approvals under the Endangered Species Act;</li></ul>   |
| 4.0   | Hydrogeology and                                     | MTO / MOECC / NVCA / | 4.01 | <ul style="list-style-type: none"><li>A Pre-condition Water Well Survey shall be undertaken prior to construction to document the baseline conditions of water wells within the study area to ensure wells are not impacted by construction;</li></ul>  |

| Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR Addendum to be Confirmed during Detail Design |  |                                  |      |   |
|---|--|----------------------------------|------|---|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies               | ID#  | Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design  |
|   | Groundwater  | LSRCA                            | 4.02 | <ul style="list-style-type: none"><li>During detail design, further geotechnical investigations will be undertaken to understand the potential for groundwater interaction in high aquifer vulnerability areas relative to the earthworks necessary to implement the proposed Highway 400 improvements. Opportunities to minimize deep excavations in high aquifer vulnerability areas will be examined at that time;</li></ul> |
|   |  |                                  | 4.03 | <ul style="list-style-type: none"><li>Should surface water and groundwater dewatering be anticipated to exceed the maximum MOECC daily allowance during construction a Permit to Take Water (PTTW) and/or Environmental Activity and Sector Registry (EASR) may be required;</li></ul>  |
|   |  |                                  | 4.04 | <ul style="list-style-type: none"><li>No storage, maintenance or refuelling of equipment shall be permitted near any sensitive features;</li></ul>  |
|   |  |                                  | 4.05 | <ul style="list-style-type: none"><li>An emergency spill kit shall be available on site in case of fluid leaks or spills from machinery;</li></ul>  |
|   |  |                                  | 4.06 | <ul style="list-style-type: none"><li>Prepare and implement a spill prevention and control management plan;</li></ul>   |
|   |  |                                  | 4.07 | <ul style="list-style-type: none"><li>Appropriate notification shall be carried out (i.e. MOECC, MNRF) should any “spills” occur;</li></ul>   |
| 5.0   | Stormwater Management                                | MTO / NVCA / LSRCA / MOECC / MUN | 5.01 | <ul style="list-style-type: none"><li>All culverts will require extensions to accommodate the proposed highway widening;</li></ul>  |
|   |  |                                  | 5.02 | <ul style="list-style-type: none"><li>Twenty-four (24) culverts are also recommended for replacement (C43, C44, C46, C49, C51, C56, C60, C62, C64, C65, C66, C68, C71, C72, C73, C74, C75, C76, C79, C80, C82, C83, C84, C85);</li></ul>  |
|   |  |                                  | 5.03 | <ul style="list-style-type: none"><li>Six (6) stormwater management wet ponds and fourteen (14) stormwater management dry detention facilities are proposed;</li></ul>  |
|   |  |                                  | 5.04 | <ul style="list-style-type: none"><li>Further consultation shall be undertaken with the City of Barrie, the Town of Innisfil, NVCA and LSRCA during further stages of design regarding stormwater management.</li></ul>   |
| Socio-Economic Environment  |  |                                  |      |   |
| 6.0   | Land Use   | MTO / MUN                        | 6.01 | <ul style="list-style-type: none"><li>Opportunities to minimize impacts will be investigated during detail design and consultation will be undertaken with agricultural operations, institutions and local businesses to minimize impacts to their operations as much as possible;</li></ul>  |
| 7.0   | Property   | MTO / MUN / Property Owners      | 7.01 | <ul style="list-style-type: none"><li>Safe access to the commercial and private entrances shall be maintained at all times during construction. If there are impacts to signs, vegetation, landscaping or driveways of any of the commercial, private or municipal properties, the area of impact must be returned to the conditions of the land prior to construction or better;</li></ul>                                     |
| 8.0   | Noise  | MTO / MOECC / MUN / Property     | 8.01 | <ul style="list-style-type: none"><li>The height, length, and exact location of all noise walls will be determined during future design stages;</li></ul>   |
|   |  |                                  | 8.02 | <ul style="list-style-type: none"><li>Best management practices for construction noise mitigation shall be employed including the following:</li></ul>  |

| Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR Addendum to be Confirmed during Detail Design |  |                    |      |  |
|---|--|--------------------|------|--|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies | ID#  | Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design   |
|   |  | Owners             | 8.03 | <ul style="list-style-type: none"><li>Time Periods and Duration: Noisy equipment shall only be operated when necessary and switched off when not in use to minimize noise impacts;</li></ul>   |
|   |  |                    | 8.04 | <ul style="list-style-type: none"><li>Storage Areas: Storage areas shall be designated in locations removed from sensitive receivers. Where this is not possible, the storage of earth and other supplies may potentially be positioned to function as a noise barrier;</li></ul>  |
|   |  |                    | 8.05 | <ul style="list-style-type: none"><li>Concurrent Operations: Noisy operations shall be scheduled concurrently to take advantage of the fact that the combined noise levels produced may not be significantly greater than the level produced if the operations were performed separately;</li></ul>  |
|   |  |                    | 8.06 | <ul style="list-style-type: none"><li>Alternative Construction Methods: Alternatives to standard construction techniques may also be available and determined to be more practical and/or cost-effective in dealing with construction noise impacts and perceptions. Examples associated with several operations are discussed below;</li></ul>  |
|   |  |                    | 8.07 | <ul style="list-style-type: none"><li>Compressors: While most compressors are powered by diesel or gasoline engines, many are contained or have baffles to help abate noise levels. Electric compressors are significantly quieter than diesel or gasoline engine powered compressors;</li></ul>   |
|   |  |                    | 8.08 | <ul style="list-style-type: none"><li>Less Noisy Equipment: Less noisy equipment shall be used wherever feasible;</li></ul>  |
|   |  |                    | 8.09 | <ul style="list-style-type: none"><li>During Detail Design, when construction activities and processes are better defined, potential noise impact issues shall be revisited and a Construction Noise Mitigation Report shall be prepared. The plan shall include a more accurate assessment of construction noise impacts, and identify construction noise impact criteria levels, mitigation elements and monitoring activities. The plan shall also establish an appropriate construction noise complaint process by which the public can register complaints triggered by unacceptably loud or objectionable construction activity;</li></ul> |
| 9.0   | Air Quality  | MTO / MOECC        | 8.10 | <ul style="list-style-type: none"><li>A Noise Bylaw Exemption shall be obtained from the Town of Innisfil and the City of Barrie prior to construction where required;</li></ul>   |
|   |  |                    | 9.01 | <ul style="list-style-type: none"><li>During construction it is proposed that the best management practices include the following:</li></ul>   |
|   |  |                    | 9.02 | <ul style="list-style-type: none"><li>Use of reformulated fuels, emulsified fuels, exhaust catalyst and filtration technologies, cleaner engine repowers, and new alternative-fuelled trucks to reduce emissions from construction equipment;</li></ul>  |
|   |  |                    | 9.03 | <ul style="list-style-type: none"><li>Regular cleaning of construction sites and access roads to remove construction-caused debris and dust;</li></ul>   |
|   |  |                    | 9.04 | <ul style="list-style-type: none"><li>Dust suppression on unpaved haul roads and other traffic areas susceptible to dust, subject to the area being free of sensitive plant, water or other ecosystems that may be affected by dust suppression chemicals;</li></ul>   |
|   |  |                    | 9.05 | <ul style="list-style-type: none"><li>Covered loads when hauling fine-grained materials;</li></ul>   |
|   |  |                    | 9.06 | <ul style="list-style-type: none"><li>Prompt cleaning of paved streets / roads where tracking of soil, mud or dust has occurred;</li></ul>   |

| Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR Addendum to be Confirmed during Detail Design |  |                    |       |   |
|---|--|--------------------|-------|---|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies | ID#   | Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design  |
|   |  |                    | 9.07  | <ul style="list-style-type: none"><li>Tire washes and other methods to prevent trucks and other vehicles from tracking soil, mud or dust onto paved streets or roads;</li></ul>   |
|   |  |                    | 9.08  | <ul style="list-style-type: none"><li>Covered stockpiles of soil, sand and aggregate as necessary;</li></ul>  |
|   |  |                    | 9.09  | <ul style="list-style-type: none"><li>Compliance with posted speed limits and, as appropriate, further reductions in speeds when travelling sites on unpaved surfaces;</li></ul>  |
| 10.0  | Landscape Composition                                | MTO / MUN          | 10.01 | <ul style="list-style-type: none"><li>A detailed Landscape Plan will be developed during further design stages and shall incorporate the recommendations outlined in the <i>Landscape Opportunities Plan (Appendix F)</i> and in the <i>Highway Snow Drifting Consultation</i> (RWDI, June 2016);</li></ul>   |
| 11.0  | Snow Drift   | MTO /MUN           | 11.01 | <ul style="list-style-type: none"><li>The implementation of potential mitigation measures, as recommended in the <i>Highway Snow Drifting Consultation</i> (RWDI, June 2016) will be confirmed during detail design;</li></ul>  |
| 12.0  | Waste & Contamination                                | MTO / MOECC        | 12.01 | <ul style="list-style-type: none"><li>Excess material will require proper management (removal, storage and disposal). Materials shall be managed in accordance with the <i>Ontario Provincial Standard Specification (OPSS) 180 – General Specification for the Management of Excess Materials</i>;</li></ul>   |
|   |  |                    | 12.02 | <ul style="list-style-type: none"><li>A Designated Substance Survey shall be undertaken during Detail Design to confirm the presence of designated substances of all structures that will be rehabilitated or replaced;</li></ul>   |
|   |  |                    | 12.03 | <ul style="list-style-type: none"><li>Preliminary Site Screenings (available under separate cover) have been undertaken on various properties throughout the study area. During Detail Design all additional site assessments and recommendations made in the PSSs shall be undertaken and additional PSSs shall be undertaken on any outstanding properties;</li></ul>   |
|   |  |                    | 12.04 | <ul style="list-style-type: none"><li>All potential impacts and recommended mitigation measures shall be confirmed during detail design once design details are better known;</li></ul>   |
| Cultural Environment  |  |                    |       |   |
| 13.0  | Archaeology  | MTO / MTCS         | 13.01 | <ul style="list-style-type: none"><li>If permission to enter on the remaining properties, as indicated in the <i>Stage 2 Archaeological Assessment Report</i> (AECOM, February 2017) is obtained in the future, or once the properties are acquired by MTO, these properties must be subject to a Stage 2 archaeological assessment as per the <i>Standards and Guidelines for Consultant Archaeologists</i> (MTCS, 2011). The Contractor shall comply with all recommendations outlined in the <i>Stage 2 Archaeological Assessment</i> (AECOM, February 2017), once final, and any further assessments (i.e. Stage 3 and/or Stage 4 Archaeological Assessments) completed during Detail Design;</li></ul> |
|   |  |                    | 13.02 | <ul style="list-style-type: none"><li>During construction there is the possibility of encountering deeply buried archaeological material. In the event the following situations are encountered during construction, the Contractor shall stop work immediately and undertake the actions as described below:</li></ul>   |

| Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR Addendum to be Confirmed during Detail Design |  |  |       |  |
|---|--|--|-------|--|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies                                     | ID#   | Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design   |
|   |  |  | 13.03 | <ul style="list-style-type: none"><li>Should previously undocumented archaeological resources be discovered, there may be a new archaeological site which would be subject to Section 48 (1) of the <i>Ontario Heritage Act</i>. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licenced consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the <i>Ontario Heritage Act</i>. The Heritage Operations Unit of the Ministry of Tourism, Culture and Sport must be notified immediately;</li></ul>   |
|   |  |  | 13.04 | <ul style="list-style-type: none"><li>The <i>Cemeteries Act, R.S.O. 1990, c.C 4</i> and the <i>Funeral, Burial and Cremation Services Act, 2002, S.O. 20002, c33</i> (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services;</li></ul>  |
|   |  |  | 13.05 | <ul style="list-style-type: none"><li>Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the <i>Ontario Heritage Act</i> and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence;</li></ul>   |
| 14.0  | Built Heritage                                       | MTO / MTCS   | 14.01 | <ul style="list-style-type: none"><li>The following heritage treatments are proposed for the replacement of the heritage structures along the corridor:<ul style="list-style-type: none"><li>Inclusion of the Ontario Coat of Arms on the abutments (where the existing bridge includes the Ontario Coat of Arms);</li><li>Decorative railing;</li><li>Curved soffit; and,</li><li>Landscaping treatments as outlined in <b>Section 6.2.5</b> and the <i>Landscape Opportunities Plan</i> in <b>Appendix F</b>;</li></ul></li></ul>  |
| Transportation  |  |  |       |  |
| 15.0  | Community Access & Out of Way Travel                 | MTO / MUN/ Infrastructure Ontario / Emergency Services | 15.01 | <ul style="list-style-type: none"><li>Details regarding traffic management and community access shall be determined during detail design. Further consultation with the municipalities, emergency services, the agricultural community and the property owners adjacent to the interchange shall be undertaken with regards to potential out-of-way travel and temporary closures as required during construction.;</li></ul>  |
|   |  |  | 15.02 | <ul style="list-style-type: none"><li>As part of the improvements to the Highway 400 / Bayfield Street interchange and as outlined in the 2004 TESR, Rose Street will be closed and a cul-de-sac will be provided to remove direct access from Rose Street onto the Highway 400 northbound on-ramp to improve safety at the interchange. As Rose Street currently provides access to Highway 400 from the Ontario Provincial Police (OPP) Station in the northeast quadrant of Highway 400 and Bayfield Street, further discussions will take place with the OPP and Infrastructure Ontario concerning the provision of a direct on-ramp to Highway 400 from the station that would not be open for public access;</li></ul> |
| 16.0  | Utilities  | MTO / MUN / Utilities                                  | 16.01 | <ul style="list-style-type: none"><li>There are potential utility conflicts with Bell Canada, Barrie Hydro, Innisfil Hydro, Hydro One, Town of Innisfil (water), City of Barrie (water), County of Simcoe Area Network, Rogers Cable, and Enbridge Consumers Gas throughout the study area. The relocation of all utility conflicts shall be undertaken prior to construction;</li></ul>   |

| Summary of Environmental Concerns, Mitigation Measures and Commitments from this TESR Addendum to be Confirmed during Detail Design |  |                    |       |  |
|---|--|--------------------|-------|--|
| ID #  | Environmental Element / Concern and Potential Impact | Concerned Agencies | ID#   | Mitigation, Protection, Monitoring, and Study Commitments to be carried forward to Detail Design   |
| Minister's Decision Letter  |  |                    |       |  |
| 17.0  | Minister's Decision Letter                           | MTO / MOECC        | 17.01 | <ul style="list-style-type: none"><li>During the Project's detail design stage and prior to the commencement of construction, MTO shall pre-consult with the Ministry of the Environment's Southwestern Region Office prior to the completion of the stormwater management plan(s), in order to identify issues of concern and to establish a procedural and analytic framework for completion of the stormwater management plan(s);</li></ul> |
|   |  |                    | 17.02 | <ul style="list-style-type: none"><li>The final stormwater management plan(s) shall be submitted to the Air, Pesticides, and Environmental Planning (APEP) Supervisor of the Ministry of the Environment's Southwestern Region Office, with a cover letter referencing the name of the Project and indicating that the plan is being submitted in accordance with this condition;</li></ul>  |
|   |  |                    | 17.03 | <ul style="list-style-type: none"><li>Upon completion of the above conditions (ID 17.01 and 17.02), MTO shall submit a written statement to the Director, Environmental Assessment and Approvals Branch, Ministry of the Environment, indicating when and how the above noted conditions have been fulfilled;</li></ul>  |

## 7. Application of the Class EA Principles and Process

The Class EA and preliminary design update for the *Highway 400 Improvements from 1km South of Highway 89 to the Junction of Highway 11* followed the study principles and process set forth in the *Class EA for Provincial Transportation Facilities*. This TESR Addendum and the 2004 TESR (G.W.P. 30-95-00) under separate cover, outline how the transportation, environmental, consultation, environmental, documentation, bump-up, and environmental clearance principles were met through the study process undertaken for this project.

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

## **Appendix A - Changes to the Approved Plan outlined in the 2004 TESR (G.W.P. 30-95-00)**

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

## **Appendix B - Environmental Assessment Conditions of Approval Letter**

## **Appendix C - Highway 400 Widening and Interchange Evaluation Summary Tables**

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

## **Appendix D - Relevant Correspondence**

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

## **Appendix E - Copies of PIC Displays**

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

## **Appendix F - Landscape Opportunities Plan**

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

## **Appendix G - List of Reports Available under Separate Cover**

Highway 400 Improvements from 1 km South of Highway  
89 to the Junction of Highway 11

**List of Reports Available under Separate Cover**

AECOM (July 2017) *Draft Drainage and Hydrology Report*: Highway 400 Improvements from 1km South of Highway 89 to the Junction at Highway 11

AECOM (December 2016) *Noise Study Report*: Highway 400 Improvements from 1km South of Highway 89 to the Junction at Highway 11

AECOM (February 2015) *Preliminary Hydrogeological Assessment*: Highway 400 Improvements Highway 89 to Highway 11.

AECOM (February 2017) *Stage 2 Archaeological Assessment Report*: Highway 400 Improvements from 1km South of Highway 89 to the Junction of Highway 11.

FRi Ecological Services (February 2015) *Existing Environmental Conditions Report*: Highway 400 from 1km South of Highway 89 to the Junction of Highway 11.

FRi Ecological Services (February 2017) *Natural Heritage Impact Assessment Report*: Highway 400 from 1km South of Highway 89 to the Junction of Highway 11.

RWDI (August 2016) *Air Quality Assessment*: Highway 400 Improvements Highway 89 to Highway 11.

RWDI (June 2016) *Highway Snow Drifting Consultation*: Highway 400 Improvements from 1km South of Highway 89 to the Junction at Highway 11.

URS (February 2015) *Contamination Overview Study*: Highway 400 Improvements from 1km South of Highway 89 to the Junction at Highway 11.

URS (February 2015) *Overview of Existing and Planned Land Use Report*: Highway 400 Improvements from 1km South of Highway 89 to the Junction at Highway 11.

