



HARVIE ROAD/BIG BAY POINT ROAD/HIGHWAY 400
CLASS ENVIRONMENTAL ASSESSMENT STUDY

**DRAFT ENVIRONMENTAL ASSESSMENT
REPORT**

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MORRISON HERSHFIELD

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1 INTRODUCTION AND BACKGROUND

1.1 Introduction

The Corporation of the City of Barrie is undertaking this Study consistent with the Municipal Class Environmental Assessment (Class EA) process to identify and assess required transportation improvements to Harvie Road and Big Bay Point Road in the area of Highway 400. The Study is reassessing Phase 2 (Alternative Solutions) of the Class EA process to consider the potential for a highway crossing or an interchange approximately where Harvie Road and Big Bay Point Road crosses Highway 400. **Figure 1** below illustrates the study area.

On January 1, 2010, 2,283 Hectare of land was annexed in the south end of Barrie between County Road 27 and Yonge Street.

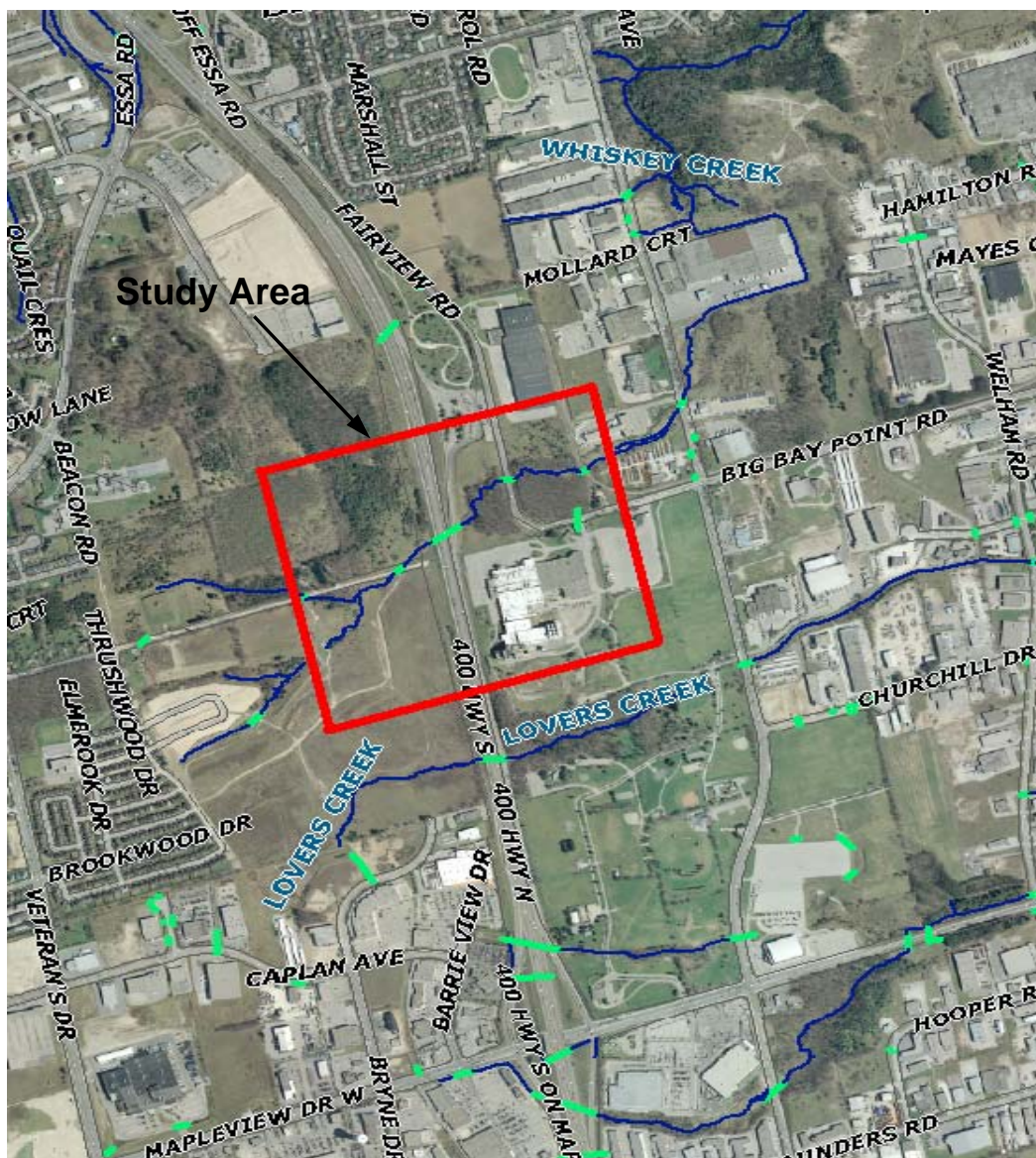


Figure 1 - Study Limits

1.2 Project Background

The City of Barrie has completed Phases 1 and 2 of a Class EA for Harvie Road/Big Bay Point Road/Highway 400 as part of a larger EA which examined all of the Highway 400 Crossings in Barrie. Council, per Motion 05-G-343, approved seven lanes crossing under/over Highway 400 connecting Harvie Road to Big Bay Point Road.

The Bryne Drive MP, completed in December 2005 identified the potential for an interchange in the study area and mentions that the proposed interchange will effect the proposed alignment of Bryne Drive. The Bryne Drive MP is currently being updated and is examining alignments further west. The preferred alternative, approved by Council by Motion 06-G-005 in December 2005 is five lanes.

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 MTO to review the possibility 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.

The Ministry of Transportation (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. This study identifies that Highway 400 may ultimately be widened to eight lanes at Harvie and Big Bay Point Road. MTO is in the process of initiating updates to this study.

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 four lanes.

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

1.3 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 Solutions to the Problem or Opportunity
- Perform an Inventory of the Physical, Social/Cultural, Natural, and Economic Environment
- Identify Impact of Alternative Solutions on the Environment and Mitigating Measures
- Evaluate Alternative Solutions and identify recommended solutions
- Consult Review Agencies and Public regarding the problem or opportunity and alternative solutions
- Select preferred solution

If the preferred alternative determines that a crossing or interchange is required at Harvie Road/Big Bay Point Road the EA will advance to Phases 3 and 4 and consider design alternatives for the preferred alternative.

1.4 The Project Team

Morrison Hershfield (MH) was retained by the City of Barrie to undertake the Class EA for the potential Harvie Road/Big Bay Point Road crossing at Highway 400.

The Project Team is outlined in Table 1 below:

Table 1 - Project Team

Proponent:	City of Barrie	
	Ralph Scheunemann	Project Manager
	Leonard Borgdorff	Engineering
	Steve Rose	Traffic
	Geoff Mitchinson	Operations (Rail)
Ministry:	Ministry of Transportation	
	Michael Sit	Project Manager
	Peter Dorton	Planning
	Stephen Lamptey	Traffic
Primary Consultant:	Morrison Hershfield	
	John Grebenc	Project Manager
	Carmela Gemmiti	Roadway Engineering
	Ali Mekky	Traffic
	Edward Li	Structural
	Farooq Arshad	Drainage/SWM
	Paul Draycott	Natural Environment and Fisheries

1.5 The Class Environmental Process

The Environmental Assessment Act of Ontario

The Environmental Assessment Act of Ontario (EAA) provides for the protection, conservation, and wise management of the environment in Ontario. 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 pre-approved Class EA process.

The Class Environmental Assessment Process

The Municipal Class EA is an approved Class EA process that applies to municipal infrastructure projects including roads, water, and wastewater. The Municipal Class EA outlines a comprehensive planning process as follows:

- **Phase 1:** Identify Problem and Opportunity
- **Phase 2:** Identification of alternatives (including “Do Nothing”)
- **Phase 3:** Examine Alternative Design Concepts for the Preferred Alternative Solution
- **Phase 4:** Prepare and File Environmental Study report

- **Phase 5:** Proceed to Detailed Design, Construction, and Operation

This Study encompasses Phases 1 and 2 of the Class EA process, which involve: Analysis and evaluation of the effects on the environment including physical, social/cultural, natural, and economic for each alternative; Consultation with technical agencies and public throughout the process and; Determination of a preferred alternative and associated mitigation measures. Phases 3 and 4 may follow this study to complete the EA.

The EA process provides a comprehensive planning approach to consider several alternative solutions and evaluate their impact on a set of criteria (e.g. physical, natural, socio-economical, cultural, economic) and determine any mitigating measures to arrive at a preferred alternative for addressing the problem (or opportunity). The Municipal Class EA is an approved planning process 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 Municipal Class EA process is shown on **Figure 2**.

1.6 The Key Project Milestones

The study was initiated in October 2009. Over the last year traffic analysis such as macro and micro modeling has been done as well as a review of background documents and field investigations. The key project milestones to date are as follows:

Notice of Study Commencement	November 5 & 6, 2010
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

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 **Appendix B**. This notice described the purpose of the study, the need for improvements and the proposed alternative solutions.

EXHIBIT A.2 MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA

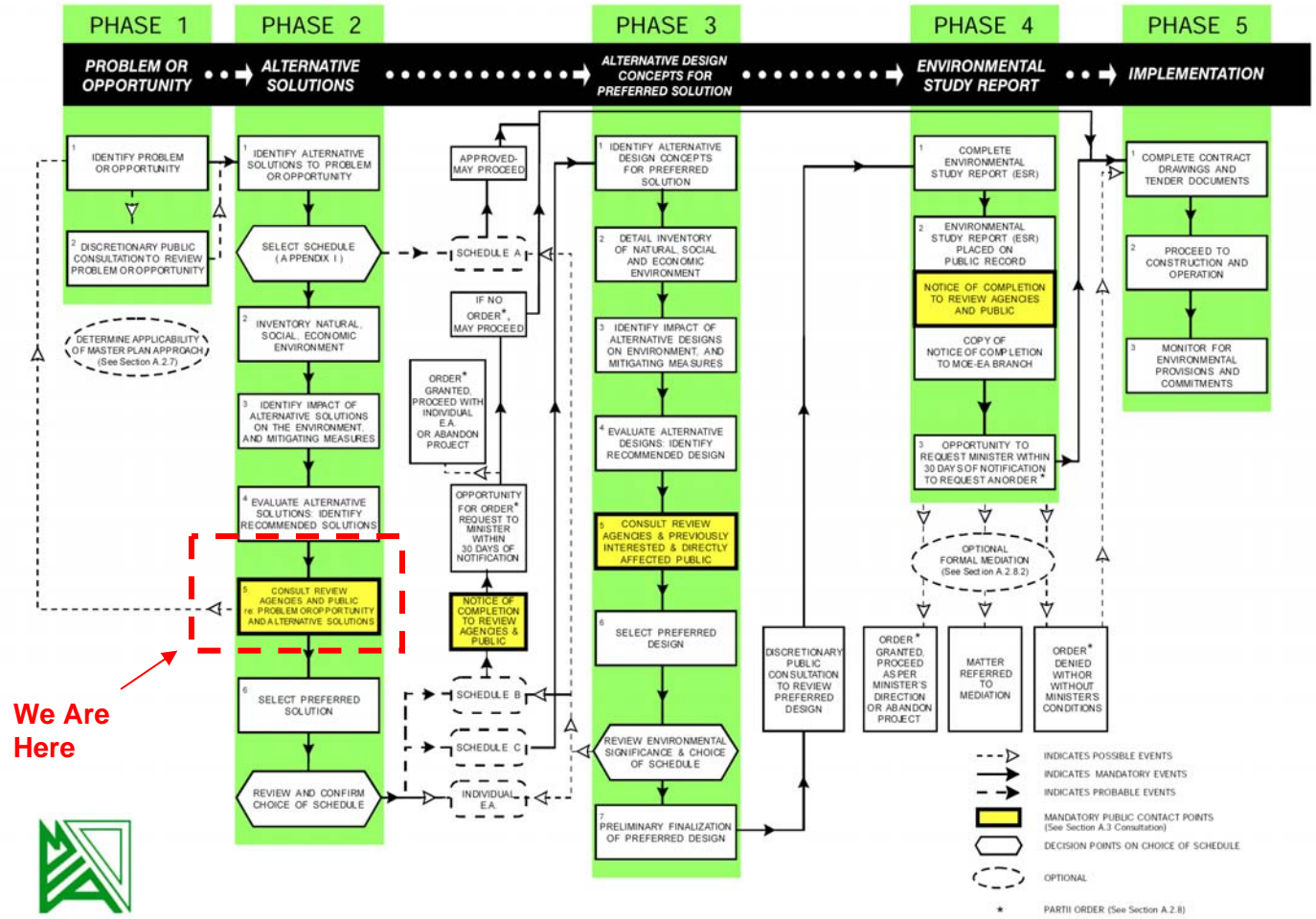


Figure 2 - Municipal Class EA Design and Planning Process

2 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.

2.1 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 (currently being redeveloped) 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.

On the west side of Highway 400 there is an existing on-line pond, 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.

2.2 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 which also meets future transportation needs.”

The City of Barrie is undertaking this project in response to 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 and allow for future growth.

3 PROJECT ENVIRONMENT

This section provides a description of the physical, natural, social/cultural natural and economic environment of the proposed 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 Land Use

Most of the land in the study area 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. Residential lands are on the south side of Harvie Road west of Highway 400.

3.2 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 8 lanes within the study area.

Transportation improvements are being implemented by Park Place for the Highway 400 off ramps at Mapleview Drive (4 lanes).

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.

Transportation improvements are being implemented by Park Place on Mapleview Drive. Please refer to **Appendix F**.

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 Essa Road Class EA is in Phases 3 and 4. The City of Barrie Highway 400 crossing EA calls for widening Essa Road by one lane in each direction in the vicinity of Highway 400.

Bryne Drive

Bryne Drive is a north-south major collector under the jurisdiction of the City of Barrie. It provides a 4-lane urban cross-section 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 calls for 5 lanes between Caplan Drive 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 1999 Transportation Study calls for widening Fairview Road to 4 lanes 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.

Park Place will be widening Bayview Drive to 5 lanes from Big Bay Point Road to Mapleview Drive.

3.3 Existing Traffic Operations

Existing traffic operations were taken from the draft 2006 Harvie Road/Big Bay Point Road Interchange Feasibility Study the draft report can be reviewed on the City of Barrie website at www.barrie.ca.

Traffic operations on Highway 400 and the crossing roads were analyzed using the Paramics micro-simulation model. The Paramics model is a state of the art micro-simulation model with advanced traffic flow algorithms that facilitate analysis of complex transportation systems. It was applied in this Study to assist in determining the feasibility of an interchange on Harvie Road. In particular the model was used to assess the weaving, merge, and diverge manoeuvres on the freeway elements between the proposed interchange at Harvie Road and the existing interchanges at Mapleview Drive and Essa Road. Traffic operations at the intersections of the arterial roadways including Mapleview Drive and Bayview Drive were also assessed.

The Paramics model has advanced animation capabilities that make it easy to understand and present analysis results. The range of outputs provided includes traffic volumes on road sections and intersection, travel speeds, link and intersection delays and level of services. The level of service definition is based on the Ministry of Transportation Highway Capacity Manual criteria for signalized intersections and for highway and freeway sections and elements. The quality of traffic operations on freeway segments was based on the Highway Capacity Manual procedures that define level of service (LOS) on the basis of traffic density in vehicles per lane-kilometer [v/km/lane].

Existing traffic operations on Highway 400 segments are provided in Table 2 below. Most of the segments operated at LOS B and LOS C indicating adequate operating conditions with speeds that are close to free flow conditions but with restricted abilities to undertake overtaking maneuvers. The southbound basic highway segment and diverge area north of Essa Road operate at LOS D due to capacity constraints at the ramp terminal to the mainline area hindering free flow and resulting in speeds of 65 to 80 km/h.

Table 2 - Existing Traffic Operations on Highway 400 Elements

Section	Element	# Lanes	Observed Volume	Modeled Volume	Speed [kph]	Density [v/km/lane]	LOS
South of Mapleview	NB Segment	3	4100	4140	105	14.2	C
South of Mapleview	NB Diverge	4	4100	4140	98	11.4	C
South of Mapleview	SB Segment	3	3300	3320	98	12.3	C
South of Mapleview	SB Merge	4	3300	3320	98	9.2	B
Mapleview to Harvie	NB Merge	5	4100	4060	100	8.8	B
Mapleview to Harvie	NB Segment	3	4100	4060	99	14.7	C
Mapleview to Harvie	SB Segment	3	3700	3850	102	13.6	C
Mapleview to Harvie	SB Diverge	4	3700	3850	104	10.5	C
Harvie to Essa	NB Diverge	4	4100	4060	75	14.2	C
Harvie to Essa	SB Merge	4	3700	3850	103	10.3	B
North of Essa	NB Segment	3	4700	4420	93	17.4	C
North of Essa	SB Segment	3	4500	4660	78	21.6	D
North of Essa	SB Diverge	4	4500	4660	65	19.3	D
North of Essa	NB Merge	4	4700	4420	95	13.0	C

Existing traffic operations for the ramp terminals and other intersections on Mapleview Drive and Essa Road are summarized in Table 3. Most of the intersections on Mapleview Drive operated at LOS B or C with average intersections delays of 15 to 30 seconds. Traffic operations of LOS C or better are generally considered acceptable for signalized intersection.

The modelled traffic volume was compared to the observed traffic volumes from the existing traffic counts and the percentage difference was calculated. The model was calibrated to more accurately reflect the observed traffic volumes and results for the percentage difference are shown in Table 3.

Table 3 - Existing Traffic Operations at Ramp Terminal Intersections

Intersection	Traffic Volume [vph]			Delay [s]	LOS
	Observed	Modeled	% Difference		
Essa/Fairview	4000	3703	-7%	19.7	B
Hwy 400 NB Off Ramp/Essa	3053	2680	-12%	36.1	D
Hwy 400 SB On/Off/Ramp/Essa	3861	3266	-15%	29.7	C
Mapleview/Bryne	2425	2811	16%	20.8	C
Mapleview/Barrie View	3545	4041	14%	25.1	C
Hwy 400 SB on/Off Ramp Mapleview	4154	4097	-1%	28.7	C
Hwy 400 NB on/Off Ramp Mapleview	4215	4241	1%	29.6	C
Mapleview/Costco Entrance	3212	3344	4%	23.0	C
Mapleview/Bayview	3407	3178	-7%	24.1	C
Bayview/Big Bay Point	1977	1926	-3%	16.8	B

Although the Highway 400 SB off ramp / Essa Road intersection operates at LOS C with an average delay of approximately 30 seconds, the SB approach operates at LOS D with an average delay of over 50 seconds resulting in long queues that extend back and affect traffic operations on the Highway 400 SB mainline.

At the Highway 400 NB off ramp / Essa Road intersection, both NB and EB approaches operate at LOS D with delays of approximately 50 seconds even though the overall intersection has a delay of 36.1 seconds. The close proximity of the Essa Road/Fairview intersection affects traffic operations at the ramp terminal. Queues at the intersection extend to the ramp terminal and reduce the capacity of the EB movement causing the long delays. The traffic operations for future conditions are found in Section 5.

3.4 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.

3.5 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.

3.6 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 invested in a second Advance Road Weather Information Tower in South Barrie that will better assess and predict road weather and winter maintenance needs throughout the Study Area and beyond.

3.7 Access to existing property

Access to existing properties will be provided. 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 recently 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.

3.8 Natural Environment

Whiskey Creek

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 outletting 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 website www.barrie.ca.

Terrestrial Habitat

East of Highway 400, Big Bay Point Road bisects a wooded area containing species such as red oak, white ash, white pine, sugar maple, white birch and black cherry. Also along this road are specimen trees in and/or adjacent to the road right-of-way. These trees include white pine, Austrian pine and Manitoba maple.

West of Highway 400 is Harvie Road. This section differs from Big Bay Point Road because it has a more rural character. Along this road, there are specimen trees and hedgerows, in addition to the edges of many clumps of trees or small wooded areas. Species in this area include white pine, sugar maple, white ash, red oak, balsam poplar and white birch. The areas within the project limits were investigated for butternut by MH arborist and certified butternut health assessor on March 6, 2010. No butternut trees were observed.

Fisheries and Wildlife

Azimuth Environmental Consulting Inc. completed a fish sampling investigation throughout the watershed as part of the 2001 Master Watershed Plan study with assistance provided by the Ministry of Natural Resources. Results indicate that Whiskey Creek is a cold water system that supports brook trout and mottled sculpin, from Lackie's Bush downstream. Both species are key indicators of water quality, and are highly susceptible to thermal fluctuations and turbidity. Fish sampling was completed at a total of six sites downstream of Highway 400 to the outlet of Lake Simcoe. Sampling results indicate that brook trout adults and YOY (young of the year) are present from Lackie's Bush downstream to Lake Simcoe, indicating that Whiskey Creek supports a self-sustaining trout population within the City of Barrie, downstream of Bayview Drive. Due to the intermittent nature of the watercourse upstream of Lackie's Bush, fish sampling of the headwaters could only be completed between Harvie Road and Highway 400, however no fish were sampled or observed during the exploratory assessment at this station. No fish have been observed upstream of Harvie Road during previous field investigations of the study area.

Fish are currently unable to access the headwaters of Whiskey Creek upstream from Lackie's Bush at Bayview Drive. A large tiered gabion basket causeway located at the Radio Shack property conveys intermittent flow from a channelized reach of Whiskey Creek extending upstream to the Bayview Drive culvert crossing. The structure is approximately 80m long and 3m high creating a large impassable barrier to fish movement.

The Whiskey Creek Watershed is about 60% urbanized. However, the only significant area of natural land is located outside of the study area. Notwithstanding, most of the creek is contained within natural valley sections. The ultimate development of the watershed indicated the watershed probably won't support large numbers of wildlife habitat except within Lackie's Bush and natural valley creek sections where favourable habitat for songbirds and small mammals exist. Additionally, it is likely that urban animals such as small rodents, birds, squirrels etc. can be supported within the watershed itself.

3.9 Archaeology, Heritage and Cultural

A Stage 1 Archaeological Assessment was conducted for the Highway 400 Planning Study from one kilometer south of Highway 89, northerly to the Penetanguishene Road (Highway 93) at Highway 11 conducted in November 2001 for the Ministry of Transportation. This study noted it was determined that no archaeological sites exist in the limits of the study area, but the nature of the landscape, the presence of 18 archaeological sites within a two kilometer radius and the general history of the region indicate that there is historic and precontact archaeological potential within the study area limits. It is recommended that:

1. Prior to any land disturbance, all lands currently under or formerly under agricultural production should be subjected to a Stage 2 archaeological assessment in accordance with the Stage 1-3 archaeological assessment technical guidelines provided by the MTCR. All land should be ploughed and allowed to weather through at least one significant rainfall, then pedestrian surveyed at five metre intervals to facilitate the recovery of archaeological material. Woodlots or areas containing scrub brush should be test pitted at five metre intervals. All test pits must be excavated to sub-soil and the material screened through six-metres mesh to facilitate the recovery of small artifacts.
2. Should deeply buried archaeological remains be found on the property during construction activities, the Heritage Operations of the Ministry of Tourism, Culture and Recreation (MTCR) should be notified immediately.
3. In the event that human remains are encountered during construction, the proponent should contact both the MTCR, and the Registrar or Deputy Registrar of Cemeteries Regulation Unit of the Ministry of Consumer and Commercial Regulations, (416) 326-8392.

The Whiskey Creek Master Drainage Plan Update from October 2009 noted that there are no buildings in the Whiskey Creek Watershed that are identified on the Heritage Sites Inventory.

3.10 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 were calculated at each receptor location. Receptor locations are located in **Appendix C** Figure 10. 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.

Table 1 in **Appendix C** shows 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. Table B-9 in **Appendix C** shows the significance of the increased sound exposures due to an increase of traffic volumes.

A noise assessment for a connection of Harvie Road to Big Bay Point Road crossing Highway 400 or an interchange may require noise mitigation, especially if the proposed development of the adjacent lands is residential. A noise assessment should be considered once the type of development is determined.

3.11 Soil Conditions

A geotechnical investigation on Big Bay Point Road was carried out by Trow 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 a 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 4 details the relevant findings in each report.

Table 4 - Borehole Information

Report Title and Origin	Borehole ID	Distance from Site (m)	Relevant Findings
Geotechnical Investigation Allandale Sewer and Water Project, Barrie, Ontario Peto MacCallum Ltd., 1985	Peto MacCallum Borehole 14 – Surface Elevation 276.63	650	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 augering, borehole open, no free water
Geotechnical Investigation Bayview Drive Reconstruction and Churchhill Drive Extension, Barrie, Ontario Peto MacCallum Ltd., 1999	Peto MacCallum Borehole No. 4 – Surface Elevation 278.85	650	Sand: Compact to very dense brown/grey fine to medium sand, trace silt to silty, trace to some gravel, moist Upon completion of augering borehole open to 4.50 m (dry)
A Soil Investigation For A Proposed Industrial Subdivision at Lots 8, 9 & 10, Concessions 11 & 12, City of Barrie Soil-Eng Limited, 1982	Soil-Eng Borehole 17 – Surface Elevation 279.8	660	Brown compact to very dense Fine Sand traces of silt and gravel Dry on completion

3.12 Site Geology and Subsurface Conditions

Details of the soil strata encountered in the boreholes and the results of laboratory moisture content are indicated on the attached borehole information found in **Appendix D**. 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 2.3 metres below existing grade. The fill material within the boreholes was found to be damp.

Sandy Silt Till

A 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.

3.13 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.

3.14 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, and a 600mm sanitary sewer
- 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
- Hydro line and poles are located along the south side of Harvie Road and Big Bay Point Road

3.15 Service Centre

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 and expected to open by January 2012.

3.16 Rail

The Rail crossing (spur) that crosses Big Bay Point Road at approximately 450m west of Bayview Drive (to old Molson's Brewery property) is privately owned. The old Molson Brewery property is currently for sale and the rail needs may change depending on new development plans; but it is assumed the rail crossing of Fairview Road shall be retained.

Rail deliveries historically occurred between 10:00 am to 2:00 pm, between am & pm road peak periods, typically three times per week.

3.17 Economic Environment

3.17.1 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.

3.17.2 Budget Considerations

The Corporation of the City of Barrie has a 10-Year Capital Plan which is reviewed annually by Council. The City of Barrie 2010 to 2019 Capital Plan currently calls for a highway crossing connecting Harvie Road to Big Bay Point Road to be constructed by 2015.

4 ALTERNATIVES AND EVALUATION

4.1 Alternative Solutions

Integral to this planning process is the development of alternative solutions to correct the noted deficiencies and to address the problem statement. The following alternative solutions for this study have been identified as follows:

Alternative Solution 1 – Do Nothing Alternative

Continue to operate the transportation facility in its current form. No consideration for additional measures to address long-term project specific problems or opportunities. This alternative involves no change to the existing roadways. This alternative provides a benchmark to gauge the environmental effect of not implementing changes to the existing transportation system.

Refer to **Exhibit 1** in **Appendix I**.

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. Transportation improvements would be from approximately 185 metres west of the new Bryne Drive alignment to Bayview Drive. Phase 3 of the Class EA would include assessment of the underpass and overpass options. Refer to **Exhibit 2** in **Appendix I**.

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. Refer to **Exhibit 3** in **Appendix I**. The interchange shown on Exhibit 3 is based on a Ministry of Transportation typically preferred Parclo A-4 layout with adjustment in the northeast quadrant to allow for the ongoing reconstruction of the Service Centre. A portion of the northbound off ramp movement from Highway 400 will be directed to the Service Centre facilities with the return movement to northbound Highway 400 via the new E-N ramp. Phase 3 of the Class EA would include assessment of the underpass and overpass options.

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.

Alternative Solution 5 – Transportation Demand Management

Divert traffic to other roadways. This would include the examining a connection of Harvie Road and Big Bay Point Road across Highway 400 and a new interchange at Highway 400 to assist in handling the traffic increases.

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.

4.2 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 do not solve the problem statement:

- Alternative 4 (Limit Future Growth and Development)
- Alternative 5 (Transportation Demand Management (TDM))
- Alternative 6 (Update Other Roadways)

The alternatives above were prescreened 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.

4.3 Analysis and Evaluation of Alternative Solutions

The 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 Planning Solutions table used the Alternative Solutions above and weighs each against the following Evaluation Criteria:

Physical

- Safety
- Traffic/Travel Demand
- Roadway and Highway Geometrics
- Railway
- Ability to accommodate alternative transportation modes
- Utilities

Social / Cultural

- Property Impacts
- Development Opportunity
- Emergency Services
- Impact of Traffic Congestion on quality of life

- Access to property
- Archaeology
- Built Heritage/Cultural Environment

Natural

- Vegetation/Wildlife Habitats
- Watercourse/Stormwater

Economic

- Construction Costs
- Land Costs
- Maintenance/Operating expenditures

The preliminary assessment and evaluation of planning solutions matrix can be found in **Appendix H**.

5 TRAFFIC ANALYSIS

5.1 Introduction

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 three scenarios for the year 2031, which included future transportation improvements identified in the City of Barrie 1999 Transportation Master Plan. The three scenarios assessed consisted of:

- 1) Do Nothing
- 2) Harvie Road / Big Bay Point Road Crossing
- 3) Harvie Road / Big Bay Point Road Interchange

The results are discussed in the following sections.

5.2 Evaluation of Three Scenarios using Aimsun Micro-Simulation Model Approach

The Aimsun micro-simulation model shows small changes for time savings that are not necessarily conclusive between the Do Nothing, Crossing, and Interchange alternatives. With the 8-lane scenario there is a 0.3 minute, 18 seconds or 1.6% time savings with the crossing over the do-nothing and with the interchange there is a 0.6 minute, 36 second or 3.2% percent savings over the do-nothing. There is a 0.3 minute, 18 seconds or 1.6% time savings with the interchange over the crossing. These time savings show an improvement with the Crossing over the Do Nothing and the Crossing over the Interchange. However, these improvements are small.

The Aimsun model results show that queue lengths are significantly decreased at the existing Essa Road interchange with the introduction of an interchange rather than a Highway 400 crossing. Analysis for the existing Mapleview Drive interchange show little difference between the crossing and the interchange.

Additional analysis was completed on the following items: Highway 400 speed and volumes; Harvie Road interchange volumes; overall network performance; corridor travel time and delay; Highway 400 ramp queues; level of service at the adjacent interchanges; and volume and speed at highway interchanges for the three alternatives (Do-nothing, Crossings and Interchanges).

The micro-model results are provided in **Appendix E**.

5.3 Evaluation by Morrison Hershfield using EMME 3 Model

Morrison Hershfield also completed an evaluation using macro-simulation (Emme 3) software. This is the latest model developed for the City of Barrie used for long-range planning.

Given below is a documentation of the results obtained from comparing the travel time savings and their values due to the construction of the Fly-over or the Interchange, for the year 2031.

Assumptions that were made:

- Number of hours affected per day = 5 hours
- Value of Time per person = \$15/hr
- Vehicle Occupancy = 1.2 persons
- Number of Work days/ year = 250

Using Emme and the City's most recent strategic model, the following results were obtained:

- Building a crossing would save 102 vehicle.hours in the peak hour. This translates into \$2.3 million annual savings in the value of the travel time saved.
- Building an interchange would save 241 vehicle.hours in the peak hour. This translates into \$5.4 million annual savings in the value of the travel time saved.
- There is no hyper-congestion in the area (2031). Accordingly, the estimate of the strategic model should be reasonable.

Please note that the effect of time savings for the heavy vehicles was not factored in, a reasonable assumption may be to add about 5% to the numbers above, or \$2.4M annual savings for the crossing and \$5.8M annual savings for the interchange.

The cost to build a crossing (Alternative 2) of Highway 400 on Harvie Road from 185 m West of Future Bryne Drive Extension to Big Bay Point Road connecting to Fairview Drive and reconstructing Fairview Drive to Bayview Drive would be in the approximate range of \$15,000,000 to \$20,000,000. The cost to build an interchange (Alternative 3) on Highway 400 at Harvie Road/Big Bay Point Road to the same limits would be in the approximate range of \$25,000,000 to \$30,000,000. The exact cost may depend on a number of factors including the final design configuration and allowance for potential future roadway and highway widening, property impacts, timing affecting bid prices, etc.

Based on these estimated costs of construction and the time savings calculated from the most recent traffic model future traffic projections it would take a few years of operation to pay for the construction costs through time savings forecast for the improvements rather than not completing any improvements (Alternative 1 – Do Nothing). The estimates indicate that the interchange may have a shorter payoff period than the highway crossing from a time savings perspective.

5.4 Weaving Analysis

The section where a freeway entrance is followed by an exit and the paths of traffic entering the freeway and that exiting the freeway cross and are in conflict is referred to as the "weaving section". This section is an important consideration in the location of the ramp terminals. The conflict between entering and exiting traffic tends to interrupt the operation of normal through traffic, precipitates turbulence in traffic flow, and has the effect of reducing service volumes and capacity. A weaving analysis was performed for the placement of a new interchange. The results are as follows:

Section	Total Weaving Traffic (8-lane)	Length of Weaving Section (m) (Approximate)	Level of Service (LOS)
Southbound Harvie to Mapleview	1654	600	B to C
Southbound Essa to Harvie	1866	600	B to C
Northbound Mapleview to Harvie	2477	600	C
Northbound Harvie to Essa	1854	650	B

The results indicate the lengths of weaving sections are sufficient for the total weaving traffic for the placement of an interchange.

5.5 Evaluation by IBI using EMME 3 Model

Subsequently for this study a further assessment of the highway crossing versus interchange was completed by IBI Group. The full report is available at the City of Barrie on the sixth floor front counter.

In overall terms, the interchange and the crossing alternatives illustrate the value of a potential crossing of Highway 400 at Big Bay Point Rd/Harvie Rd. In terms of meeting the goals and objectives of the City, the following key comments can be drawn from the analysis:

- In terms of relieving Mapleview Drive interchange at Highway 400, there is not a substantial difference between the crossing alternative and the interchange. The crossing alternative provides approximately 90% of the benefit to Mapleview Drive as compare to the Interchange.
- In terms of relieving Essa Road, the interchange alternative provides additional benefit, through the crossing alternative also benefits Essa Road interchange. The crossing provides approximately 50% of the benefit of the interchange. As Essa Road interchange is planned for reconstruction, it may be possible to improve operations significantly with a crossing at Big Bay Point Rd / Harvie Rd.

5.6 Traffic Analysis Discussion

The Aimsun model results show that queue lengths are significantly decreased at the existing Essa Road interchange with the introduction of an interchange rather than a Highway 400 crossing. Analysis for the existing Mapleview Drive interchange show little difference between the crossing and the interchange.

The weaving analysis shows that the lengths of weaving sections are sufficient for the total weaving traffic for the placement of an interchange at Harvie Road / Big Bay Point Road.

Based on the estimated costs of construction and the time savings calculated from the most recent traffic model future traffic projections it would take a few years of operation to pay for the construction costs through time savings forecast for the improvements rather than not completing any improvements (Alternative 1 – Do Nothing). The estimates indicate that the

interchange may have a shorter payoff period than the highway crossing from a time savings perspective.

The traffic modelling has been based on the transportation improvements identified in the 1999 City of Barrie Transportation Master Plan. The 1999 Transportation Master Plan does not account for intensification, under the Province of Ontario's provincial growth plan nor the future growth from the recently annexed lands from the Town of Innisfil. Once the anticipated growth and increased traffic is accommodated by the update to the Transportation Master Plan it is expected that additional transportation improvements will be required beyond the needs identified in this report.

6 CONSULTATION (PIC#1)

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 first Public Information Centre (PIC) will be 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 will be used to develop a Preferred Solution.

The PIC mailout information is provided in **Appendix G**.

Following the completion of the PIC, and in consideration of all concerns raised through review agency and public comment, alternatives will be further assessed, the preferred solution will be identified and appropriately documented in this report. This report and recommendations will be submitted to City Council for approval. Those individuals and parties that requested to be informed of the Class EA process will be notified by mail of the date that Council may approved the preferred solution so that deputations to Council can be made.

Upon approval of the preferred solution, the study may continue in accordance with Phases 3 and 4 of the Class EA process which will develop and evaluate alternative design concepts to mitigate concerns raised in Phase 2 of the EA process and to implement the preferred solution. Additional public consultation and coordination with City of Barrie staff and Council will occur throughout these stages, culminating with a preferred design alternative for the transportation improvements.