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1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The Corporation of the City of Barrie is undertaking this Study that is consistent with the Municipal Class Environmental Assessment (Class EA) process to identify and assess the required transportation improvements to Harvie Road and Big Bay Point Road in the area of Highway 400.

The study consisting of Phases 1 and 2 of the EA process was completed in June 2005.

MH was retained to reassess Phase 2 of the Class EA process with respect to the Harvie Road and Big Bay Point Road crossing. MH completed the Phase 1 & 2 Environmental Study Report in January 2012. Refer to the Phase 1 & 2 Environmental Study Report for further information. The report is available on the City of Barrie web page (www.barrie.ca).

This Phase 3 and 4 Environmental Study Report was built on the Phase 1 and 2 Environmental Study Report and reviews the study background, existing and future conditions within the study area, existing and future projected conditions within the study area, existing and future traffic data and the alternatives solutions. In addition, the ESR reviews and presents the results from Public Information Centre (PIC) #2, the final preferred design and recommendations for construction.

1.2 Project Scope

The overall objective of this report is to document the planning process for the proposed transportation improvements in the study area. The objectives of this report are as follows:

- Identify the problem or opportunity;
- Identify alternative planning solutions to the problem or opportunity;
- Perform an inventory of the physical, social / cultural, natural, and economic environment;
- Identify impacts of the alternative solutions on the environment and provide mitigating measures;
- Evaluate alternative solutions and identify recommended solutions;
- Consult the reviewing agencies and the public regarding the problem or opportunity and alternative solutions;
- Identify design alternatives;
- Obtain public input and comments;
- Prepare preliminary project costs and property requirements and identify appropriate mitigating measures;
- Liaise with other jurisdictions affected by this undertaking; and
- Prepare and file an Environmental Study Report (ESR).

1.3 The Municipal Class Environmental Assessment (Class EA)

The Environmental Assessment Act of Ontario (EAA) provides for the protection, conservation, and wise management in Ontario of the environment. The EAA applies to municipalities and to activities including municipal road projects. Activities with common characteristics and common potential effects may be assessed as part of a “class”, and are therefore approved subject to compliance with the approved Class Environmental Assessment (EA) process.
This process provides a rational planning approach to consider the environmental and technical advantages and disadvantages of alternatives and their trade-offs to arrive at a preferred alternative for addressing the problem (or opportunity). The Municipal Class EA is an approved planning document that describes the process that must be followed to meet the requirements of the Ontario EA Act. Providing the Class EA planning process is followed, a proponent does not have to apply for formal approval under the EA Act.

The Class EA process places emphasis on both project assessment and on public and agency involvement and consultation, and encourages stakeholder participation throughout the process to resolve all project related issues and concerns. If concerns are raised that cannot be resolved through discussion with the Region, a “Part II Order” request may be submitted to the Minister of the Environment.

Municipal infrastructure projects are classified in the Class EA in terms of one of the following schedules:

Schedule ‘A’ Projects that are limited in scale have minimal adverse environmental effects and include the majority of municipal road maintenance, operation, and emergency activities. These projects are pre-approved and therefore, a municipality can proceed without further approval under the EA Act.

Schedule ‘A+’ Projects that have the potential for local environmental impacts and generally includes the rehabilitation of existing facilities. These projects are pre-approved but require notifying the affected public.

Schedule ‘B’ Projects that have the potential for some adverse environmental effects. These projects are approved subject to a screening process, which includes directly contacting affected public and relevant review agencies.

Schedule ‘C’ Projects that have the potential for significant environmental effects that must proceed under the planning and documentation procedures outlined in the Municipal Class EA document.

This project is being completed as a Schedule “C” project. The preparation of an Environmental Study Report (ESR) is required for Schedule ‘C’ projects. This ESR is filed for a minimum 30 day public review period.

The Municipal Class EA process is shown in Figure 1-1 and includes the following basic phases for a Class “C” project. Figure 1-1 is from the Municipal Class Environmental Assessment manual written by the Municipal Engineers Association in June 2000, as amended in 2007 & 2011.

MH completed the Phase 1 & 2 Environmental Study Report in January 2012. Refer to the Phase 1 & 2 Environmental Study Report for further information on the City of Barrie web page (www.barrie.ca). This study only covers Phase 3 and 4.
We are here
1.4 Study Area

The study area includes the Essa Road interchange, the proposed Harvie / Big Bay / 400 Crossing interchange, and the Mapleview Drive interchange (refer to Figure 1-2).

Figure 1-2 - Study Area Limits

1.5 Project Background

The MTO has completed a Planning and Preliminary Design Study and recommended transportation improvements to address traffic operation, capacity, and safety needs associated with the Highway 400 corridor through Barrie. The 2004 Highway 400 TESR and 2005 PDR called for eight lanes but protection for ten lanes at Harvie and Big Bay Point Road. MTO is currently updating this study.

The City of Barrie undertook the Highway 400 Crossing Roads Class Environmental Assessment consistent with the Municipal Class Environmental Assessment (Class EA) process to identify and assess required improvements to the eleven road corridors within the City that
cross Highway 400. The study consisting of Phases 1 and 2 of the EA process was completed in June 2005. As per Motion 05-G-343, a crossing between Harvie Road and Big Bay Point Road consisting of 6 through lanes and 1 turning lane for a total of 7 lanes was identified in the EA as a recommended improvement.

The Bryne Drive MP, only Phase 1 and 2 of the Bryne Drive MP was completed in December 2005, identified the potential for an interchange in the study area and noted that the proposed interchange will affect the proposed alignment of Bryne Drive. The update to the Bryne Drive MP is currently on hold. The preferred alternative, approved by Council by Motion 06-G-005 in December 2005, is a five lane roadway.

In 2006, the Harvie Road/Big Bay Point Road Feasibility Interchange Study was conducted by TSH (now Aecom) with input from the City of Barrie and The Ministry of Transportation (MTO) to review the feasibility of providing a new interchange on Highway 400 at the Harvie Road/Big Bay Point Road crossing. This report was never finalized but the draft report suggested that a new interchange on Highway 400 was feasible and examined several different interchange configurations.

A Class EA has been completed for Harvie Road between Bryne Drive and Essa Road and the preferred design alternative, approved by Council by Motion 02-G-534, is a four lane roadway.

A Class EA has been completed for Whiskey Creek in October 2009. The preferred alternative calls for regional storm conveyance under Highway 400, Bryne Drive and Harvie Road and was approved by Council by Motion 09-G-418.

MH was retained to reassess Phase 2 of the Class EA process with respect to the Harvie Road and Big Bay Point Road crossing. MH completed the Phase 1 & 2 Environmental Study Report in January 2012. Both the macro and micro modelling was done as part of this study. The City of Barrie in consultation with Morrison Hershfield retained the firm of Delcan to use the 2031 traffic demands from the City’s macro model (in Emme 3) and the Aimsun software to develop the scenarios for the year 2031, which included future transportation improvements identified in the City of Barrie 1999 Transportation Master Plan.

In December 2013, The City of Barrie approved the Multi-Modal Active Transportation Master Plan (MMATMP) which serves as the City’s roadmap in developing a well-balanced transportation network to serve its future needs and development. A new highway crossing at Harvie Road / Big Bay Point Road was recommended as a high priority for implementation. In addition, the TMP recommends a new Highway 400 interchange at Big Bay Point Road. The needs/justification and property requirements for a potential interchange will be established/refined through a future Class EA study. The micro modeling completed as part of Phase 1 and 2 report by Delcan was updated by WSP as part of the MMATMP. WSP is currently updating the micro model.

In 2015, the City of Barrie has completed Phases 3 and 4 of a Class EA for Harvie Road / Big Bay Point Road / Highway 400 as part of a larger EA. This study identified three Alternative Design concepts for the proposed Harvie Road/ Big Bay Point Road / Highway 400 crossing to address the preferred solution from Phase 1 & 2 of the Class EA. In addition, a conceptual Partial Parclo A interchange was also developed to identify preliminary general property requirements to protect for a potential future interchange, subject to further studies. Morrison Hershfield completed the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report as part of the Phases 3 and 4 EA. This study examined three
design alternatives for the potential interchange at Harvie Road/Big Bay Point Road at Highway 400, and reviewed the Traffic Operations that addresses existing and future deficiencies and the effect of each design alternative on the operations of Highway 400 mainline lanes, interchange ramps and speed change lanes as well as other intersections within the study area. MTO has not endorsed the conclusions of the traffic report at this time.

1.6 Problem or Opportunity

The City of Barrie has developed into its present form through population growth and annexation. The City has grown from the City Centre and north shore of Kempenfelt Bay southerly, around the west side of the bay encompassing Allandale, Painswick and more recently, the area between Essa Road and Mapleview Drive along Highway 400.

The impetus for this study is to meet the existing and future travel demand in the growing residential, industrial and commercial areas in the south end of Barrie between Mapleview Drive and Essa Road. The City recognizes that to meet the transportation needs associated with existing and future growth, improvements to the transportation infrastructure are necessary.

1.7 Issues to be Addressed

The City of Barrie currently has two major highway 400 interchanges in the south end of Barrie namely Mapleview Drive and Essa Road. Both Mapleview Drive and Essa Road are currently experiencing delays during the peak hours, particularly in the area of Highway 400 ramp terminals. As developments expand and traffic volumes increase delays on Mapleview Drive and Essa Road will continue to increase and eventually may affect the mainline operation of Highway 400.

The alignments of the on-ramps of a potential new interchange at Harvie & Big Bay Point Road may constitute weaving conflict for the existing MTO Service Centre north of the proposed interchange. This conflict will be of prime concern in the study with respect to safe operations of proposed highway interchange alternative. Lastly, the potential conflicts to and from the Mapleview Drive interchange should also be examined.

On the west side of Highway 400 there is an existing on-line pond on Whiskey Creek, also known as Pond A, which provides quantity and Level 2 quality control, for storm events up to, and including, the 100-year. Any loss of storage between the pond and Highway 400 resulting from the construction of the proposed Highway 400 interchange or the proposed Harvie Road underpass will have to consider the downstream effects resulting from loss of storage and a dam-break of Pond A.

1.8 Problem Statement

The Problem Statement, which sets the framework for this Class EA, is as follows:

“That existing traffic and infrastructure deficiencies be corrected in an environmentally friendly manner that also meets future transportation needs.”

The City of Barrie is undertaking this project in response to the problems and complaints associated with the congested transportation system in the south end of Barrie. Proposed transportation improvements will result in an opportunity to correct existing infrastructure deficiencies, provide better connectivity and accessibility, and allow for future growth.
1.9 Study Organization

1.9.1 The Project Team

Morrison Hershfield Limited (MH) was retained by the City of Barrie to undertake the Class EA for the transportation improvements at Harvie Road/Big Bay Point Road and Highway 400. The Project Team is outlined in Table 1-1.

Table 1-1 - Project Team

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<tr>
<th>Proponent:</th>
<th>City of Barrie</th>
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<tr>
<td>Ralph Scheunemann</td>
<td>Project Manager</td>
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<td>Steve Patterson</td>
<td>Manager IP</td>
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<td>Steve Rose</td>
<td>Traffic</td>
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<td>Geoff Mitchinson</td>
<td>Operations (Rail)</td>
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<tr>
<td>Mike Nugent</td>
<td>Engineering (Rail)</td>
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<td>Kate Ash</td>
<td>Policy and Standard Technologist (Rail)</td>
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<tr>
<th>Ministry:</th>
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<td>Jason White</td>
<td>Manager, Engineering</td>
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<tr>
<td>Bob Stephenson</td>
<td>Head, Planning &amp; Design</td>
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<tr>
<td>Olga Garces</td>
<td>Area Manager, Highway Engineer</td>
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<tr>
<td>Linda Fischer</td>
<td>Head, Environ. Planning</td>
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<tr>
<td>Janice Munro</td>
<td>Area Manager, Traffic Office</td>
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<tr>
<td>Justin White</td>
<td>Highway Engineering</td>
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<td>Susan Sieradzki</td>
<td>Environmental</td>
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<td>Goran Nikolic</td>
<td>Traffic</td>
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<tr>
<td>Jeanne-Marie Deletsu</td>
<td>Planning</td>
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<td>Liaquat Ali</td>
<td>Traffic</td>
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<tr>
<td>Peter Dorton</td>
<td>Corridor Management</td>
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<td>Nanda Kandiah</td>
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<td>John Grebenc</td>
<td>Project Manager</td>
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<tr>
<td>Carmela Gemmiti (November 2010 to April 2014)</td>
<td>Roadway Engineering</td>
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<td>Ali Mekky</td>
<td>Traffic</td>
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<td>Sara Fadaee</td>
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<tr>
<td>Farooq Arshad</td>
<td>Drainage/SWM</td>
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<td>Paul Draycott</td>
<td>Natural Environment and Fisheries</td>
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1.9.2 The Key Project Milestones

The study was initiated in October 2009. The key project milestones to date are as follows:

**Phase 1 and 2:**

- Notice of Study Commencement: November 5 & 6, 2010
- Final Meeting with MTO: October 20, 2010
- PIC Notice Mailed: October 29, 2010
- Advertised November 11, 12 & 13, 2010
- Public Information Centre #1: November 17, 2010

**Phase 3 and 4:**

- Final Meeting with MTO: April 7, 2015
- Public Information Centre #2: April 23, 2015

1.9.3 Notice of Study Commencement

During this study, a Notice of Study Commencement was advertised in the Barrie Examiner on November 5 & 6. A copy of the Notice of Study Commencement is included in the Phase 1 & 2 Report of the Class EA. This notice described the purpose of the study, the need for improvements and the proposed alternative solutions.
2. SUMMARY OF PHASE 1 & 2 REPORT

The following sections summarize the key points of the Phase 1 & 2 Environmental Study Report.

2.1 Alternative Solutions

The following alternative solutions were developed during Phase 2 of the Class EA:

2.1.1 Alternative Solution 1 – Do Nothing Alternative

Continue to operate the transportation facility in its current form. Please refer to Exhibit 1 in Phase 1 & 2 Report of the Class EA.

2.1.2 Alternative Solution 2 – Build a Highway 400 Crossing Connecting Harvie Road and Big Bay Point Road

This alternative involves connecting Harvie Road and Big Bay Point Road across Highway 400. Please refer to Exhibit 2 in Phase 1 & 2 Report of the Class EA.

2.1.3 Alternative Solution 3 – Implement a New Highway 400 Interchange at Harvie Road and Big Bay Point Road

This alternative includes the implementation of a New Highway 400 Interchange at Harvie Road and Big Bay Point Road. Please refer to Exhibit 3 in Phase 1 & 2 Report of the Class EA.

2.1.4 Alternative Solution 4 – Limit Future Growth and Development

Implement policies that would place additional constraints on where growth may occur and/or how much development may occur.

2.1.5 Alternative Solution 5 – Transportation Demand Management

The Transportation Demand Management (TDM) includes Diversion of traffic to other roadways. TDM also entails the encouragement of the use of other modes of transportation such as transit usage, bicycles, and carpooling.

2.1.6 Alternative Solution 6 – Update Other Roadways

This alternative involves updating other roadways including possible widening and additional provisions for alternative modes of transportation, such as public transit and bicycles for travelers using the corridors. Other road improvements were considered in the TMP.

2.2 Pre-Screening of Alternatives

The following alternative solutions were considered as potential alternatives in the planning process but were not carried forward as stand-alone alternatives, as they did not solve the problem statement:
Alternative Solution 4 (Limit Future Growth and Development)
Alternative Solution 5 (Transportation Demand Management (TDM))
Alternative Solution 6 (Update Other Roadways)

The alternative solutions above were not carried forward due to the following reasons:

- Alternative 4 – Existing transportation problems will not be resolved.
- Alternative 5 - Non-structural improvement solutions such as more car-pooling, greater transit use and staggering of working times were considered to be beneficial, however, these measures would have only a minor impact on future traffic volumes and would not address any of the existing or future transportation / infrastructure deficiencies.
- Alternative 6 – Property and geometric limitations for transportation improvements would not resolve existing transportation issues at Mapleview Drive. There is inadequate capacity crossing Highway 400 in the south end of Barrie

2.3 Public Information Centre #1

The first Public Information Centre (PIC) was held on Wednesday November 17, 2010, from 4:00 p.m. to 7:00 p.m. at Barrie City Hall, in the Sir Robert Barrie Room, located on the 2nd Floor, City Hall, 70 Collier Street to receive comments regarding the proposed alternative solutions (including the potential for a new highway crossing or and interchange). These comments were used to develop a Preferred Solution.

Approximately 54 people attended the PIC. The attendees had the opportunity to speak with representatives from the City and the Consultant and provide comments in the form of a comment sheet. The comments received either in the form of the comment sheet provided or in subsequent correspondences either by emails, facsimiles, or letters, are compiled in the Phase 1 & 2 Report of the Class EA.

In general, over 70% of the respondents agreed that the “Do Nothing” option is not feasible and of that over 70% of the public agreed that an interchange is necessary to alleviate congestion and improve the traffic in the area. However, approximately 40% of the respondent has expressed concern regarding the potential increase of traffic in the residential area as a result of an interchange. Other general concerns included the increase in noise and air pollution and impacts to adjacent woodlots and the natural environment.

A copy of the PIC display boards can be found in the Phase 1 & 2 Report of the Class EA.

2.4 Analysis and Evaluation of Alternative Solutions

Following the PIC and in consideration of all concerns and comments raised by the reviewing agencies and public, the alternative solutions were evaluated and assessed by the Project Team, related reviewing agencies including MTO, and relevant stakeholders while taking into considerations the feedbacks from the public in order to identify a preferred solution.

The detailed evaluation and assessment of the Alternative Solutions by the Project Team can be found in the Phase 1 & 2 Report of the Class EA.
2.5 Selection of the Preferred Planning Solution

Both Alternative Solutions 2 and 3 will improve traffic, provide better connectivity and accessibility, and allow for future growth within Barrie, the associate costs and environmental impacts for an interchange will be more substantial when compared to Alternative Solution 2, the crossing option, hence the overall evaluation yields that Alternative Solution 2 is the preliminary preferred planning solution. For further information, refer to slide 3 in Appendix C.

2.6 Proceeding to Phase 3 and 4 of the Class EA

MTO November 24th 2010 comments (see Phase 1 & 2 Report of the Class EA) indicated that the traffic analysis and evaluation using macro-simulation in this study was acceptable at a strategic level, the results, including the weaving analysis, need to be confirmed and evaluated at a micro level to confirm operational performance. Accordingly, MTO has subsequently requested traffic analysis of a larger study area and additional weaving analysis to confirm the need and justification of a Harvie/Big Bay Point Road interchange at Highway 400.

Given this required additional review, the micro modeling completed as part of Phase 1 and 2 report by Delcan was updated by WSP as part of the MMATMP.

WSP completed a comprehensive calibration of the prior 2009 Aimsun Model, enhanced the model development and validated to the adjusted 2011 base year traffic counts. In addition, the future preferred road networks recommended in the City of Barrie Multimodal Active Transportation Master Plan (TMP) was fine-tuned and analyzed with the Aimsun micro-simulation software for the south section of the City of Barrie, including the annexed area, to identify the potential operational deficiencies on the future networks. The Aimsun micro-simulation models were developed from the calibrated and validated base year model.

In 2015, the City of Barrie has completed Phases 3 and 4 of a Class EA for Harvie Road / Big Bay Point Road / Highway 400 as part of a larger EA. This study identified three Alternative Design concepts for the proposed Harvie Road/ Big Bay Point Road / Highway 400 crossing to address the preferred solution from Phase 1 & 2 of the Class EA.

In addition, a conceptual Partial Parclo A interchange was also developed to identify preliminary general property requirements to protect for a potential future interchange, subject to further studies. Morrison Hershfield completed the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report as part of the Phase 3 and 4 EA. This study examined three design alternatives for the potential interchange at Harvie Road/ Big Bay Point Road at Highway 400, and reviewed the Traffic Operations that addresses existing and future deficiencies and the effect of each design alternative on the operations of Highway 400 mainline lanes, interchange ramps and speed change lanes as well as other intersections within the study area.

The key findings of the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report are discussed in Section 3.6. For further information, refer to the separate cover.

MTO has not endorsed the conclusions of the traffic report at this time.
3. PROJECT ENVIRONMENT

This section provides a description of the physical, social, cultural and economic environment within the Harvie Road / Big Bay Point Road / Highway 400 Crossing study area. A combination of field investigation, review of existing engineering drawings and impacts, traffic studies, natural environment studies, and archaeological study established this inventory.

3.1 Emergency Services

Emergency Police and Ambulance vehicles currently access the study area mainly from either, the existing Essa Road / Highway 400 interchange, or the Mapleview Drive / Highway 400 interchange. Fire Station 4 is located on Ardagh Road, west of Ferndale Drive.

3.2 Transit Service

Presently, there is a single bus route on Bryne Drive between Caplan Avenue and Commerce Park Drive (south intersection). The future plan is to extend this service to Essa Road. There are also transit routes on Bayview Drive between Mapleview Drive and Little Avenue.

3.3 Safety

There is a history of mostly traffic congestion complaints for the area adjacent to Mapleview Drive. Winter safety complaints, in terms of slippery conditions, can be addressed with greater priority given to sanding, salting and ploughing. The City of Barrie has an Advanced Road Weather Information Tower in South Barrie on Yonge Street north of Ashford Drive that assesses and predicts road weather conditions so that maintenance needs can be more accurately determined.

3.4 Property Access

Access to existing properties will be maintained. Access configuration will depend on proposed plans for property development. The Molson Brewery Plant that was located on the east side of Highway 400 and on the south side of Big Bay Point Road and has been demolished. Depending on the plans for the development of the site, access can be provided in the Harvie Road / Big Bay Point Road corridor for any of the proposed transportation improvements.

The Phases 3 and 4 of the Class EA will examine the need for medians, which may affect some of the turning movements at the existing access points on Big Bay Point Road and Harvie Road in the study area.

3.5 Land Use

Most of the land in the study area surrounding the proposed Harvie / Big Bay Point / Highway 400 crossing is not developed. The old Molson plant building has been demolished.

West of Highway 400, the area is primarily designed as “general industrial” with Whiskey Creek located within an environmental protection area. Lands adjacent to Harvie Road are designated as Industrial and Commercial east of Thrushwood Drive.

3.6 Transportation

Traffic analysis was undertaken during Phase 1 and 2 to determine the traffic impacts of the alternative solutions (Highway 400 crossing, Highway 400 interchange).
As previously discussed in Section 2.6, MTO requested additional traffic analysis for a larger study area and additional weaving analysis to confirm the need and justification of a Harvie/Big Bay Point Road interchange at Highway 400.

MH examined three design alternatives for the highway crossing and potential interchange at Harvie Road/Big Bay Point Road at Highway 400, and reviewed the Traffic Operations that addresses existing and future deficiencies and the effect of each design alternative on the operations of Highway 400 mainline lanes, interchange ramps and speed change lanes as well as other intersections within the study area.

The key findings of the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report are discussed in the following sections. For further information, refer to the standalone report.

3.6.1 Existing Road Network

Harvie Road and Big Bay Point Road are under the jurisdiction of the City of Barrie. Highway 400 is under the jurisdiction of the Ministry of Transportation Ontario.

Highway 400

Highway 400 is a north-south 6-lane provincial highway under the jurisdiction of the Ministry of Transportation, Ontario. It has a posted speed of 100 km/h and includes a diamond interchange at Mapleview Drive and a Parclo A-4/A-2 interchange at Essa Road. Given potential growth in traffic in the area MTO has completed a Class EA to widen Highway 400 to eight lanes but protection for ten lanes at Harvie and Big Bay Point Road. MTO is currently updating this study.

Transportation improvements are being implemented in 2015-2019 capital plan.

Mapleview Drive

Mapleview Drive is an east-west arterial road under the jurisdiction of the City of Barrie. It has a posted speed limit of 60 km/h and has a 6-lane urban cross section. There are currently 8 signalized intersections located between Veterans Drive in the west and Bayview Drive in the east, including the signalized intersection at the two diamond interchange ramp terminals with Highway 400.

Harvie Road

Harvie Road is an east-west arterial road under the jurisdiction of the City of Barrie. It includes a 2-lane rural cross section and has a posted speed of 50 km/h. Harvie Road currently terminates just west of Highway 400.

Four lanes have been approved by Council as part of the Harvie Road Class EA from Bryne Drive to Essa Road.

Big Bay Point Road

Big Bay Point Road is an east-west arterial road under the jurisdiction of the City of Barrie. It has a 2-lane rural cross section and has a posted speed limit of 50 km/h. As Big Bay Point
Road approaches Highway 400 from the east, it curves northward and continues as Fairview Road parallel to Highway 400 east of the Service Centre.

The City of Barrie’s 1999 Transportation Study calls for widening Big Bay Point Road to 5 lanes east of Bayview Drive. The City of Barrie’s Highway 400 crossing EA calls for widening Harvie Road and Big Bay Point Road to 7 lanes from Bryne Drive to Bayview Drive.

**Essa Road**

Essa Road is an arterial road under the jurisdiction of the City of Barrie that runs generally from south-south-west to north-north-east. It consists of a 4-lane cross-section and has a posted speed limit of 50 km/h. Signalized intersections are provided at the two ramp terminal intersection of the interchange with Highway 400.

The Phases 3 and 4 of the Essa Road Class EA Study is complete. The City of Barrie Highway 400 crossing EA recommends the widening Essa Road by one lane in each direction in the vicinity of Highway 400. A new W-S ramp was built in the southwest quadrant of the Essa Road Interchange.

**Bryne Drive**

Bryne Drive is a north-south major collector under the jurisdiction of the City of Barrie. It provides 5-lanes between Commerce Park Drive South and Essa Road and currently terminates north of Caplan Drive and south of Essa Road with a gap in the Harvie Road area.

The Bryne Drive Class EA approved by Council in 2006, recommends five lanes between Caplan Drive South and Essa Road.

**Fairview Road**

Fairview Road is a 2-lane north-south arterial road under the jurisdiction of the City of Barrie. It has a posted speed limit of 50 km/h and extends from the west limit of Big Bay Point Road to Essa Road.

The City of Barrie’s MMATMP recommends 5 lanes may be required along Fairview Road from Little Avenue to Big Bay Point Road.

**Bayview Drive**

Bayview Drive is a north-south major collector under the jurisdiction of the City of Barrie. It has a posted speed limit of 50 km/h and includes a 4-lane cross section to a point north of Mapleview Drive where it tapers down to a 2-lane cross-section.

Bayview Drive is currently five lanes from Big Bay Point Road to Mapleview Drive. Bayview Drive south of Big Bay Point Road is currently being widened to 5 lanes.

**Service Centre**

A Service Centre is located on the east side of Highway 400 just north of Big Bay Point Road. The existing Service Centre has direct access and egress to and from Highway 400 northbound.
The Service Centre can also be accessed through Fairview Road via a parking lot and pedestrian crossing.

Currently, there are potential weaving problems and safety concerns with the proximity of the egress of the Service Centre to the northbound Highway 400 off ramp with a distance of approximately 800m between the Service Centre exit and the ramp.

Any transportation improvements identified in the study area will require the existing Highway 400 the Barrie Service Centre located on the east side of Highway 400 just north of Big Bay Point Road to remain open. The Service Centre is currently being renovated.

The existing lane configurations within the study area are shown in Figures 3-1.
Figure 3-1 - Existing Lane Configurations
3.6.2 Existing Traffic Operations

Existing intersection operations were analyzed in order to identify any operational deficiencies in the existing road network.

The existing signalized intersections within the Study Area were determined to be currently operating at overall LOS of D or better during the AM and PM peak hours.

The results of the operational analyses for the signalized intersections and detailed analysis sheets can be found in the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report.

3.6.3 Future Road Network

Future improvements to the existing road network include planned improvements by the City and the MTO, and those recommended through the development of the City’s Multimodal Active Transportation Master Plan (TMP) within the 2031 time horizon and potential post 2031 improvements are shown in the MMATMP on FIGURE 10-2.

3.6.3.1 City Road Improvements

The following are planned improvements to City-owned roads:

- Little Avenue widening to five lanes from Fairview Road to Marshall Street.
- Essa Road widening to seven lanes from Bryne Drive to east of Fairview Road.
- Fairview Road widening to five lanes north of Little Avenue and potential for additional lanes and two-way left-turn lane (TWLTL) south of Little Avenue.
- Bryne Drive extension to fill the gap at Harvie Road between the two segments, having five lanes from 680m south of Essa Road to 530m north of Caplan Drive. The Bryne Drive profile was revised to accommodate the Harvie Road EA profile and the existing SWM Pond outlet structures. The revised Bryne Drive Profile is shown in Appendix E.
- Harvie Road / Big Bay Point Road widening and new Highway 400 crossing are expected to be:
  - three lanes from Essa Road to Veterans Drive
  - five lanes from Veterans Drive to future Bryne Drive
  - seven lanes from future Bryne Drive to Huronia Road including across Highway 400
- A new Highway 400 interchange at Harvie Road / Big Bay Point Road was recommended in the City TMP as a partial four-ramp Parclo A4 interchange without the two northbound on-ramps at Big Bay Point Road.

3.6.3.2 Highway 400 Mainline and Interchanges Improvements

Planned improvements/expansions on Highway 400 in this area were identified in the Highway 400 Planning and Design Study Report. The timing for Highway 400 widening is uncertain and
is not identified in the PDR and is being reviewed by MTO. It is assumed that the Highway 400 widening and interchange improvements will be implemented by the 2031 horizon year.

- The mainline Highway 400 will be widened from the current six lanes to 10 lanes from the Bayfield Interchange to the Mapleview Interchange.

- The mainline Highway 400 will be widened from the current six lanes to 10 lanes from the Mapleview Interchange to the Essa Interchange with alignment shift.

- The Essa Road Interchange geometric configurations include:
  - additional lane on the N-E/W off-ramp
  - realigned E-S on-ramp loop
  - realigned W-N on-ramp loop
  - a new W-S on-ramp in the southwest quadrant
  - additional lane on the S-E/W off-ramp

3.6.4 Future Traffic Operations

3.6.4.1 Future Traffic Operations without Improvements - Do Nothing Scenario

The Do Nothing option (2031 with no Hwy 400 widening) would not address the future congestion and facilitate any future growth in the area, and most signalized intersections in the Study Area are expected to operate at LOS E or F during the PM peak hour and the existing network cannot accommodate the planned growth.

Details of the Future Do Nothing scenario can be found in the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report.

3.6.4.2 Future Traffic Operations with Improvements

The future (2031) intersection operations were analyzed with the network improvements in order to identify any operational deficiencies and explore the potential merit of changes in proposed lane configuration and/or signal timing to address such deficiencies.

The future signalized intersections within the Study Area are expected to operate at overall LOS of D or better during the AM and PM peak hour which is considered acceptable.

The results of the operational analyses for the signalized intersections can be found in the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report.

3.6.5 Weaving Analysis

As mentioned in Section 3.6.3.2, the timing for Highway 400 widening is uncertain as it is not identified in the existing PDR and is currently being reviewed by MTO under the PDR Update.

MH conducted a weaving analysis for two sections along Highway 400 under two scenarios:
1. Harvie Road / Big Bay Point Road and Highway 400 Interchange with existing Highway 400 lane geometry; and

2. Harvie Road / Big Bay Point Road and Highway 400 Interchange with widened Highway 400.

The two sections weaving sections are:

- Highway 400 northbound and southbound between the potential New Harvie Road / Big Bay Point Road interchange and Mapleview Drive interchange; and

- Highway 400 southbound between the proposed Essa Road W-S interchange ramp and the potential new Harvie Road / Big Bay Point Road interchange.

For further details regarding the weaving analysis, refer to the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report.

3.6.5.1 Harvie Road / Big Bay Point Road and Highway 400 Interchange with Existing Highway 400 Lane Geometry

In this scenario, it was assumed that the Highway 400 widening will not be implemented by the 2031 horizon year when the interchange will be fully functional and the mainline Highway 400 will remain six lanes from the Mapleview Interchange to the Essa Interchange.

**Weaving Analysis from Essa Road Interchange**

The length of the southbound weaving section is 685m. The Level of Service in the weaving segment between the potential interchange at Harvie Road / Big Bay Point Road and the interchange at Essa Road is not satisfactory and there would be weaving issues based on the existing Highway 400 configurations and geometry and the projected weaving volumes. Therefore, Highway 400 would need to be widened between the potential New Harvie Road / Big Bay Point Road interchange and Essa Road interchange by the 2031 horizon year.

**Weaving Analysis to and from Mapleview Drive Interchange**

The lengths of the northbound and southbound weaving sections are 513m and 606m, respectively. The weaving segment between the potential interchange at Harvie Road / Big Bay Point Road and the existing interchange at Mapleview Drive is expected to fail operating. There would be weaving issues with the existing Highway 400 configurations and geometry and the forecast weaving volumes. Therefore, Highway 400 needs to be widened between the potential new Harvie Road / Big Bay Point Road interchange and the Mapleview Drive interchange by the 2031 horizon year when the interchange will become functional.

3.6.5.2 Harvie Road / Big Bay Point Road and Highway 400 Interchange with widened Highway 400

In this scenario, it is assumed that the Highway 400 widening and interchange improvements will be implemented by the 2031 horizon year and the mainline Highway 400 will be widened from the current six lanes to 10 lanes from the Mapleview Interchange to the Essa Interchange.
Weaving Analysis from Essa Road Interchange
The Level of Service in the weaving segment between the potential interchange at Harvie Road / Big Bay Point Road and the interchange at Essa Road would be LOS C, which is satisfactory. There would be no weaving issues based on the recommended configurations and geometry and the forecast weaving volumes within the 2031 time horizon.

Weaving Analysis to and from Mapleview Drive Interchange
The Level of Service in the weaving segment between the potential interchange at Harvie Road / Big Bay Point Road and the existing interchange at Mapleview Drive is satisfactory and there would be no weaving issues based on the recommended configurations and geometry and the forecast weaving volumes within the 2031 time horizon.

3.6.6 Simulated Travel Speed Analysis
MH conducted a lane by lane simulated travel speed analysis along Highway 400 for the construction of Harvie Road / Big Bay Point Road and Highway 400 Interchange. In this scenario, it is assumed that the Highway 400 will be widened from the current six lanes to 10 lanes from the Mapleview Interchange to the Essa Interchange. The following sections were studied:

- Highway 400 northbound and southbound between the potential New Harvie Road / Big Bay Point Road interchange and Mapleview Drive interchange; and
- Highway 400 southbound between the proposed Essa Road W-S interchange ramp and the potential new Harvie Road / Big Bay Point Road interchange.

The key findings of the simulated travel speed analysis are summarized in the following sections. For further details regarding the simulated travel speed analysis, refer to the Harvie Road / Big Bay Point Road and Highway 400 Interchange – Future Traffic Operations report.

3.6.6.1 Simulated Travel Speed Analysis to and from Mapleview Road Interchange
The simulated travel speeds in the weaving segment between the potential interchange at Harvie Road / Big Bay Point Road and the existing interchange at Mapleview Drive would be satisfactory. There would be no speeding issues based on the recommended configurations and geometry and the forecast weaving volumes within the 2031 time horizon.

3.6.6.2 Simulated Travel Speed Analysis from Essa Road Interchange
There is a proposed right lane drop for the Essa Road W-S ramp in the southbound direction that causes the low speed on the proposed Essa Road W-S interchange speed change lane. MH studied another scenario to remove the proposed right lane drop in the southbound direction and to provide continuous movement of auxiliary lanes to the potential New Harvie Road / Big Bay Point Road interchange. The analysis revealed that the travel speed on Highway 400 southbound before the Potential Future Highway 400 N-E/W Ramp Terminal would be improved.

The simulated travel speeds in the weaving segment between the recommended interchange at Harvie Road / Big Bay Point Road and the interchange at Essa Road would be satisfactory.
There would be no speed reduction issues based on the recommended configurations and geometry and the forecast weaving volumes. MH recommends implementation of a continuous southbound auxiliary lane from Essa Road to Mapleview Drive.

### 3.6.7 Future Additional Traffic Analysis

Additional Traffic analysis may be required in the future as the future Highway 400 can still be influenced by planning for Highway 400 improvements being studied presently by MTO under the Highway 400 PDR addendum. The number of lanes and operation and need for interchanges, timing, etc. is still being studied and can still be influenced. Therefore, the need for the interchange cannot be finalized in this study. The City will undertake an updated needs and justification study once MTO has determined the preliminary preferred design alternative.

The MTO Highway 400 PDR Update is scheduled to be completed in 2015 and will provide guidance on the proposed alignment shift of Highway 400 associated to the 10 lane widening.

Upon completion of the Highway 400 PDR Update, the traffic report will need to be updated to undertake additional weaving and safety analysis to finalize the design of the future interchange ramps.

Since the interchange design will not be finalized until after completion of the Highway 400 PDR Update, it is important that the property adjacent to the future interchange is protected from any further development. The City will negotiate the protection as part of its development review and approval. Refer to Slide 19 in **Appendix B** for the anticipated property impacts of the potential interchange construction. In order to determine the required property protection area, conservative ramp geometries were assumed using MTO’s Geometric Design Guidelines to ensure adequate property would be available if in the future, an interchange will be warranted.

### 3.7 Natural Environment

#### 3.7.1 Whiskey Creek

The Whiskey Creek Master Drainage Plan Update has been completed in October 2009. The findings of the report are summarized below:

Whiskey Creek flows through the study area in an easterly direction across Harvie Road, Highway 400 and Fairview Avenue then discharges to Kempenfelt Bay at Minet’s Point. The headwater of Whiskey Creek is located just west of Highway 400. The creek flows from west to east for approximately 5250m prior to out-letting into Kempenfelt Bay adjacent to Minet’s Point Park.

Within the Harvie Road study corridor, the stream is approximately 0.8m wide and the riparian area is covered by grasses with sumac and some poplar growth. Watercress was also seen along the stream. Downstream of Highway 400, where the stream crosses Fairview Road, it passes through a heavily wooded area and is wider (up to 3.0m). Whiskey Creek is considered to have a riffle/run/pool configuration with substrates dominated by gravel and sand. Some fish cover is provided by woody debris, undercut banks and overhanging terrestrial vegetation. Seasonal migratory barriers were noted at the Fairview Road culvert due to debris jams.
The areas examined fall within Reaches 5 and 6 of Whiskey Creek, as designated by Azimuth Environmental Consulting Inc. (R.G. Robinson and Associates (Barrie) Ltd., 2002) as part of the Whiskey Creek Master Drainage Plan. Watercress was observed upstream of Harvie Road, indicating groundwater inputs to the watercourse. Whiskey Creek, between Highway 400 and Harvie Road, was described by Azimuth as having an incised creek channel with substrates dominated by cobble, gravel, sand and woody debris. Between Highway 400 and Fairview Road, the creek was not considered to sustain a resident fish population. Azimuth Environmental Consulting Inc. identified an accumulation of sand and debris at the outlet of the culverts that discharge to Whiskey Creek from the Highway 400 east embankment. Approximately 50 m downstream of Fairview Road, surface flow was noted to withdraw into the sandy substrate, which was considered to be a groundwater recharge zone (R.G. Robinson and Associates, 2002).

As indicated in the MTO Highway 400 Harvey Road / Big Bay Point Road Interchange Feasibility Study, Whiskey Creek currently crosses Highway 400 through a 1.2 x 0.9 concrete culvert from a south-west to north-east direction.

The Whiskey Creek Master Drainage Plan Update is available on the city of Barrie web page at www.barrie.ca.

3.7.2 Vegetation Communities

A detailed environmental impact assessment was undertaken for the project to document existing aquatic, terrestrial and land use resources throughout the environmental study area and to assess potential impacts on these resources in relation to the project works. The key findings of the environmental assessment study are summarized in the following sections.

For more information, refer to the standalone Natural Heritage Environmental Impact Assessment Study Report.

The study area contains six vegetation communities: Cultural Meadow (CUM), Cultural Thicket (CUT), Cultural Woodlot (CUW) Coniferous Forest (FOC), Deciduous Forest (FOD) and Meadow Marsh (MAM). The forested areas are mature forests with many trees having a diameter of greater than 30cm. The vegetation communities are shown in Figure 3-2.

3.7.3 Wildlife

Wildlife was observed within the study area during field investigations and Potential Species at Risk and Species of Conservation were identified. Table 3-1 provides a summary of all the potential Species at Risk habitat in the study area.

<table>
<thead>
<tr>
<th>Species</th>
<th>Designations</th>
<th>Protection*</th>
<th>Suitable Habitat in Environmental Study Area</th>
</tr>
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<tbody>
<tr>
<td>Barn</td>
<td>Hirundo</td>
<td>THR THR</td>
<td>MBCA ESA No</td>
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Table 3-1 - Potential Species at Risk and Species of Conservation
### Species Designations

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<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>COSEWIC (SARA)</th>
<th>Provincial (SARO)</th>
<th>Federal Legislation</th>
<th>Provincial Legislation</th>
<th>Suitable Habitat in Environmental Study Area</th>
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<tr>
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<td>THR</td>
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<td>Peregrine Falcon</td>
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<td>THR</td>
<td>SARA</td>
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<tr>
<td>Red-headed Woodpecker</td>
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<td>THR</td>
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<tr>
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#### Birds

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<th>Provincial Legislation</th>
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<tbody>
<tr>
<td>Eastern Wood-Pewee</td>
<td>Contopus virens</td>
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#### Herpetofauna

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#### Mammals

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<td>Little Brown Myotis</td>
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</table>
3.7.4 Fish and Fish Habitat

There is one watercourse within the study limits, Whiskey Creek, which flows permanently in a general easterly direction and outlets into Lake Simcoe at Minet’s Point. The watercourse is conveyed under Highway 400 by a 1.2m by 0.9m open footing concrete culvert on a south-west to north-east skew. This watercourse at this location is near to the headwaters of the Whiskey Creek.

During the site investigations, downstream of Highway 400, the channel had good morphology with a mix of riffles, runs, flats, and pools. The riffle areas had a mean depth of 0.06m and mean width of 1.2m. The mean depth of the runs was 0.09m with a mean width of 1.0m. The flats had a mean depth of 0.13m and a mean width 1.5m. Pooled areas had a mean depth of 0.4m and a mean width of 1.0m. Substrates within this reach were mainly gravel, sand and silt with cobbles present close to the culvert. The banks were stable within this reach with no erosion evident. Instream cover was provided mainly by instream and overhanging woody debris and vascular plants. Submergent aquatic vegetation consisted of mainly Richardson’s Pondweed (Potamogeton richardsonii). Shore cover was moderate as the reach flows through a wooded area. Some drainage flows from the south and into the creek at the culvert area. Fish sampling was not conducted due to the extremely shallow water depths and no fish observed.

The morphology of the reach upstream of Highway 400 to the culvert under Harvie Road was a mix of runs and flats. The widths ranged from 0.5m to 1.0m and depth ranged from 0.10 to 0.25m. Pooled areas were identified directly upstream of the culvert at Harvie Road and located at a debris blockage upstream of the right-of-way (ROW) fence. Substrates in this reach were mainly silt and sand with some gravel and cobble present at the culverts. Some minor erosion of the banks was evident in this reach with moderate erosion also present on the outside bends of meanders at the midway point in the reach. Minimal shore cover was present as the riparian areas were mainly meadow communities with sparse riparian trees, mainly in the vicinity of the ROW fence. Fisheries sampling was not conducted at this reach. In addition, MH did not observe any fish during the field investigations.

Consultation with the Lake Simcoe Region Conservation Authority (LSRCA) identified the following fish species as being present in Whiskey Creek downstream of the study area: Brook Trout (Salvelinus fontinalis), Slimy Sculpin (Cottus cognatus), Mottled Sculpin (Cottus bairdii), Northern Redbelly Dace (Phoxinus eos), Blacknose Dace (Rhinichthys atrarulus), Longnose Dace (Rhinichthys cataractae), Creek Chub (Semotilus atromaculatus), and Smallmouth Bass (Micropterus dolomieu).

LSRCA classified this waterway as coolwater thermal regime within the study area but with sensitive coldwater species downstream. As such, a timing window for in-water work applies with no in-water work allowed from October 1st to June 1st. Table 3-2 summarizes the existing fish and fish habitat within the study area.

Figure 3-3 illustrates where potential fish habitat was present.
Table 3-2 - Summary of Existing Fish and Fish Habitat

<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Whiskey Creek</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow: Permanent, Intermittent or Ephemeral</td>
<td>Permanent</td>
</tr>
<tr>
<td>Thermal Regime: warm/cool/cold</td>
<td>MNR: warmwater; LSRCA: coolwater with sensitive coldwater species downstream</td>
</tr>
<tr>
<td>Substrate Type</td>
<td>Gravel, sand, silt, cobble</td>
</tr>
<tr>
<td>Vegetation: Riparian &amp; In-stream</td>
<td>Watercress, Pondweed</td>
</tr>
<tr>
<td>Fish Observed: Species</td>
<td>MH: No sampling</td>
</tr>
<tr>
<td></td>
<td>MNR: Brook Trout downstream of study area</td>
</tr>
<tr>
<td></td>
<td>LSRCA: Brook Trout, Slimy Sculpin, Mottled Sculpin, Northern Redbelly Dace, Blacknose Dace, Longnose Dace, Creek Chub and Smallmouth Bass</td>
</tr>
<tr>
<td>Directly Support a Fishery: Y/N</td>
<td>Yes</td>
</tr>
<tr>
<td>Timing Window Restriction</td>
<td>October 1st to June 1st</td>
</tr>
</tbody>
</table>

3.7.5 Environmentally Significant Areas

3.7.5.1 Wetlands

There are no significant wetlands within the study area.

There are several unverified wetlands within or adjacent to the study area. Two unverified wetlands are located within the Whiskey Creek watercourse system on the west and east side of Fairview Road. The third unverified wetland is situated to the south-east of the proposed Bryne Drive. There is another wetland located north of Harvie Road, west of Highway 400 along Whiskey Creek.

3.7.5.2 Designated Natural Areas

Designated natural areas include areas identified for protection. There are no Designated Natural Areas within the study area. The study area does fall within the Lake Simcoe Protection Plan area.

3.7.5.3 Lake Simcoe Protection Plan

Lake Simcoe Protection Plan (2009) is a plan for watershed protection to restore the health of Lake Simcoe. Primary objectives include restoring the health of the cold water fisheries and other aquatic life within Lake Simcoe watershed; improving and maintain water quality; reducing the amount of phosphorus going into the lake; protecting and rehabilitating important natural areas such as shorelines; and addressing impacts of invasive species, climate change and recreational activities.
Figure 3-2 – Vegetation Communities (Ecological Land Classification)
Figure 3-3 – Watercourses and Aquatic Habitats
3.8 Archaeology and Cultural Heritage

A Stage 2 Archaeological Assessment was conducted for this project in order to identify the archaeological potential for the location for any Native and Euro-Canadian archaeological sites that may be impacted by proposed highway and road improvements of this study.

Two archaeological sites were identified during the test pit assessment of the lands required for the project. Refer to the Stage 2 Archaeological Assessment Report in Appendix A for further details regarding the archaeological findings.

3.9 Noise

Valcoustics Canada Limited completed a preliminary traffic noise assessment as part of the Highway 400 Crossing Roads Study completed in May 2005.

Sound exposures were calculated using STAMSON V5.02-ORNAMENT, the computerized road traffic noise prediction model of the Ministry of Environment (MOE).

Using the road traffic data (supplied by Dillon Consulting), 24-hour (Leq 24-hour) sound exposures was calculated at each receptor location. Receptor locations are located in Phase 1 & 2 of the Class EA. To assess the noise impact, the existing sound exposures were compared to the future with the proposed road improvements. This was a conservative approach since the future “do nothing” scenario is typically compared with the future “with improvements” scenario. Since the traffic volumes are typically increasing, the existing sound exposure would be somewhat less than for the future “do nothing” scenario and the predicted noise impact greater.

As shown in Phase 1 & 2 of the Class EA, for each receptor, the existing sound exposures, the future sound exposures with the improvement sand the resulting noise impact (i.e. change between scenarios).

In addition to the detailed calculations at specific receptor locations, a calculation of the increased noise generation of each road segment was done.

There are some locations where the sound exposures increase is predicted to be greater than 5dBA. Thus, noise migration measures need to be considered.

Improvements to Harvie Road, Big Bay Point Road and the potential for a new Highway 400 interchange will result in an increase in traffic volumes. In the next phases of the EA a noise assessment will be undertaken to determine if noise mitigation due to increased traffic volumes is required.

In addition to the comment provided with respect to noise from Valcoustics Canada Limited, a Noise Impact Review (August, 2008) was undertaken by I.E Coulter Associates Limited for Bryne Drive Master Plan for the City of Barrie. The report concluded that due to the significant background noise generated by traffic on Highway 400, none of the identified Alignment Alternatives will result in an increase in noise levels.
3.10 Soil Conditions

A geotechnical investigation on Big Bay Point Road was carried out by Trow (exp) in February 2008 for the Big Bay Point Road Transmission Watermain at Highway 400. The purpose of the investigation was to determine the subsurface soil and groundwater conditions by way of three sampled boreholes.

The quaternary geology in the general area of the site results from the actions of the Simcoe lobe of the Laurentide Ice Sheet which covered the area in the Late Wisconsinan glaciation. The predominant soil formations in the area are the glaciofluvial ice-contact deposits, which consist of gravel and sand; minor till; including esker, kame, end moraine, ice-marginal delta and subaqueous deposits.

The City of Barrie Engineering Department provided Trow with copies of previous investigations carried out in the same general area by Dominion Soil Investigations Inc., Soil-Eng Limited, and Peto MacCallum Ltd. Three complete reports, as well as the borehole logs, laboratory test results and borehole location plan from a fourth report were made available to Trow.

The partial report that was provided was completed by Dominion Soil Investigation Inc. in November of 1980. This investigation included two deep boreholes, one on each side of the highway (Boreholes 8 and 9). The borehole logs encountered brown sand with traces of silt and gravel, loose to very dense and dry to damp. These boreholes extended to elevations of 277.7 and 277.2 metres, respectively. Both boreholes were dry upon completion. Piezometers installed in the boreholes confirmed that the boreholes remained dry during the three weeks following the drilling.

The three additional reports provided by the City of Barrie detailed the findings for investigations located in the general vicinity of the site. Table 3-3 details the relevant findings in each report.

<table>
<thead>
<tr>
<th>Report Title and Origin</th>
<th>Borehole ID</th>
<th>Distance from Site (m)</th>
<th>Relevant Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geotechnical Investigation Allandale Sewer and Water Project, Barrie, Ontario Peto MacCallum Ltd., 1985</td>
<td>Peto MacCallum Borehole 14 – Surface Elevation 276.63</td>
<td>650</td>
<td>Sand: Compact brown silty fine sand, some gravel, wet Becoming fine to medium sand, some silt, moist at 1.5 metres depth Upon completion of auguring, borehole open, no free water</td>
</tr>
<tr>
<td>Geotechnical Investigation Bayview Drive Reconstruction and Churchill Drive Extension, Barrie, Ontario Peto MacCallum Ltd., 1999</td>
<td>Peto MacCallum Borehole No. 4 – Surface Elevation 278.85</td>
<td>650</td>
<td>Sand: Compact to very dense brown/grey fine to medium sand, trace silt to silty, trace to some gravel, moist Upon completion of auguring borehole open to 4.50 m (dry)</td>
</tr>
<tr>
<td>A Soil Investigation For A Proposed Industrial Subdivision at Lots 8, 9 &amp; 10, Concessions 11 &amp; 12, City of Barrie Soil-Eng Limited, 1982</td>
<td>Soil-Eng Borehole 17 – Surface Elevation 279.8</td>
<td>660</td>
<td>Brown compact to very dense Fine Sand traces of silt and gravel Dry on completion</td>
</tr>
</tbody>
</table>
The location of the Harvie Road / Big Bay Point Road crossing may change in the future. Since foundation boreholes are required to be located within the outline of the final foundation location, which cannot be determined at this early stage in the assessment, a full foundations investigation study could not be completed. The foundations for the structure can be assessed in a general way as follows assuming that the new road is over Highway 400. If spread foundations are possible, they would be founded at levels approximately at the existing ground elevations on either side of Highway 400. They would then need to be lowered or backfilled to at least provide frost protection cover at approximately 1.8 metres of cover.

3.11 Site Geology and Subsurface Conditions

They include textural descriptions of the subsoil along with the other results of the field testing program. It should be noted that the soil boundaries indicated on the Borehole Logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect transition zones, for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The stratigraphy at the site, as revealed in the boreholes, is generally comprised of granular fill overlying native deposits of sand and silt.

Topsoil and Asphalt
A 0.15 metre thick layer of topsoil was encountered at the surface of Borehole BH14. The top 300 mm of Borehole BH16 was comprised of asphalt.

Sand and Gravel Fill
Boreholes BH14 and BH16 both encountered a deposit of sand and gravel fill underneath the overlying surficial materials. The sand and gravel fill extended to approximately 0.8 to 2.3metres below existing grade. The fill material within the boreholes was found to be damp.

Sandy Silt Till
Native sandy silt till, with trace gravel layer was encountered as the surficial deposit in Borehole BH13, and in BH14 directly below the sand and gravel fill material. The material extended to 3.0 to 3.5 metres depth. The compactness condition of the native sandy silt varied from loose to very dense, but was typically compact. Moisture contents ranged from 6 to 24 percent.

Sand
A native sand layer was encountered in Boreholes BH13, BH14, and BH16. The sand, with trace amounts of gravel, and trace to with silt, extended from 2.3 to 3.5 metres below grade to the termination of the boreholes at depth ranging from 12.7 to 20.4 metres below grade. The compactness condition of the native sand varied from loose to very dense, but was typically dense to very dense. Moisture contents ranged from 3 to 19 percent. Although no boulders were encountered in the sand deposit in the boreholes, sand deposits can contain boulders and there may be boulders located along the proposed tunnel path.

3.12 Groundwater Conditions

Groundwater observations are included as footnotes on the enclosed Borehole Logs. All of the boreholes were open and dry upon completion of drilling. The moisture contents of the recovered samples indicate the groundwater table in this area is located below the bottom of the boreholes. It must be noted that seasonal variations in the water table should be expected, with higher levels occurring during wetter periods of the year (such as spring thaw and late fall), and lower levels during drier periods.
3.13 Utilities and Services

The following utilities can be found within the Harvie Road and Big Bay Point Road right-of-way:

- A 400mm watermain, a 500mm watermain, a 600mm sanitary sewer, and a 750mm CPP watermain;
- A pumping station located immediately north of Harvie Road approximately 400m east of Highway 400;
- A 300mm watermain located approximately 80m west of the pumping station, running west to east;
- A Bell Canada underground line contained within a 0.3m steel pipe located just south of Harvie Road;
- Bell Fiber Optic underground lines located along the west limit of the Highway 400 right-of-way, running in a north-south direction, and located on both north side and south side of Big Bay Point Road running west to east;
- A gas underground line located approximately 28 north of the centerline of Harvie Road and 200mm gas line running west to east just east of Highway 400; and
- Hydro line and poles are located along the south side of Harvie Road and Big Bay Point Road.

The proposed Harvie Road crossing alignment was shifted to the north to avoid impacting the existing utilities corridor.

3.14 Service Centre

A Service Centre is located on the east side of Highway 400 just north of Big Bay Point Road. The existing Service Centre has direct access and egress to and from Highway 400 northbound. The Service Centre can also be accessed through Fairview Road via a parking lot and pedestrian crossing.

Currently, there are potential weaving problems and safety concerns with the proximity of the egress of the Service Centre to the northbound Highway 400 off ramp with a distance of approximately 800m between the Service Centre exit and the ramp.

Any transportation improvements identified in the study area will require the existing Highway 400 the Barrie Service Centre located on the east side of Highway 400 just north of Big Bay Point Road to remain open. The Service Centre is currently being renovated.

3.15 Rail

There is an existing rail crossing (spur) that crosses Big Bay Point Road at approximately 450m west of Bayview Drive (to the old Molson’s Brewery property) which is privately owned.

The existing rail crossing is only signed and the future needs for warning lights / bells or potential gates should be studied in accordance to Transport Canada guidelines regarding at-grade crossings. There is potential to remove the existing rail spur as part of the Highway 400 crossing construction.
3.16 Economic Environment

3.16.1 Impact on Business

Business Owners along Highway 400 between Mapleview Drive and Essa Road have advised that the existing traffic congestion is negatively impacting their business. Any improvement in traffic capacity would have a positive impact on business.

Without either a highway crossing or highway interchange, development opportunity would eventually be limited in the south end of Barrie and associated development cost charges would not be collected.

3.16.2 Budget Considerations

The Corporation of the City of Barrie has a 10-Year Capital Plan which is reviewed annually by Council. As shown in Figure 3-4, the City of Barrie’s 2015 to 2019 Capital Plan currently calls for a highway crossing connecting Harvie Road to Big Bay Point Road to start the detail design by 2016 subject to endorsement by council.
Other planned transportation improvements in the area include:

- Harvie Road / Big Bay Point Road Highway 400 Crossing – Bryne Drive to Bayview Drive (7 lanes)
- Big Bay Point Road – Bayview Drive to Huronia Road (7 lanes)
- Harvie Road - Veterans Drive to Bryne Drive (5 lanes)
- Harvie Road – Essa Road to Veterans Drive (3 lanes)
- Bryne Drive – from North of Caplan to south of Essa (5 lanes)
- Bayview Drive – Big Bay Point Road to Little Ave (3 lanes)
4. DESIGN ALTERNATIVES AND EVALUATION

Integral to this planning process is the development of design alternatives to implement the Preferred Planning Solution identified in the Phase 1 and 2 Report. The development and evaluation of the design alternatives for this study is detailed in the following sections.

4.1 Design Alternative Requirements

In developing the design alternatives for Harvie Road / Big Bay Point Road as a multi-modal corridor, the following components were required:

- Six general purpose lanes for vehicular traffic
- Provision of left turn lanes and/or continuous centre median, where appropriate
- Accommodation for Active Transportation via dedicated on-road bike lanes or off-road multi-use paths.

In addition, the following aspects were considered:

- Minimizing impacts to adjacent properties
- Minimizing impacts to the municipal pump station on Big Bay Point Road
- Minimizing impacts to the natural environment (i.e. Whiskey Creek, woodlots, trees, etc.)
- Maximizing traffic operations and safety
- Minimizing construction costs

4.2 Development and Pre-Screening of Design Alternatives

Based on the considerations listed previously, a number of alternative design concepts were developed based on the Phase 2 Preferred Planning Solution that attempted to address the problem statement. A preliminary screening of these alternatives was also done at this time to eliminate alternatives that would cause significant impacts. All design alternatives were developed using 80km/h as the design speed.

The pre-screening assessment resulted in 2 alignment alternatives, 5 profile alternatives and 3 typical section alternatives being considered for further analysis as follows:

Alignment Alternatives

- Highway 400 Crossing with 500m Horizontal Radius; and
- Highway 400 Crossing with 280m Horizontal Radius.

Profile Alternatives

- Highway Crossing over Highway 400 and over the railway crossing (Refer to Figure 4-1);
- Highway Crossing over Highway 400 and at-grade with the railway crossing (Refer to Figure 4-1);
- Highway Crossing over Highway 400 and removing the railway crossing (Refer to Figure 4-1);
- Highway Crossing under Highway 400 and at-grade with the railway crossing (Refer to Figure 4-2); and
- Highway Crossing under Highway 400, raising Highway 400 and at-grade with the railway crossing (Refer to Figure 4-2).
Figure 4-1 – Proposed Profile for Harvie Road / Big Bay Point Road Crossing Over Highway 400 (Alternatives 2a and 2b)

Figure 4-2 – Proposed Profile for Harvie Road / Big Bay Point Road Crossing Under Highway 400 (Alternatives 3a, 3b and 3c)
Typical Sections

- MTO Standard Geometrics (Refer to Figure 4-3);
- City of Barrie Standard Geometrics (Refer to Figure 4-4); and
- Reduced Geometrics (Refer to Figure 4-5).

Note: cross sections are looking east and the right side of the cross section is the south side of the ROW and the north side the left.
During this process it was subsequently determined that the 500m Horizontal Radius Alignment option was to be dropped from further consideration as it would conflict with the existing municipal pump station and would place the radius on the crossing structure which was considered undesirable. The 280m Horizontal Radius alignment option was thus carried through for all Design Alternatives.

The Highway Crossing over Highway 400 and at-grade with the railway crossing profile option was dropped from further evaluation due to requiring a reduction in design speed to implement the necessary vertical curves.

The MTO Standard Geometrics typical section is required within the Controlled Access Highway (CAH) limits of Highway 400 and is carried through in all the Design Alternatives. The other typical section options were implemented within the corridor beyond the CAH limits.

The design alternatives were further assessed to be compatible with a Partial Parclo A interchange concept to fine tune what additional property is required for a potential future interchange, but will need to be updated subsequent to the completion of this EA study when the Highway 400 PDR Update is completed by MTO.
4.3 Description of Design Alternatives

Following the completion of the pre-screening process, the alternatives which were carried forward from each category were combined as appropriate to form an intermediate list of alternatives for detailed analysis. The Design Alternatives are described in the following sections and the plan drawings can be found in Appendix B.

4.3.1 Design Alternative 1: Do Nothing

Design Alternative 1 is a continuation of existing conditions and would involve no change to the existing roadway (Required to be considered for comparison purposes, as per the EA Act).

The physical environment, in terms of existing infrastructure and pavement structure will continue to deteriorate with time. Maintenance costs are expected to increase as the deterioration continues.

As the population of the City of Barrie grows, the volume of traffic in south Barrie will continue to increase. The number of complaints, disruption to enjoyment of ride and potential impact on property values will increase as the infrastructure continues to deteriorate and traffic congestion increases.

Existing property accesses will be maintained and would not require any reconstruction or relocations. Although as traffic congestion increases, accessing the properties will become more difficult for left-turning motorists as they wait for a gap in the traffic.

The natural environment will not be affected through this alternative.

4.3.2 Design Alternative 2a: Highway Crossing Over Highway 400 & Over Railway Crossing & Standard Geometrics

Design Alternative 2a is the construction of a highway crossing linking Harvie Road to Big Bay Point Road going over the existing Highway 400 and continuing over the existing railway crossing on Big Bay Point Road through a grade separation crossing then matching the existing profile further east.

The standard roadway typical section (Figure 4-4) will be implemented outside the Controlled Access Highway (CAH) limits which will increase property and grading impacts due to the larger footprint of the facility. Within the CAH limits, the MTO typical sections (Figure 4-3) will be utilised. The need to carry sidewalks along both sides of the road and along the crossing within the CAH as well as the potential to implement off-road multi-use paths in the boulevard rather than providing on-street bike lanes with buffer will be further reviewed by the project team and coordinated for MTO approval.

This Design Alternative will require the placement of high fills to a maximum of approximately 12m to implement the proposed profile to the east of Highway 400. The high fills will result in significant grading impacts to adjacent properties to implement the embankment slopes and may require the construction of retaining walls to mitigate the impacts.
The raised profile will impact the access to the municipal pump station on Big Bay Point Road and would require relocating the entrance further east, where the profile is closer to the existing road profile.

The raised profile will also significantly impact existing private property entrances which will require driveway profile reconstructions which limits of works may have the potential to require entering the property to implement.

This Design Alternative will require the realignment of the Highway 400 southbound lanes during construction to install the crossing structure. No impacts to the Highway 400 northbound lanes are anticipated.

The construction staging is anticipated to occur in the following sequence:

- Construction Stage 1: The Highway 400 southbound lanes will be permanently shifted to the west and both abutments will be constructed; and
- Construction Stage 2: The centre pier will be constructed.

A grade separation structure would be required to maintain the existing railway crossing further adding to the costs.

The realignment of Whiskey Creek under Highway 400 will be required to implement this Design Alternative. The existing 1.2mX0.9m concrete box culvert will be replaced with a closed system approximately 500m in length to convey Whiskey Creek under Highway 400 and Big Bay Point Road and outletting to the existing creek east of Fairview Road. To mitigate potential flooding issues, the proposed culvert should be sized to convey the Regional Storm flows.

Additional drainage impacts of the Design Alternative will be that West of Highway 400, the overland flow will be directed south to the upstream side of the Whiskey Creek culvert crossing.

This Design Alternative should have minor impacts to existing utilities, primarily surface features, as the raised profile may add fill on top of the existing utility corridor.

The increase in traffic and congestion will have an impact on ambient noise levels after construction. As Highway 400 traffic is the most substantial noise generator in the study area, the impacts of the proposed crossing will be minor in comparison. Since the crossing is going over Highway 400, it will be exposed to more noise with little to stop propagation.

4.3.3 Design Alternative 2b: Highway Crossing Over Highway 400, Remove Railway Crossing & Reduced Geometrics

Design Alternative 2b is similar to 2a with the exception that the railway crossing will not be maintained. This allows an optimized profile to reduce the fill required and limits impacts to adjacent properties.

The reduced roadway typical section (Figure 4-5) will be implemented which will limit the property and grading impacts in comparison to Design Alternative 2a due to the smaller footprint of the facility. Within the CAH limits, the MTO typical sections (Figure 4-3) will be utilised. The need to carry sidewalks along both sides of the road and along the crossing within the CAH as well as the potential to implement off-road multi-use paths in the boulevard rather than providing
on-street bike lanes with buffer will be further reviewed by the project team and coordinated for MTO approval.

Due to the removal of the railway crossing, the vertical profile was lowered compared to Design Alternative 2a. This will require the placement of high fills to a maximum of approximately 10m (compared to 12m required by Design Alternative 2a due to the railway grade separation) to implement the proposed profile to the east of Highway 400. The high fills will result in significant grading impacts to adjacent properties to implement the embankment slopes and may require the construction of retaining walls to mitigate the impacts.

The raised profile will impact the access to the municipal pump station on Big Bay Point Road. Compared to Design Alternative 2a, the proposed profile in the vicinity of the pump station entrance has been reduced to less than a meter grade raise. This will allow the existing entrance location to be maintained with some regrading of the driveway profile to match the new profile.

The raised profile will also impact existing private property entrances which will require driveway profile reconstructions which limits of works may have the potential to require entering the property to implement.

This Design Alternative will require the realignment of the Highway 400 southbound lanes during construction to install the crossing structure. No impacts to the Highway 400 northbound lanes are anticipated.

The construction staging is anticipated to occur in the following sequence:

- Construction Stage 1: The Highway 400 southbound lanes will be permanently shifted to the west and both abutments will be constructed; and
- Construction Stage 2: The centre pier will be constructed.

The realignment of Whiskey Creek under Highway 400 will be required to implement this Design Alternative. The existing 1.2mX0.9m concrete box culvert will be replaced with a closed system approximately 500m in length to convey Whiskey Creek under Highway 400 and Big Bay Point Road and outletting to the existing creek east of Fairview Road. To mitigate potential flooding issues, the proposed culvert should be sized to convey the Regional Storm flows.

Additional drainage impacts of the Design Alternative will be that West of Highway 400, the overland flow will be directed south to the upstream side of the Whiskey Creek culvert crossing.

This Design Alternative should have minor impacts to existing utilities, primarily surface features, as the raised profile may add fill on top of the existing utility corridor.

The increase in traffic and congestion will have an impact on ambient noise levels after construction. As Highway 400 traffic is the most substantial noise generator in the study area, the impacts of the proposed crossing will be minor in comparison. Since the crossing is going over Highway 400, it will be exposed to more noise with little to stop propagation.
4.3.4 Design Alternative 3a: Highway Crossing Under Highway 400, At Grade Railway Crossing & Standard Geometrics

Design Alternative 3a is the construction of a highway crossing linking Harvie Road to Big Bay Point Road going under the existing Highway 400 and matching the existing profile just west of the existing railway for an at-grade crossing.

The standard roadway typical section (Figure 4-4) will be implemented which will increase property and grading impacts due to the larger footprint of the facility. Within the CAH limits, the MTO typical sections (Figure 4-3) will be utilised. The need to carry sidewalks along both sides of the road and along the crossing within the CAH as well as the potential to implement off-road multi-use paths in the boulevard rather than providing on-street bike lanes with buffer will be further reviewed by the project team and coordinated for MTO approval.

This Design Alternative will require earth cuts to a maximum of approximately 4m to implement the proposed profile. The cuts may cause grading impacts to adjacent properties to implement the necessary back slopes and may require the construction of retaining walls to mitigate the impacts.

The proposed profile will follow the existing profile in the vicinity of the municipal pump station entrance. This will allow the existing entrance location to be maintained with some minor regrading of the driveway profile to accommodate the widening of Big Bay Point Road.

The lowered profile will also impact existing private property entrances which will require driveway profile reconstructions which limits of works may have the potential to require entering the property to implement.

This Design Alternative will require the realignment of the Highway 400 northbound and southbound lanes to install the crossing structures on Highway 400.

The construction staging is anticipated to occur in the following sequence:

- Construction Stage 1: The southbound crossing structure will be constructed to the west of the existing southbound lanes. The Highway 400 southbound lanes will be permanently shifted to the west and both abutments will be constructed; and
- Construction Stage 2: Southbound traffic will be shifted west to the new structure and the northbound structure will be constructed to the west of the existing northbound lanes. Highway 400 northbound lanes will then be permanently shifted to the new structure.

A bridge truss structure crossing the entire width of the road is required for the installation and support of warning signals for the at-grade rail crossing further adding to the costs. The need for a gate at the crossing will be evaluated in accordance with Transport Canada guidelines.

The realignment of Whiskey Creek under Highway 400 will be required to implement this Design Alternative. The existing 1.2mX0.9m concrete box culvert will be replaced with a closed system approximately 200m in length to convey Whiskey Creek under Highway 400 and Big Bay Point Road and outletting to the existing creek west of Fairview Road. Due to the lowered profile, overland flow can be accommodated within the roadway which will allow the proposed culvert to be sized to convey only the minor storm event flows. The sizing of the proposed culvert should be confirmed through additional hydraulic analysis and coordinated through LSRCA.
Additional drainage impacts of the Design Alternative will be that West of Highway 400, the overland flow will be directed east to the profile low-point and can outlet to the downstream side of the Whiskey Creek culvert crossing.

This Design Alternative may have impacts to existing utilities, both surface and underground features, as the cut profile may extend to the existing utility corridor and impact the required depth of cover for the utilities.

The increase in traffic and congestion will have an impact on ambient noise levels after construction. As Highway 400 traffic is the most substantial noise generator in the study area, the impacts of the proposed crossing will be minor in comparison. Since the crossing is going under Highway 400, there is opportunity to mitigate the propagation of noise into the ambient environment.

4.3.5 Design Alternative 3b: Highway Crossing Under Highway 400, At Grade Railway Crossing & Reduced Geometrics

Design Alternative 3b is similar to Design Alternative 3a with exception of the implementation of the reduced geometrics. The reduced roadway typical section will limit the property and grading impacts in comparison to Design Alternative 3a due to the smaller footprint of the facility.

This Design Alternative will require earth cuts to a maximum of approximately 4m to implement the proposed profile. The cuts may cause grading impacts to adjacent properties to implement the necessary back slopes and may require the construction of retaining walls to mitigate the impacts.

The proposed profile will follow the existing profile in the vicinity of the municipal pump station entrance. This will allow the existing entrance location to be maintained with some minor regrading of the driveway profile to accommodate the widening of Big Bay Point Road.

The lowered profile will also impact existing private property entrances which will require driveway profile reconstructions which limits of works may have the potential to require entering the property to implement.

This Design Alternative will require the realignment of the Highway 400 northbound and southbound lanes to install the crossing structures on Highway 400.

The construction staging is anticipated to occur in the following sequence:

- Construction Stage 1: The southbound crossing structure will be constructed to the west of the existing southbound lanes. The Highway 400 southbound lanes will be permanently shifted to the west and both abutments will be constructed; and
- Construction Stage 2: Southbound traffic will be shifted west to the new structure and the northbound structure will be constructed to the west of the existing northbound lanes. Highway 400 northbound lanes will then be permanently shifted to the new structure.

A bridge truss structure crossing the entire width of the road is required for the installation and support of warning signals for the at-grade rail crossing further adding to the costs. The need for a gate at the crossing will be evaluated in accordance with Transport Canada guidelines.
The realignment of Whiskey Creek under Highway 400 will be required to implement this Design Alternative. The existing 1.2mX0.9m concrete box culvert will be replaced with a closed system approximately 200m in length to convey Whiskey Creek under Highway 400 and Big Bay Point Road and outletting to the existing creek west of Fairview Road. Due to the lowered profile, overland flow can be accommodated within the roadway which will allow the proposed culvert to be sized to convey only the minor storm event flows. The sizing of the proposed culvert should be confirmed through additional hydraulic analysis and coordinated through LSRCA.

Additional drainage impacts of the Design Alternative will be that West of Highway 400, the overland flow will be directed east to the profile low-point and can outlet to the downstream side of the Whiskey Creek culvert crossing.

This Design Alternative may have impacts to existing utilities, both surface and underground features, as the cut profile may extend to the existing utility corridor and impact the required depth of cover for the utilities.

The increase in traffic and congestion will have an impact on ambient noise levels after construction. As Highway 400 traffic is the most substantial noise generator in the study area, the impacts of the proposed crossing will be minor in comparison. Since the crossing is going under Highway 400, there is opportunity to mitigate the propagation of noise into the ambient environment.

**4.3.6 Design Alternative 3c: Highway Crossing Under Highway 400, Raising Highway 400, At Grade Railway Crossing & Reduced Geometrics**

Design Alternative 3c is similar to Design Alternative 3b with the exception that Highway 400 will be raised at the crossing location to obtain the necessary clearance between the proposed crossing profile and the existing 1.2mX0.9m concrete box culvert conveying Whiskey Creek. This allows for an optimized profile to reduce the cut required and eliminates the low-point within the crossing location that is present in Design Alternative 3a and 3b. The reduced roadway typical section will limit the property and grading impacts in comparison to Design Alternative 3a due to the smaller footprint of the facility.

This Design Alternative will require earth cuts to a maximum of approximately 2m to implement the proposed profile (compared to 4m required for Design Alternative 3a and 3b). The cuts may cause grading impacts to adjacent properties to implement the necessary back slopes and may require the construction of retaining walls to mitigate the impacts.

The proposed profile will follow the existing profile in the vicinity of the municipal pump station entrance. This will allow the existing entrance location to be maintained with some minor regrading of the driveway profile to accommodate the widening of Big Bay Point Road.

The lowered profile will also impact existing private property entrances which will require driveway profile reconstructions which limits of works may have the potential to require entering the property to implement.

This Design Alternative will require the realignment of the Highway 400 northbound and southbound lanes to install the crossing structures on Highway 400. The raising of the Highway 400 profile will also significantly increase the construction impacts to Highway 400 to tie in the raised profile back to existing.
The construction staging is anticipated to occur in the following sequence:

- **Construction Stage 1:** The southbound crossing structure will be constructed to the west of the existing southbound lanes. The Highway 400 southbound lanes will be permanently shifted to the west and both abutments will be constructed; and  
- **Construction Stage 2:** Southbound traffic will be shifted west to the new structure and the northbound structure will be constructed to the west of the existing northbound lanes. Highway 400 northbound lanes will then be permanently shifted to the new structure.

A bridge truss structure crossing the entire width of the road is required for the installation and support of warning signals for the at-grade rail crossing further adding to the costs. The need for a gate at the crossing will be evaluated in accordance with Transport Canada guidelines.

The realignment of Whiskey Creek under Highway 400 will be required to implement this Design Alternative. The existing 1.2mX0.9m concrete box culvert will be extended by approximately 200m in length to convey Whiskey Creek under Highway 400 and Big Bay Point Road and outletting to the existing creek west of Fairview Road. The raised profile in comparison to Design Alternatives 3a and 3b will allow the existing Whiskey Creek profile to be maintained. Due to the lowered profile, overland flow can be accommodated within the roadway which will allow the culvert to be sized to convey only the minor storm event flows.

The elimination of the profile low-point will also have the benefit that overland flow will be directed east and can outlet directly to the existing Whiskey Creek channel.

This Design Alternative may have impacts to existing utilities, both surface and underground features, as the cut profile may extend to the existing utility corridor and impact the required depth of cover for the utilities.

The increase in traffic and congestion will have an impact on ambient noise levels after construction. As Highway 400 traffic is the most substantial noise generator in the study area, the impacts of the proposed crossing will be minor in comparison. Since the crossing is going under Highway 400, there is opportunity to mitigate the propagation of noise into the ambient environment.

## 4.4 Evaluation Criteria

The design alternatives developed to correct the deficiencies are to be screened with respect to their impact on the physical, social/cultural, natural, and economic environments. The assessment process compares various alternatives to the undertaking in a comprehensive manner by ensuring that the conclusions and recommendations are reached in a clear and logical fashion, and that all environmental issues sensitive to each undertaking are given thorough consideration. This assessment has been based on the work undertaken to-date.

The preliminary assessment and evaluation of design alternatives table used the Design Alternatives above and weighs each against the following Evaluation Criteria:

### Technical
- Design Speed;
- Traffic Operations (Includes Road Geometrics and Active Transportation);
**Physical**
- Emergency Services;
- Railway;
- Property Access;
- Transit; and
- Water Booster Pump Station.

**Social / Cultural**
- Archaeological;
- Residential;
- Noise; and
- Development.

**Natural**
- Fisheries / Aquatic Habitats;
- Natural Hazards; and
- Terrestrial Habitats.

**Economic**
- Capital Costs (Harvie and Big Bay);
- Capital Costs (Highway 400);
- Maintenance Costs;
- Economic Stimulus due to Development of open lands; and
- Land Costs.

4.5 Evaluation and Assessment of the Design Alternative

The design alternatives were evaluated qualitatively based on the set of evaluation criteria. The design alternatives were assessed under each criterion individually and the overall effectiveness of the alternative was determined. **Table 4-1** illustrates the complete evaluation of the Design Alternatives.

The Do Nothing option would not address the future congestion and facilitate any future growth in the area, although there would be no natural environmental impacts as in **Table 4-1**, the social impact related to congestion, including time loss and commuter frustration would increase as delays grow. Therefore, the Do Nothing option was deemed ineffective.
### Table 4-1 - Evaluation & Assessment of Alternative Designs for Harvie / Big Bay Point Crossing

<table>
<thead>
<tr>
<th>Description of Evaluation Criteria</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>How the Criteria is Being Assessed</td>
<td>Do Nothing</td>
</tr>
<tr>
<td>Technical</td>
<td></td>
</tr>
<tr>
<td>Design Speed</td>
<td>Impact on roadway design speed.</td>
</tr>
<tr>
<td>Traffic Operation (Includes Road Geometrics &amp; Active Transportation)</td>
<td>Ability to maintain and/or maximize opportunities for improved Traffic Operations including Road Geometrics (i.e. Lane Widths) and Active Transportation (i.e. Sidewalks, On-Street Bike Lanes).</td>
</tr>
<tr>
<td>Physical</td>
<td></td>
</tr>
<tr>
<td>Emergency Services</td>
<td>Ability to maintain and/or maximize opportunities for improved access for emergency vehicles.</td>
</tr>
<tr>
<td>Rail</td>
<td>Ability to minimize impacts on the existing at-grade railway spur crossing Big Bay Point Road.</td>
</tr>
<tr>
<td>Property Access</td>
<td>Ability to maintain and/or maximize opportunities for improved access to adjacent residential and commercial properties. Property access would be reviewed on a site by site basis.</td>
</tr>
</tbody>
</table>
Table 4-1 - Evaluation & Assessment of Alternative Designs for Harvie / Big Bay Point Crossing (Cont’d)

<table>
<thead>
<tr>
<th>Description of Evaluation Criteria</th>
<th>How the Criteria is Being Assessed</th>
<th>Alternative 3a</th>
<th>Alternative 2b</th>
<th>Alternative 3c</th>
<th>Alternative 2b</th>
<th>Alternative 3a</th>
<th>Alternative 2b</th>
<th>Alternative 3a</th>
<th>Alternative 2b</th>
<th>Alternative 3a</th>
<th>Alternative 2b</th>
<th>Alternative 3c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transit</td>
<td>Ability to improve from existing and/or integrate transit services into the overall transportation system.</td>
<td>• No improvements to existing emergency services.</td>
<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
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<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
</tr>
<tr>
<td>Water Booster P&amp;I</td>
<td>Ability to minimize impacts on the existing Water Booster Pump Station along Big Bay Point Road.</td>
<td>• No impacts to the pump station.</td>
<td>• Significant noise in road profile adjacent to the pump station to accommodate railway grade elevation and impact existing entrance and grading.</td>
<td>• Raise in road profile adjacent to the pump station will impact existing entrance and grading.</td>
<td>• Reduced roadway widths will limit the impacts to the property.</td>
<td>• Road profile adjacent to the pump station closely follows the existing grade and will minimally impact the pump station.</td>
<td>• Reduced roadway widths will limit the impacts to the property.</td>
<td>• Road profile adjacent to the pump station closely follows the existing grade and will minimally impact the pump station.</td>
<td>• Reduced roadway widths will limit the impacts to the property.</td>
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<td>• Reduced roadway widths will limit the impacts to the property.</td>
<td>• Road profile adjacent to the pump station closely follows the existing grade and will minimally impact the pump station.</td>
</tr>
<tr>
<td>Social/Cultural Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Archaeological</td>
<td>Potential for disruption of archaeological resources.</td>
<td>• No impacts on archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
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<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
</tr>
<tr>
<td>Residential</td>
<td>Potential for impacts on adjacent residential areas.</td>
<td>• No disruption to the corridor.</td>
<td>• Reduction in noise and existing congestion at Easa and Mapleview.</td>
<td>• Reduced traffic and noise congestion at Easa Road and Mapleview Drive where majority of residential properties exist.</td>
<td>• Reduced traffic and noise congestion at Easa Road and Mapleview Drive where majority of residential properties exist.</td>
<td>• Reduced traffic and noise congestion at Easa Road and Mapleview Drive where majority of residential properties exist.</td>
<td>• Reduced traffic and noise congestion at Easa Road and Mapleview Drive where majority of residential properties exist.</td>
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<td>• Reduced traffic and noise congestion at Easa Road and Mapleview Drive where majority of residential properties exist.</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>Ability to minimize impacts on ambient noise levels after construction due to increase in traffic and congestion. Highway 400 traffic is the most substantial noise generator.</td>
<td>• Increased traffic on Easa, Mapleview and Byrne Drive are not distributed. Most significant residential areas are nearby at Easa.</td>
<td>• Noise higher for the crossing pavement.</td>
<td>• Noise higher for the crossing pavement.</td>
<td>• Noise higher for the crossing pavement.</td>
<td>• Noise higher for the crossing pavement.</td>
<td>• Noise higher for the crossing pavement.</td>
<td>• Noise higher for the crossing pavement.</td>
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<td>• Noise higher for the crossing pavement.</td>
<td>• Noise higher for the crossing pavement.</td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td>Potential for impacts on adjacent and future development.</td>
<td>• No impacts to development but lack of transportation improvements will reduce potential economic benefits.</td>
<td>• Allows for future development potential.</td>
<td>• Reduces visibility of the Highway 400 Service Centre.</td>
<td>• Allows for future development potential.</td>
<td>• Reduces visibility of the Highway 400 Service Centre.</td>
<td>• Allows for future development potential.</td>
<td>• Reduces visibility of the Highway 400 Service Centre.</td>
<td>• Allows for future development potential.</td>
<td>• Reduces visibility of the Highway 400 Service Centre.</td>
<td>• Allows for future development potential.</td>
<td></td>
</tr>
<tr>
<td>Natural Environment</td>
<td>Potential for impacts on fisheries, aquatic habitats and watercourses.</td>
<td>• No impacts on fisheries, aquatic habitats and watercourses.</td>
<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 350m of larger closed system.</td>
<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 350m of larger closed system.</td>
<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 350m of larger closed system.</td>
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<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 350m of larger closed system.</td>
<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 350m of larger closed system.</td>
<td>• The existing 1.22m X 1.2m box culvert carrying Whiskey Creek under Hwy 400 can be maintained and extended.</td>
</tr>
</tbody>
</table>
## Table 4-1 - Evaluation & Assessment of Alternative Designs for Harvie / Big Bay Point Crossing (Cont’d)

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>How the Criteria is Being Assessed</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural Hazards</strong></td>
<td>Potential for impacts on natural hazards, erosion, flooding and flooding for major storm flows over Bryne Ditch from 980M Point west of Highway 400 Reduced over standard Geometric may mitigate.</td>
<td></td>
</tr>
<tr>
<td>Do Nothing</td>
<td>West of Harvie 400, the overland flow will be directed west to the upstream side of the Whiskey Creek culvert crossing. The existing road structure will require upgrading to accommodate the increased flows and convey the Regional Storm.</td>
<td></td>
</tr>
<tr>
<td>Alternative 2a - Harvie / Big Bay Point Crossing Overway Highway 400 Railway Crossing &amp; Standard Geometric</td>
<td>West of Harvie 400, the overland flow will be directed west to the upstream side of the Whiskey Creek culvert crossing. The existing road structure will require upscaling to accommodate the increased flows and convey the Regional Storm.</td>
<td></td>
</tr>
<tr>
<td>Alternative 3b - Harvie / Big Bay Point Crossing Over Harvie 400 Railway Crossing &amp; Reduced Geometric</td>
<td>West of Harvie 400, the overland flow will be directed east to the profile low point and can outfall to the downstream side of the Whiskey Creek culvert crossing. The existing road structure upscaling will be minimized.</td>
<td></td>
</tr>
<tr>
<td>Alternative 3c - Harvie / Big Bay Point Crossing Under Harvie 400 Railway Crossing &amp; Standard Geometric</td>
<td>Overland flow will be directed east and can outfall directly to the existing Whiskey Creek culvert crossing.</td>
<td></td>
</tr>
<tr>
<td>Alternative 3d - Harvie / Big Bay Point Crossing Under Harvie 400 Railway Crossing &amp; Reduced Geometric</td>
<td>Overland flow can be carried through opening under Harvie 400 over Harvie Road.</td>
<td></td>
</tr>
<tr>
<td>Terrestrial Habitat</td>
<td>Potential for impacts on terrestrial species and habitats (Wildlife &amp; Vegetation).</td>
<td></td>
</tr>
<tr>
<td>Do Nothing</td>
<td>No impacts to existing woodlots.</td>
<td></td>
</tr>
<tr>
<td>Alternative 2a - Harvie / Big Bay Point Crossing Overway Highway 400 Railway Crossing &amp; Standard Geometric</td>
<td>No impacts to existing woodlots.</td>
<td></td>
</tr>
<tr>
<td>Alternative 3b - Harvie / Big Bay Point Crossing Over Harvie 400 Railway Crossing &amp; Reduced Geometric</td>
<td>No impacts to existing woodlots.</td>
<td></td>
</tr>
<tr>
<td>Alternative 3c - Harvie / Big Bay Point Crossing Under Harvie 400 Railway Crossing &amp; Standard Geometric</td>
<td>No impacts to existing woodlots.</td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td>Capitale Cost Harvie &amp; Big Bay Point</td>
<td>Construction costs to implement improvements on Harvie Road and Big Bay Point Road.</td>
</tr>
<tr>
<td>Do Nothing</td>
<td>No construction costs</td>
<td></td>
</tr>
<tr>
<td>Alternative 2a - Harvie / Big Bay Point Crossing Overway Highway 400 Railway Crossing &amp; Standard Geometric</td>
<td>Additional costs due railway grade separation crossing structure.</td>
<td></td>
</tr>
<tr>
<td>Alternative 3b - Harvie / Big Bay Point Crossing Over Harvie 400 Railway Crossing &amp; Reduced Geometric</td>
<td>Additional costs due railway grade separation crossing structure.</td>
<td></td>
</tr>
<tr>
<td>Maintenance Costs</td>
<td>Costs to maintain infrastructure over short and medium term.</td>
<td></td>
</tr>
<tr>
<td>Do Nothing</td>
<td>Increasing maintenance costs as existing infrastructure deteriorates and requires repairs.</td>
<td></td>
</tr>
<tr>
<td>Alternative 2a - Harvie / Big Bay Point Crossing Overway Highway 400 Railway Crossing &amp; Standard Geometric</td>
<td>Costs limited to winter maintenance (Salt, Sanding, Snowploughing)</td>
<td></td>
</tr>
<tr>
<td>Alternative 3b - Harvie / Big Bay Point Crossing Over Harvie 400 Railway Crossing &amp; Reduced Geometric</td>
<td>Costs limited to winter maintenance (Salt, Sanding, Snowploughing)</td>
<td></td>
</tr>
<tr>
<td>Economic Stimulus due to Development of open lands</td>
<td>Provides for additional traffic required for new development.</td>
<td></td>
</tr>
<tr>
<td>Do Nothing</td>
<td>No improvement or allowance for new development.</td>
<td></td>
</tr>
<tr>
<td>Alternative 2a - Harvie / Big Bay Point Crossing Overway Highway 400 Railway Crossing &amp; Standard Geometric</td>
<td>Provides for new development</td>
<td></td>
</tr>
<tr>
<td>Alternative 3b - Harvie / Big Bay Point Crossing Over Harvie 400 Railway Crossing &amp; Reduced Geometric</td>
<td>Provides for new development</td>
<td></td>
</tr>
<tr>
<td>Land Costs</td>
<td>Costs to acquire adjacent property to implement transportation improvements.</td>
<td></td>
</tr>
<tr>
<td>Do Nothing</td>
<td>No property acquisitions required</td>
<td></td>
</tr>
<tr>
<td>Alternative 2a - Harvie / Big Bay Point Crossing Overway Highway 400 Railway Crossing &amp; Standard Geometric</td>
<td>Significant property acquisitions required</td>
<td></td>
</tr>
<tr>
<td>Alternative 3b - Harvie / Big Bay Point Crossing Over Harvie 400 Railway Crossing &amp; Reduced Geometric</td>
<td>Significant property acquisitions required</td>
<td></td>
</tr>
</tbody>
</table>
5. CONSULTATION (PUBLIC INFORMATION CENTRE #2)

Consultation is a key feature of the environmental assessment planning process, which provides a two-way communications process between the proponent and the affected and interested parties. Consultation provides opportunities for information exchange and for those consulted to have their concerns considered during the decision-making process. The goal of consultation is to generate meaningful dialogue between the project planners and stakeholders and to allow an exchange of ideas and broadening of the information base to ultimately lead to an improved decision-making process, and thereby, an improved design solution.

The second Public Information Centre (PIC #2) is currently scheduled for April 23, 2015.

The PIC #2 will present the alternative designs and evaluation to the public to obtain comments and suggestions received from the public and agencies. Based on input received from public agencies and other stakeholders, the project team will select the Preferred Design Alternative.

The information displayed during the PIC included the following:

- Purpose of the Public Information Centre #2
- Summary of Additional Studies Completed Since Public Information Centre #1
- Study Purpose
- Objectives of Phase 3 & 4 of the Class EA
- Municipal Class EA Plan and Design Process in Ontario
- Transportation Master Plan Recommendations
- Study Area
- Alternative Design Concepts
- Evaluation of Alternative Design Concepts
- Highway 400 Crossing Estimated Costs and Timing
- Preliminary Future Interchange Property Requirements

A copy of the PIC display boards is included in Appendix C.
6. ENVIRONMENTAL IMPACTS, MITIGATION MEASURES AND MONITORING

This section describes the anticipated or potential environmental impacts, both positive and negative, associated with the implementation of the proposed transportation improvements. Mitigation measures, to minimize any adverse effects of the project, and recommended monitoring activities are also identified in this chapter.

6.1 Property Impacts

Property takings will be required to implement the Highway 400 crossing. Outside of the existing ROW’s property is privately owned exception of the parcel south of the Highway 400 Service Centre, east of Highway 400, west of Fairview Road and north of the Big Bay Point Road ROW.

Additional property will be required for the future interchange. Since the interchange design will not be finalized until after completion of the Highway 400 PDR Update, it is important that the property adjacent to the future interchange is protected from any further development. The City will negotiate the protection as part of its development review and approval.

Refer to Slide 19 in Appendix B for the anticipated property impacts of the interchange construction.

The final property required to implement the interchange will be dependent on the proposed ramp design which will require confirmation through an update to the Traffic Report and additional weaving and safety analysis.

6.2 Natural Environment

6.2.1 Terrestrial Impacts Assessment and Mitigation

Potential impacts to the terrestrial habitat in the project area include loss of/damage to vegetation, disturbance to bird’s nests and loss of habitat to other animals. With appropriate mitigation measures damage can be kept to a minimal level.

The following mitigation measures are recommended to protect terrestrial habitat include:
- Appropriate lengths of silt fencing along the perimeter of minimized, designated work areas to limit construction impacts;
- Utilization best management practices;
- Prior to construction the contractor shall inspect the construction area for nests and eggs and advise the Contract Administrator of the locations of any nests and eggs immediately;
- The contractor shall, prior to the removal of any nests, notify the Contract Administrator who shall contact the Environmental Office and the environmental consultant responsible for birds;
- Following the removal of a nest, the structure will be netted to prevent the recurrence of nesting activity;
- The contractor shall monitor the area daily for the recurrence of nesting activity upon removal of nests and notify the Contract Administrator immediately if a nest reappears;
- The contractor shall not destroy nests and eggs of protected migratory birds during migratory bird nesting season (April 1 to July 15);
Advise workers to perform a visual survey of machinery and work area prior to commencing work, as wildlife may be found basking or hiding on or under equipment, rocks, debris piles etc.;

If any trenches are being filled, visually inspect the trench before filling and release any wildlife that is within the trench;

Minimized vegetation removal;

Development and implementation of a replanting plan in keeping with the sensitive local communities, and based on native, indigenous species complementary to those communities and their ecological functions;

Trees or shrubs to be removed during construction should be considered with respect to transplanting opportunities within the project area, as feasible regarding slope and exposure characteristics, soil types and moisture regimes, and relative timing considerations;

The impacts and implementation of mitigation measures will be reviewed during the detailed design stage.

6.2.2 Fisheries and Aquatic Habitat Impacts and Mitigation

Whiskey Creek is considered degraded within the study area but supports sensitive coldwater species in its downstream reaches. In addition a SWM Pond was approved and recently built immediately upstream of the study area and directly on Whiskey Creek. Efforts are being made by LSRCA and landowners to rehabilitate and protect coldwater habitats within Whiskey Creek. In addition, the LSRCA has identified that the design will be subject to the following parameters with respect to Whiskey Creek:

- Maintain the quality and quantity of the water within Whiskey Creek;
- Maintain the floodplain function of Whiskey Creek;
- Prevent erosion and sedimentation;
- Maintain and enhance fish habitat;
- Provide for appropriate mitigation (replacement) for natural feature loss; and
- Maintain the geomorphological processes (i.e. meanderbelt) of Whiskey Creek.

The following are potential environmental impacts to aquatic habitat that have been identified:

- Permanent changes to existing aquatic habitat related to the enclosure and/or modification of the existing channel;
- Alteration of riparian vegetation which may affect bank stability and exposed soils;
- Increased erosion potential which may lead to sediment transport; and
- Introduction of contaminants into the watercourse through increased stormwater runoff, the use of industrial equipment, and construction debris which may lead to changes in water chemistry and/or cause direct mortality of fish.

The following mitigation measures are recommended to avoid causing harm to fish and fish habitat for work in and around Whiskey Creek are described below:

- Implementation of timing constraints for in-water works to the period from October 1 to June 1 where no in-water work can occur for coldwater watercourses to protect sensitive life stages/processes of fish;
Design and implement isolation/containment plan to delineate in-water work zones to allow work in the dry and maintain clean flow downstream/around the work zone at all times;

Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish;

Manage all water from dewatering operations to prevent erosion and/or release of sediment-laden or contaminated water to the waterbody;

Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish;

Any dewatering should be filtered through a sediment bag and discharged in the roadside ditch or flat vegetated area as far from the watercourse as reasonably possible (minimum 30m);

Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site;

Limit access to waterbody and banks to protect riparian vegetation and minimize bank erosion;

Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting;

Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed;

Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site;

Design and implement erosion and sediment controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to the waterbody, and ensure site is stabilized prior to removal following construction;

Regular inspection and maintenance of erosion and sediment control measures during the course of construction;

Repairs to erosion and sediment control measures and structures if damage occurs;

Stabilize and re-vegetate all areas of disturbed/exposed soil following construction;

Design and implement vegetation rehabilitation plan following construction to reinstate riparian vegetation to pre-construction or better condition;

Removal of non-biodegradable erosion and sediment control materials once site is stabilized;

A qualified environmental inspector shall monitor construction activities in and around watercourses and ensure all related mitigation measures are properly installed and maintained, and are functioning effectively;

Stockpiles will be located at a minimum of 30m from the watercourse and isolated to ensure material will not enter any watercourse, wetland or ditchline. All stockpiles will be removed upon completion of the works and the site restored, as appropriate;
• Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site;
• Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds;
• Operate, store and maintain all equipment and associated materials in a manner that prevents the entry of any deleterious substance to the waterbody;
• All mobile equipment will have drip pans installed and refueling will take place no closer than 30m to any study area watercourses, wetted roadside channels, ditchlines, and wetlands in order to prevent water contamination due to accidental fuel spills;
• All construction debris and litter will be removed frequently; and
• Restoration of any temporary disruptions to in-stream fish habitat promptly.

Further coordination with LSRCA will be undertaken during the detailed design phase to refine the impact mitigation plan for aquatic habitats.

6.2.3 Erosion and Sediment Control

An Erosion and Sediment Control plan will be prepared during detailed design to minimize the erosion and sedimentation during the temporary construction works.

The following mitigation measures are recommended for implementation in the Erosion and Sediment Control Plan:
• Conscientious design, installation and maintenance of sediment traps, silt fencing, and check dams;
• Timely re-vegetation of exposed soils, both for temporary work areas and final grades (existing vegetation on embankments shall be maintained as long as possible and new slopes shall be stabilized as soon as possible by seeding and mulching);
• Minimized vegetation removal;
• The contractor will be required to specify construction access routes and fuelling areas to avoid watercourse and groundwater contamination and siltation;
• The contractor will be reminded of the requirement to report contaminant spills (including the discharge of sediment into waterways) as per the Environmental Protection Act and the Fisheries Act. All toxic chemicals and contaminants must be disposed of off-site in approved disposal sites under appropriate MOE regulations.

6.2.4 Permits and Approvals

Whiskey Creek has been identified as supporting a sensitive coldwater fishery in its downstream reaches but is considered degraded within the project area with a SWM Pond recently built immediately upstream of the study area. All proposed project work have to follow the timing windows identified by LSRCA, as well as the mitigation measures listed in this report, in order to mitigate impacts to Whiskey Creek. Further assessment of the preferred alternative at detailed design is required, to determine if “serious harm” to fish and fish habitat will result under Section 35 of the Fisheries Act.

A permit from Lake Simcoe Region Conservation Authority will be required, under the regulation Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.”
Potential habitat exists within the study area for four species protected under the Endangered Species Act. Vegetation removals should be assessed for bird nesting habitat and/or bat maternity colonies prior to removal and, in the instance that a nest or maternity colony is encountered, consultations with Ministry of Natural Resources should be undertaken to determine the need for a permit or approval.

The removal or destruction of any nest of a migratory bird protected under the Migratory Birds Convention Act may require approval from Environment Canada – Canadian Wildlife Service.

### 6.3 Geotechnical

As previously discussed in **Section 4.3**, significant earth cut and fill are anticipated as part of the construction of the highway crossing which will increase the roadway footprint and associated impacts.

The potential to use steeper slopes should be examined during the detailed design phase to limit the impacts of grading.

Detailed geotechnical investigations are recommended for the detailed design of cut and fill slopes of significant height.

If steeper slopes are found to be unfeasible or do not limit the grading as required, the use of retaining walls should be investigated. Detailed foundation investigations are recommended for the detailed design of any retaining structure.
7. WHERE DO WE GO FROM HERE

This Environmental Study Report (ESR) is the documentation required for Schedule "C" projects. This ESR details the decision-making process and the selection of the preferred design.

Following the completion of the PIC, and in consideration of all concerns raised through review agency and public comment, the preferred alternative design solution will be identified and appropriately documented in the ESR. The ESR and accompanying recommendations will then be presented to the City of Barrie General Committee of Council for endorsement. Those individuals and parties that requested to be kept informed of the Class EA process will be notified of the date that Council may approve the preferred alternative design solution so that deputations to Council can be made.

Following approval by Barrie City Council, the Final Draft ESR will be placed on the public record for a period of at least 30 calendar days and be available for review by the public or any other interested parties with a Notice of Completion being issued.

If concerns are raised during the Class EA process which cannot be resolved in discussion with the Corporation of the City of Barrie, the Ministry of the Environment may be requested to make an Order for the project to comply with Part II of the Environmental Assessment Act (referred to as a Part II Order). Requests for a Part II Order must be received by the Ministry of the Environment within 30 days of the publication of the Notice of Completion. A copy of the request must also be sent to the City of Barrie Engineering Department (see contact information below).

The Honourable Glen R. Murray
Minister of the Environment and Climate Change
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, ON M7A 2T5

Mr. Ralph Scheunemann, P. Eng.
City of Barrie, Engineering Department
P.O. Box 400
70 Collier Street, 6th Floor
Barrie, ON L4M 4T5

Following the successful completion of the Class EA process, and providing no Part II Orders have been received, it would be the City's intention to proceed to detail design for the Highway Crossing in 2016 subject to budget approval by City of Barrie Council.
APPENDIX A – Stage 2 Archaeological Assessment
SUPPLEMENTARY DOCUMENTATION FOR:
THE STAGE 2 ARCHAEOLOGICAL ASSESSMENT
FOR THE MUNICIPAL CLASS EA FOR
HARVIE ROAD/BIG BAY POINT ROAD/HIGHWAY 400,
CITY OF BARRIE, SIMCOE COUNTY
(Parts of Lots 7 and 8, Concessions 12 and 13, Geo. Twp. of Innisfil (now City of Barrie))

Prepared for
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Toronto, ON M2J 1T1
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JGrebenc@morrisonhershfield.com

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am@archaeological.ca
416-652-2141

Supplementary Documentation
Licence P035
P.I.F. # P035-0203-2013
12-Nov-2013
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2.0 IMAGES  
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- Plate 2: Recording Site 1 location.  
- Plate 3: Recording Site 1 location.  
- Plate 4: Site 2 location.  

# LIST OF MAPS

- Figure 1: Location of the Highway 400 Harvie Road Big Bay Point Road study area, 31D05 Barrie (Natural Resources Canada 2010).  
- Figure 2: Study limits assessment methodology, site locations and photo views.
1.0 PROJECT CONTEXT

1.1 Development Context

This report discusses the rationale, methods and results of the Stage 2 archaeological assessment for the lands around Harvie Road/Big Bay Point Road/Highway 400, City of Barrie, Simcoe County. The study is part of a Municipal Class Environmental Assessment triggered under the Environmental Assessment Act (RSO 1990). The purpose of this study is to identify archaeological potential for the location of any Aboriginal and Euro-Canadian archaeological sites that may be impacted by a proposed redesign and assess these areas prior to purchase of the property. The project was conducted pre-purchase during Phase 3 and 4 of the Environmental Assessment for the road connection and possible highway ramps. The archaeological assessment was conducted for Morrison Hershfield Limited on behalf of the City of Barrie.

All archaeological assessment activities were performed according to the Standards and Guidelines for Consultant Archaeologists (MTC 2011). All work was done under the archaeological consulting license, P035, issued to Andrew Murray of A. M. Archaeological Associates under the Ontario Heritage Act. All records and artifacts pertaining to this project will be curated at the offices of A. M. Archaeological Associates. Permission to enter the subject property was arranged by Morrison Hershfield.

The road plans impact three areas east of Highway 400 and one area west of the highway (Figure 1). The three areas east of the highway include a three hectare area determined by a previous Stage 1 to have no archaeological potential because it was the site of a former brewery. The other two eastern areas are east and west of Fairview Road encompassing 1.3 and 1.9 hectares of land north of the Big Bay Point Road right-of-way. The western study area encompassed five hectares of land north of Harvie Road and Highway 400.

1.2 Record of Finds

Two archaeological sites were identified during the test pit assessment of the lands required for the project. Site 1 consists of the recovery of 11 artifacts from six shovel test pits across 135 metre long area. Nine of the artifacts are ceramic body sherds that indicate a Late Woodland occupation. Two of the artifacts are chunky fragments of Onondaga chert shatter. This chert debitage is not diagnostic of a specific time period or culture but the chunky pieces are consistent with the Late Woodland affiliation. These finds were catalogued under registered site designation BcGw-93.
Site 2 consists of a single small bifacial tool fragment. The colour and potlids indicate the tool has been burnt. The knapping qualities of Onondaga chert do not benefit from heat treatment so it is likely this tool was disposed in a hearth. The test pit was 135 metres from the concentration of artifacts of Site 1 so it is considered a separate archaeological site. Since this site could be an isolated find or part of BcGw-93, it has not been registered at this time.

### Table 1: Descriptive catalogue of artifacts

<table>
<thead>
<tr>
<th>TP</th>
<th>Freq</th>
<th>Type</th>
<th>Material</th>
<th>Easting</th>
<th>Northing</th>
<th>L</th>
<th>W</th>
<th>Th</th>
<th>Wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.01</td>
<td>1</td>
<td>Body sherd</td>
<td>Ceramic</td>
<td>604403</td>
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</tr>
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<td>4</td>
<td>Body sherds</td>
<td>Ceramic</td>
<td>604414</td>
<td>4911158</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5.3</td>
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<tr>
<td>1.03</td>
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<td>Flake</td>
<td>Onondaga</td>
<td>604383</td>
<td>4911117</td>
<td>19.2</td>
<td>10.3</td>
<td>7.6</td>
<td>0.9</td>
</tr>
<tr>
<td>1.04</td>
<td>3</td>
<td>Body sherds</td>
<td>Ceramic</td>
<td>604343</td>
<td>4911109</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>1.05</td>
<td>1</td>
<td>Body sherd</td>
<td>Ceramic</td>
<td>604431</td>
<td>4911161</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.2</td>
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<td>1.06</td>
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<td>604451</td>
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<td>24.8</td>
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<tr>
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<td>Biface</td>
<td>Onondaga</td>
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<td>4911312</td>
<td>21.4</td>
<td>11.5</td>
<td>5.1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Note: Coordinates are UTM NAD 1983.

### 1.2.1 Inventory of Documentary Record

The documentary record of the project consists of 8 GPS tracks, 4 GPS location files, 52 geo-tagged digital photographs and one digital Stage 1 and 2 assessment form. The artifact collection has been labelled, bagged and catalogued and is stored in one 4” by 6” six millimetre plastic zip-lock bag. The artifact and documentary record will be stored at the office of A. M. Archaeological Associates until they can be deposited at a long-term storage facility with the approval of the Ministry of Tourism, Culture and Sport.
2.0 IMAGES

Plate 1: Recording Site 1 location.

Plate 2: Recording Site 1 location.

Plate 3: Recording Site 1 location.

Plate 4: Site 2 location.
3.0 MAPS

Figure 1: Location of the Highway 400 Harvie Road Big Bay Point Road study area, 31D05 Barrie (Natural Resources Canada 2010).

A. M. Archaeological Associates
APPENDIX B – Alternative Design Drawings
APPENDIX C – Public Information Display Boards
Welcome to Public Information Centre #2
Harvie Road / Big Bay Point Road / Highway 400
Transportation Improvements

Municipal Class Environmental Assessment,
Phases 3 and 4
Public Information Centre

Thursday April 23th, 2015
Please provide your comments by May 7th, 2015
Purpose of the Public Information Centre #2

The purpose of holding this Public Information Centre is to:

- Provide a summary of Phase 1 & 2 of the Class EA process;
- Provide a summary of the studies completed since Public Information Centre #1;
- Present alternative preliminary designs considered for Harvie Road / Big Bay Point Road / Highway 400;
- Present potential benefits / impacts associated with the alternative preliminary designs;
- Obtain public input and comments;
- The needs / justification and property requirements for a potential interchange will be established / refined through a future Class EA study; and
- Identify the next steps in the Class EA process.
Phase 1 & 2 Class EA Preferred Alternative – Harvie / Big Bay Point Crossing and Protection of Land for a Highway Interchange
Summary of Additional Studies Completed for EA Study since Public Information Centre #1

Traffic
- 6-lane highway crossing with turning lanes will be implemented at Harvie Road / Big Bay Point Road as recommended by the City of Barrie’s Multi-Modal Active Transportation Master Plan (TMP).

Social / Cultural Environment
- Archaeological findings have been identified within the study area and the preliminary design will be adjusted to take the archeological findings into account.

Natural Environment
- The proposed improvements to the Harvie Road/Big Bay Point Road/Highway 400 within the study area can be completed without significant adverse impacts to the existing natural habitat.
- Whiskey Creek has been identified as supporting a sensitive coldwater fishery in its downstream reaches but is considered degraded within the project area with a SWM Pond recently built immediately upstream of the study area.
- No species at risk were observed during field investigations. However, potential habitat exists within the study area for four species protected under the Endangered Species Act.
The purpose of Phases 3 and 4 of the Class EA study is to address:

- The existing traffic and infrastructure deficiencies in an environmentally friendly manner, which also meets future transportation needs.

- The problems and complaints associated with the congested transportation system in the south end of Barrie.
The major objectives of this study are to:

- Complete the Municipal Class EA process with participation from the public and affected parties;

- Provide satisfactory consideration for a reasonable range of alternatives for a Harvie / Big Bay Point crossing of Highway 400 and consideration for property protection for a potential interchange which will be further refined in a future Class EA study;

- Consider the effects on all aspects of the environment and systematic evaluation of alternatives; and

- Develop a preferred design alternative for the Harvie / Big Bay Point crossing and protection of land for a potential future interchange.
Transportation Master Plan Recommendations

- In December 2013, The City of Barrie approved the Multi-Modal Active Transportation Master Plan (TMP) which serves as the City’s roadmap in developing a well-balanced transportation network to serve its future needs and development.

- The legend below shows the number of vehicle lanes on each road by the 2031 time horizon from the TMP.

- A new highway crossing at Harvie Road / Big Bay Point Road was recommended as a high priority for implementation.

- The TMP recommends a new Highway 400 interchange at Big Bay Point Road. The needs/justification and property requirements for a potential interchange will be established/refined through a future Class EA study.
The study area includes the Essa Road interchange, the proposed Harvie / Big Bay Point / Highway 400 Crossing/Interchange and the Mapleview Drive interchange.

Other planned transportation improvements within 2031 time horizon in the area include:

- Big Bay Point Road – Bayview to Huronia (7 lanes)
- Harvie Road - Veterans to Bryne (5 lanes)
- Harvie Road – Essa to Veterans (3 lanes)
- Bryne Drive – Caplan to Essa (5 lanes)
- Bayview Drive – Big Bay to Little (3 lanes)
Alternative Design Concepts for the Proposed Harvie / Big Bay Point / Highway 400 Crossing for Phase 3 and 4 EA

The following Alternative Design concepts have been identified to address the preferred solution from Phase 1 & 2 of the Class EA:

- **Alternative Design Concept 1** – Do Nothing

- **Alternative Design Concept 2** (Over Highway 400) –
  - Alternative 2a: Harvie / Big Bay Point Crossing over Highway 400 & Over Railway Crossing & Standard Geometrics
  - Alternative 2b: Harvie / Big Bay Point Crossing Over Highway 400, Remove Railway Crossing & Reduced Geometrics

- **Alternative Design Concept 3** (Under Highway 400) –
  - Alternative 3a: Harvie / Big Bay Point Crossing Under Highway 400, At Grade Railway Crossing & Standard Geometrics
  - Alternative 3b: Harvie / Big Bay Point Crossing Under Highway 400, At Grade Railway Crossing & Reduced Geometrics
  - Alternative 3c: Harvie / Big Bay Point Crossing Under Highway 400, Raising Highway 400, At Grade Railway Crossing & Reduced Geometrics

A conceptual Partial Parclo A interchange was developed to identify preliminary general property requirements to protect for a potential future interchange, subject to further studies (see Next Steps).
# Evaluation of Alternative Design Concepts for Harvie / Big Bay Point Crossing

## Harvie Big Bay Point Road Highway 400 Transportation Improvements
### Municipal Class Environmental Assessment Phase 3 and 4 – Evaluation Table

The purpose of this assessment of the alternatives is to gain a better understanding of the effects associated with the alternatives being considered. The evaluation is used to determine which alternative is preferred and the evaluation is a relative comparison between alternatives. Each potential impact was given a rank from -4 (solid red circle) to 4 (solid green circle). The ranking displayed graphically with positive effects in green and negative effects in red. A significant negative effect is -4; a significant positive impact is 4. Therefore, the alternative with the larger value indicates a greater degree of positive potential effects. A neutral effect was given a hollow black circle. The score was then calculated by multiplying the weighting by the rank and these results show the Preferred Alternative with the highest score.

### Neutral Rank:  
No significant change between alternatives  
Positive Rank:  
Fully shaded circle indicates greatest positive effect  
Negative Rank:  
Fully shaded circle indicates greatest negative effect

<table>
<thead>
<tr>
<th>Description of Evaluation Criteria</th>
<th>Evaluation Criteria</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical</strong></td>
<td>Do Nothing</td>
<td>Alternative 2a</td>
</tr>
<tr>
<td>Design Speed</td>
<td>Impact on roadway design speed.</td>
<td>Existing Design Speed of 70km/h will be maintained on Harvie Road and Big Bay Point Road.</td>
</tr>
<tr>
<td>Traffic Operation (includes Road Geometrics &amp; Active Transportation)</td>
<td>Ability to maintain and/or maximize opportunities for improved traffic operations including Road Geometrics (i.e. Lane Widths) and Active Transportation (i.e. Sidewalks, On-Street Bike Lanes).</td>
<td>Existing road geometrics will be maintained and do not implement the recommendations from the City’s Multi-Modal Active Transportation Master Plan (MMATMP).</td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td>Ability to maintain and/or maximize opportunities for improved access for emergency vehicles.</td>
<td>No improvements to existing emergency services.</td>
</tr>
<tr>
<td>Railway</td>
<td>Ability to minimize impacts on the existing at-grade railway spur crossing Big Bay Point Road.</td>
<td>The existing railway spur crossing Big Bay Point Road will be maintained.</td>
</tr>
<tr>
<td>Property Access</td>
<td>Ability to maintain and/or maximize opportunities for improved access to adjacent residential and commercial properties. Property access would be reviewed on a site by site basis.</td>
<td>No improvements to existing entrances.</td>
</tr>
</tbody>
</table>
### Evaluation of Alternative Design Concepts for Harvie / Big Bay Point Crossing

<table>
<thead>
<tr>
<th>Description of Evaluation Criteria</th>
<th>How the Criteria is Being Assessed</th>
<th>Do Nothing</th>
<th>Alternative 2a Harvie / Big Bay Point Crossing Over Hwy 400 &amp; Over Railway Crossing &amp; Standard Geometries</th>
<th>Alternative 2b Harvie / Big Bay Point Crossing Under Hwy 400, Remove Railway Crossing &amp; Reduced Geometries</th>
<th>Alternative 3a Harvie / Big Bay Point Crossing Under Hwy 400, At Grade Railway Crossing &amp; Standard Geometries</th>
<th>Alternative 3b Harvie / Big Bay Point Crossing Under Hwy 400, At Grade Railway Crossing &amp; Reduced Geometries</th>
<th>Alternative 3c Harvie / Big Bay Point Crossing, Under Hwy 400, Raising Hwy 400, At Grade Railway Crossing &amp; Reduced Geometries</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transit</td>
<td>Ability to improve from existing and/or integrate transit services into the overall transportation system.</td>
<td>No improvements to existing emergency services.</td>
<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
<td>• Improved integration of transit services through the connection of Harvie Road to Big Bay Point Road.</td>
<td></td>
</tr>
<tr>
<td>Water Booster PS</td>
<td>Ability to minimize impacts on the existing Water Booster Pump Station along Big Bay Point Road.</td>
<td>No impacts to the pump station.</td>
<td>• Significant raise in road profile adjacent to the pump station to accommodate railway grade separation will impact existing entrance and grading.</td>
<td>• Raise in road profile adjacent to the pump station will impact existing entrance and grading.</td>
<td>• Road profile adjacent to the pump station will impact existing entrance and grading.</td>
<td>• Road profile adjacent to the pump station will impact existing entrance and grading.</td>
<td>• Road profile adjacent to the pump station will impact existing entrance and grading.</td>
<td></td>
</tr>
<tr>
<td>Archaeological</td>
<td>Potential for disruption of archaeological resources.</td>
<td>• No impacts on archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td>• Potential impact on minor or potentially more significant archaeological resources.</td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>Potential for impacts on adjacent residential areas.</td>
<td>• No disruption to the corridor, however does not address negative impacts of existing congestion at Essa and Mapleview.</td>
<td>• Reduced traffic and noise congestion at Essa Road and Mapleview Drive where majority of residential properties exist.</td>
<td>• Reduced traffic and noise congestion at Essa Road and Mapleview Drive where majority of residential properties exist.</td>
<td>• Reduced traffic and noise congestion at Essa Road and Mapleview Drive where majority of residential properties exist.</td>
<td>• Reduced traffic and noise congestion at Essa Road and Mapleview Drive where majority of residential properties exist.</td>
<td>• Reduced traffic and noise congestion at Essa Road and Mapleview Drive where majority of residential properties exist.</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>Ability to minimize impacts on ambient noise levels after construction (i.e. increase in traffic and congestion. Highway 400 traffic is the most substantial noise generator.</td>
<td>• Increased traffic on Essa, Mapleview and Byrne Drive are not distributed. Most significant residential areas are nearby at Essa.</td>
<td>• Noise higher for the crossing under Hwy 400.</td>
<td>• Noise higher for the crossing under Hwy 400.</td>
<td>• Noise propagation is reduced at the crossing under Hwy 400.</td>
<td>• Noise propagation is reduced at the crossing under Hwy 400.</td>
<td>• Noise propagation is reduced at the crossing under Hwy 400.</td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td>Potential for impacts on adjacent and future development.</td>
<td>• No impacts to development but lack of transportation improvements will reduce potential economic stimulus.</td>
<td>• Allows for future development potential.</td>
<td>• Allows for future development potential.</td>
<td>• Allows for future development potential.</td>
<td>• Allows for future development potential.</td>
<td>• Allows for future development potential.</td>
<td></td>
</tr>
<tr>
<td>Natural Environment</td>
<td>Fisheries / Aquatic Habitats</td>
<td>Potential for impacts on fisheries, aquatic habitats and watercourses.</td>
<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 500m of larger closed system.</td>
<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 500m of larger closed system.</td>
<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 500m of larger closed system.</td>
<td>• Requires the realignment of Whiskey Creek under Hwy 400 through approximately 500m of larger closed system.</td>
<td>• The existing 1.22mX1.2m box culvert conveying Whiskey Creek under Hwy 400 can be maintained and extended.</td>
<td></td>
</tr>
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</table>
# Evaluation of Alternative Design Concepts for Harvie / Big Bay Point Crossing

<table>
<thead>
<tr>
<th>Description of Evaluation Criteria</th>
<th>Do Nothing</th>
<th>Alternative 1a Harvie / Big Bay Point Crossing Over Hwy 401 &amp; Over Railway Crossing &amp; Standard Geometrics</th>
<th>Alternative 1b Harvie / Big Bay Point Crossing Over Hwy 401, Remove Railway Crossing &amp; Reduced Geometrics</th>
<th>Alternative 2a Harvie / Big Bay Point Crossing Under Hwy 401, At Grade Railway Crossing &amp; Standard Geometrics</th>
<th>Alternative 2b Harvie / Big Bay Point Crossing Under Hwy 401, At Grade Railway Crossing &amp; Reduced Geometrics</th>
<th>Alternative 3a Harvie / Big Bay Point Crossing Under Hwy 401, Raising Hwy 401, At Grade Railway Crossing &amp; Reduced Geometrics</th>
<th>Rank</th>
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<tr>
<td>Natural Hazards</td>
<td></td>
<td>• Would require parcel of land beside Harvie Road to allow for major storm backup or upscaling culverts.</td>
<td>• West of Hwy 400, the overland flow will be directed west to the upstream side of the Whiskey Creek culvert crossing.</td>
<td>• West of Hwy 400, the overland flow will be directed west to the upstream side of the Whiskey Creek culvert crossing.</td>
<td>• West of Hwy 400, the overland flow will be directed west to the profile low-point and can outlet to the downstream side of the Whiskey Creek culvert crossing.</td>
<td>• West of Hwy 400, the overland flow will be directed east to the existing Whiskey Creek channel.</td>
<td>Overland flow will be directed east and can outlet directly to the existing Whiskey Creek channel.</td>
</tr>
<tr>
<td>Terrestrial Habitats</td>
<td></td>
<td>• No impacts on terrestrial species and habitats.</td>
<td>• Impacts to existing woodlots.</td>
<td>• Reduced impacts to existing woodlots.</td>
<td>• Impacts to existing woodlots.</td>
<td>• Reduced impacts to existing woodlots.</td>
<td>Reduced impacts to existing woodlots.</td>
</tr>
<tr>
<td>Economic</td>
<td></td>
<td>• No construction costs.</td>
<td>• $27 to $30 Million.</td>
<td>• $2 to $5 Million.</td>
<td>• $21 to $26 Million.</td>
<td>• $22 to $25 Million.</td>
<td>$22 to $25 Million.</td>
</tr>
<tr>
<td>Capital Cost Harvie &amp; Big Bay Point</td>
<td></td>
<td>• Permanent realignment to centralise the works to accommodate the central bridge pier.</td>
<td>• Permanent realignment to centralise the works to accommodate the central bridge pier.</td>
<td>• Permanent realignment to centralise the works to accommodate the central bridge pier.</td>
<td>• Permanent realignment to centralise the works to accommodate the central bridge pier.</td>
<td>• Permanent realignment to centralise the works to accommodate the central bridge pier.</td>
<td>Permanent realignment to centralise the works to accommodate the central bridge pier.</td>
</tr>
<tr>
<td>Capital Cost Highway 400</td>
<td></td>
<td>• Increasing maintenance costs as existing infrastructure deteriorates and requires repairs.</td>
<td>• Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
<td>• Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
<td>• Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
<td>• Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
<td>Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
</tr>
<tr>
<td>Maintenance Costs</td>
<td></td>
<td>• Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
<td>• Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
<td>• Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
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<td>• Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
<td>Costs limited to winter maintenance (Salting, Sanding, Snowploughing)</td>
</tr>
<tr>
<td>Economic Stimulus due to Development of Open Lands</td>
<td></td>
<td>• No improvement or allowance for new development.</td>
<td>• Provides for new development.</td>
<td>• Provides for new development.</td>
<td>• Provides for new development.</td>
<td>• Provides for new development.</td>
<td>Provides for new development.</td>
</tr>
<tr>
<td>Land Costs</td>
<td></td>
<td>• No property acquisition required.</td>
<td>• Significant property acquisition required.</td>
<td>• Reduced property acquisition required due to narrower ROW.</td>
<td>• Significant property acquisition required.</td>
<td>• Reduced property acquisition required due to narrower ROW.</td>
<td>Reduced property acquisition required due to narrower ROW.</td>
</tr>
</tbody>
</table>
Alternative Design Concepts – Plan View

LEGEND
- PROPERTY LINE
- EX. STORM PIPE
- EX. WATERMAIN
- EX. SANITARY PIPE
- EX. BELL CABLE
- EX. FIBER OPTIC CABLE
- PROPOSED CULVERT AND MANHOLE
- ALTERNATIVE PROPOSED CULVERT AND MANHOLE
- PRELIMINARY PROPERTY ACQUISITION
- FOR FURTHER REVIEW IN FUTURE STUDY
- PROPOSED ROAD/HIGHWAY

NOTE: PROPERTY ACCESS/DRIVEWAYS TO BE DETERMINED

DESIGN ALTERNATIVE PLAN (280m RADIUS)
HIGHWAY 400 CROSSING UNDER OR OVER
HARVIE ROAD / BIG BAY POINT ROAD
(PHASE 3 AND 4 EA)
Alternative Design Concepts—Profiles

Proposed Profile - Highway 400 Under Harvie Road / Big Bay Point Road

Proposed Profile - Highway 400 Over Harvie Road / Big Bay Point Road
Alternative Design Concepts– Typical Sections

CITY OF BARRIE 3.5m LANE WIDTH
TYPICAL SECTION – STANDARD GEOMETRICS
(ALTERNATIVE 2a AND 3a)

REDUCED LANE WIDTH 3.30m
TYPICAL SECTION – REDUCED GEOMETRICS
(ALTERNATIVE 2b, 3b AND 3c)
Harvie / Big Bay Point / 400 Highway Crossing
Estimated Costs and Timing

- Total Cost $45 to $65 million (depending on timing / scope additions / limits of work)
  - Construction scheduled for 2020/2021

- Coordinate with other road studies / projects in the area
  - Harvie Road
  - Bryne Drive Extension
  - Big Bay Point Road
  - Bayview Drive

Note:
1. The estimated cost includes construction costs to implement improvements on Harvie Road and Big Bay Point Road and construction staging along Highway 400.
Preliminary Future Interchange Property Requirements
Plan View
Next Steps…

- City of Barrie is planning a Public Information Centre on April 23, 2015 to present the Draft ESR and associated Alternative Design Concepts to the public and agencies.

- Preferred Design Alternative will be for the Harvie / Big Bay Point Crossing of Highway 400 only (and protection of land for a future potential interchange). Comments and responses will be documented in the ESR and considered in the selection of the Preferred Design Alternative.

- Subject to endorsement of City of Barrie General Committee and Council a 30 day Notice of Completion will be filed for this project.

- Design and Construction of the Harvie / Big Bay Point Crossing of Highway 400 will be subject to resolution of any Part 2 Orders, available budget, and practical ability to implement.

- Protection of property for a Future Potential Highway Interchange would be negotiated as part of development review and approval.

- Highway 400 can still be influenced by planning for Highway 400 improvements being studied presently by MTO. The number of lanes, operation and need for interchanges, timing, etc. is still being studied and can still be influenced.

- We will continue to work with the MTO on need/justification, technical feasibility and consideration for a future potential interchange and this will be subject to a future Municipal EA study.
Your Involvement is Important

You are encouraged to contact the City of Barrie if you have any questions or concerns about this study.

- Please fill out a Comment Sheet
- What issues are critical to you?
- Please keep in touch with us:

Ralph Scheunemann, P.Eng.
Sr. Infrastructure Planning Engineer
City of Barrie
70 Collier Street, 6th Floor
Barrie, ON L4M 4T5
T: (705) 739-4220, Ext. 4782
F: (705) 739-4247
Ralph.Scheunemann@barrie.ca

Thank you!
APPENDIX D – Preliminary Cost Estimates
### Cost Estimate - Harvey Road / Big Bay Point Road Crossing over Highway 400

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Length</th>
<th>Width</th>
<th>Area</th>
<th>Unit</th>
<th>Qty.*</th>
<th>Unit Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Barrie portion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Crossing Structure</td>
<td>40</td>
<td>75</td>
<td>3000</td>
<td>m2</td>
<td>3000</td>
<td>$2,300.00</td>
<td>$6,900,000.00</td>
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<tr>
<td>2 Retaining Walls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>3 Harvie Road Reconstruction</td>
<td>1.2</td>
<td></td>
<td></td>
<td>km</td>
<td></td>
<td></td>
<td>$6,700,000.00</td>
</tr>
<tr>
<td>4 At-grade Rail Crossing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$500,000.00</td>
</tr>
<tr>
<td>5 Signal</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$500,000.00</td>
</tr>
<tr>
<td>6 Culvert</td>
<td>300</td>
<td></td>
<td></td>
<td>m</td>
<td></td>
<td></td>
<td>$10,000.00</td>
</tr>
<tr>
<td>7 Highway 400 Construction Staging</td>
<td>1.2</td>
<td></td>
<td></td>
<td>km</td>
<td>1</td>
<td></td>
<td>$10,000,000.00</td>
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<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$31,940,000.00</td>
</tr>
</tbody>
</table>

Contingency (10 % of Construction Sub-total) | $3,194,000.00 |
Engineering (13% of Sub-total) | $4,152,200.00 |
Contract Administration (17% of Sub-total) | $5,429,800.00 |

City of Barrie Total: $44,716,000.00

Note: prices are based on MTO Parametric Estimating Guideline
Note: Land for Highway Crossing is 4.1 acres or $2.1M.
Note for Interchange Option: Additional land for Interchange ramps is 2.8 acres or $1.4M. Cost ramps construction is $8-10M, say $15M including Contingencies/Engineering/CA based on 1500 m long 1 lane*$2M/km=$3M plus 1250m long 2 lane*$4M/km=$5M

### Cost Estimate - Harvey Road / Big Bay Point Road Crossing under Highway 400

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Length</th>
<th>Width</th>
<th>Area</th>
<th>Unit</th>
<th>Qty.*</th>
<th>Unit Price</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Crossing Structure</td>
<td>40</td>
<td>50</td>
<td>2000</td>
<td>m2</td>
<td>2000</td>
<td>$2,500.00</td>
<td>$5,000,000.00</td>
</tr>
<tr>
<td>2 Retaining Walls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>3 Harvie Road reconstruction</td>
<td>1.2</td>
<td></td>
<td></td>
<td>km</td>
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<td></td>
<td>$6,700,000.00</td>
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<td></td>
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<tr>
<td>6 Culvert</td>
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<td>7 Highway 400 Construction Staging</td>
<td>1.2</td>
<td></td>
<td></td>
<td>km</td>
<td>2</td>
<td></td>
<td>$10,000,000.00</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$44,040,000.00</td>
</tr>
</tbody>
</table>

Contingency (10 % of Construction Sub-total) | $4,404,000.00 |
Engineering (13% of Sub-total) | $5,725,200.00 |
Contract Administration (17% of Sub-total) | $7,488,800.00 |

City of Barrie Total: $61,656,000.00

Note: prices are based on MTO Parametric Estimating Guideline
Note: Land for Highway Crossing is 4.1 acres or $2.1M.
Note for Interchange Option: Additional land for Interchange ramps is 2.8 acres or $1.4M. Cost ramps construction is $8-10M, say $15M including Contingencies/Engineering/CA based on 1500 m long 1 lane*$2M/km=$3M plus 1250m long 2 lane*$4M/km=$5M.
APPENDIX E – Revised Bryne Drive Profile
PROPOSED BRYNE DRIVE PROFILE THAT ACCOMMODATES HARVIE ROAD EA PROFILE
AND THE EXISTING SWM POND OUTLET STRUCTURES