

City of Barrie

**Environmental Study Report**

**Hewitt's Secondary Plan  
Class Environmental Assessment Study**

Phases 3 and 4

**HATCH**




October 2017

City of Barrie

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**Class Environmental Assessment Study**

Phases 3 and 4

						
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October, 2017

**City of Barrie**

**Hewitt's Secondary Plan Class Environmental  
Assessment (Phase 3 and 4) Study**

**Environmental Study Report**

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## **Executive Summary**

### **Introduction**

The City of Barrie has initiated a Schedule C Municipal Class Environmental Assessment (Class EA) Study to identify roadway capacity and servicing (water, and sanitary) improvements for four roadways within the Hewitt's Secondary Plan Area, including Mapleview Drive East from Huronia Road to 20<sup>th</sup> Sideroad; Lockhart Road from Huronia Road to just west of 20<sup>th</sup> Sideroad; Yonge Street from Lockhart Road to Mapleview Drive East; and Big Bay Point Road from just east of Prince William Way to just west of 20<sup>th</sup> Sideroad. In addition, this study includes recommendations at the two Metrolinx grade separations at Mapleview Drive East and Lockhart Road to accommodate growth to the year 2031.

Hatch was retained by the City of Barrie to complete Phases 3 and 4 of the Municipal Class EA process.

In 2010, the City of Barrie annexed 2,293 hectares of land from the Town of Innisfil, as part of the *Barrie-Innisfil Boundary Adjustment Act, 2009*. These lands were then subject to a Secondary Plan process including the Salem Secondary Plan and the Hewitt's Secondary Plan. Both were approved in 2014. Following this, six Master Plans were prepared, including the Multi-Modal Active Transportation Master Plan to meet the requirements of Phases 1 and 2 of the Municipal Class EA process.

The Master Plans identified the need for improvements to the transportation system and municipal servicing to accommodate growth to the year 2031. It was identified that there is an opportunity to provide safe, efficient and accessible options, to encourage a sustainable transportation network, including the provision of public transit and on and off-road pedestrian and cycling facilities to encourage active transportation.

The purpose of this Study is to recommend a preferred design concept to address the identified capacity deficiencies within the Study Area. The Class EA process followed is documented in this Environmental Study Report (ESR) and will be made available for a 30-calendar day review period.

If, following the review of the ESR, a person or party has an objection, they may request that the proponent voluntarily elevate the EA to an Individual EA. If the proponent declines, the person or party may pursue the matter further and write to the Ministry of the Environment and Climate Change to request a Part II Order.

### **Need and Justification**

A Transportation and Traffic Operations report was undertaken to confirm the need and justification of the proposed improvements. All of the roadways are identified as Major Arterial with a two-lane cross-section. Nineteen intersections are under stop-control and the remaining are traffic signal. There are three Barrie Transit bus routes including Route 8, 4 and 11 and there are very few active transportation facilities within the Study Area.

A mid-block capacity analysis was completed to compare the existing traffic volume to the sectional road capacity to determine the need to increase the capacity of the Study Area roads. An intersection operations and capacity analysis using existing traffic volumes and road network configuration was undertaken.

The collision analysis found that almost half of all intersection and midblock collisions were rear end collisions, which could be attributed to high travel speeds, distracted driving, insufficient gaps and poor road conditions.

By 2021, most of the roads within the Study Area are recommended to be widened to four lanes, and Mapleview Drive from Huronia Road to Madelaine Drive to six lanes.

By 2031, Mapleview Drive from Huronia Road to Country Lane/Stunden Road is recommended for further widening improvements and from Madelaine Drive to St. Paul's Crescent, the recommendation is for six lanes; as well as for Yonge Street from Mapleview Drive to Lockhart Road, the recommendation is for six lanes.

The study determined that in addition to widening the roadways, there is a need for improvements at the unsignalized and signalized intersections throughout the Study Area.

### **Alternative Design Concepts for Preferred Solution**

Based on the recommended planning solution to improve/widen Mapleview Drive East, Lockhart Road, Yonge Street and Big Bay Point Road, as well as the provision to provide grade crossings of the Metrolinx Barrie Corridor at Mapleview Drive East and Lockhart Road, to accommodate future development and growth in the annexed lands, numerous alternative design concepts were presented and evaluated, as described in further detail in Section 3.

### **Natural Heritage**

Through a review of the existing documents prepared as part of the Secondary Plan, and from information provided by the Lake Simcoe and Region Conservation Authority (LSRCA) regarding Ecological Land Classification (ELC) boundaries, ELC maps were prepared for the Study Area.

There are a number of watercourses that traverse the Study Area as part of the Lake Simcoe Watershed, including Lovers Creek and Hewitt's Creek Subwatersheds, as well as Innisfil Creeks subwatershed. Each of the Creeks throughout the Study Area contain a range of aquatic habitats, including Brook Trout Spawning Habitat and Sculpin Documented Habitat.

The site visit determined that there is a lack of wildlife along the corridors which may be due to the roadways which create barriers. All birds documented are common in southern Ontario and for the most part not considered rare. There were four species that had regional conservation status including Eastern Wood Pewee, Eastern Kingbird, Savannah Sparrow and Hooded Warbler. The Eastern Wood Pewee is listed as special concern in Ontario.

Snapping Turtles were documented by the MNRF in the St. Paul's swamp and one Eastern Gartersnake was noted during the 2016 field investigations.

Four Species at Risk (SAR) were identified by the MNRF to be potentially located within the Study Area, and only one type of habitat was found during site visits.

Two Provincially Significant Wetlands are located within the Study Area including St. Paul's Swamp and Lovers Creek Swamp along Lockhart Road and Mapleview Drive.

There are woodlands located within the Study Area, including along both sides of Big Bay Point Road, Mapleview Drive East and Lockhart Road. There are two significant valleylands located along the south

side of Lockhart Road, associated with Hewitt's Creek and Hewitt's Creek tributary, as well as a third located as part of Lovers Creek tributary north of Lockhart Road.

There are both amphibian and deer movement corridors located within the Study Area.

### **Geomorphology**

There are three creeks (Lovers Creek, Hewitt's Creek and Sandy Cove Creek) which cross the roadways a total of eight times throughout the Study Area. Each of the crossings were identified to be transitional/stressed and the recommended meanderbelt widths ranged from 18 m up to 52 m, depending on the location of the crossing.

### **Cultural Heritage**

A Cultural Heritage Resources Assessment was completed and determined through a review of previously identified cultural heritage features, as well as through a site visit, that there are a total of 32 resources of cultural heritage value within the Study Area. These include: nine farmscapes, ten residences, four remnant farmscapes, one historic settlement area, one church with cemetery; one former school, one watercourse, four roadscape, and one railscape.

### **Structural Assessment**

A structural assessment was completed for each of the crossings and determined that most of the culverts can be rehabilitated and/or extended; however, one will be required to be replaced.

### **Noise Impact Assessment**

A Noise Impact Assessment was undertaken to evaluate the noise impact at select representative sensitive points of reception resulting from changes in road traffic volume within the Study Area. The Study assessed the increase of road and rail vehicular traffic noise and compared it to the existing ambient traffic noise. Seven Outdoor Living Areas (OLA) were selected as part of the evaluation.

### **Drainage and Stormwater Management**

A Drainage and Stormwater Management study was undertaken to assess existing and future recommendations, based on the proposed roadway improvements and increase impervious surface within the Study Area. The majority of the Study Area's existing minor and major drainage systems are conveyed by roadside ditches to existing outlets.

### **Geotechnical investigation**

A Geotechnical Report was prepared to document existing groundwater conditions and pavement along each of the roadways at the culvert crossing locations.

### **Evaluation of Alternative Design Concepts**

Each of the roadway segments were divided into smaller sections to evaluate the design concepts based on the following criteria: Engineering/Operational Environment; Natural Environment; Social Environment; Cultural Environment; and Economic Environment.

### **Railway Crossings**

A Railway Crossing Assessment was undertaken for each of Mapleview Drive East and Lockhart Road at the GO Transit Barrie Rail Corridor. The assessment considered the advantages and disadvantages of an overpass or an underpass at each of the crossings.



## **Description of Preferred Design Concept**

The preferred alternative is to widen Mapleview Drive, Lockhart Road, Yonge Street and Big Bay Point Road including the provision of additional travel lanes, and turning lanes at intersections to address the traffic requirements. The preferred design concepts include a mitigated option in some segments in order to reduce property impacts, as well as to reduce impact on the natural and cultural environments. In some locations, the alignments were shifted to minimize impacts to property wherever possible.

## **Water and Wastewater – Conceptual Design of Trunk Watermain and Sanitary Sewer**

A Conceptual Design for a trunk watermain and sanitary sewer was prepared to address system upgrades and expansions within the Study Area. These system upgrades include a feedermain on Big Bay Point Road; a watermain on Mapleview Drive; and a trunk sanitary sewer on Mapleview Drive. In addition, the recommendations also include maintenance holes.

## **Consultation**

Throughout Phases 3 and 4 of the Class EA process, the Study Team met with the Lake Simcoe Region Conservation Authority and Nottawasaga Valley Conservation Authority to receive input on natural heritage and stormwater management and drainage input and recommendations. In addition, the Study Team met with the County of Simcoe and the Town of Innisfil prior to each of the PICs to provide an update on the study and to receive input on the recommended plans. Meetings with the Hewitt's Landowners Groups were held throughout the Study and meetings were held with property owners to discuss the process and options available. First Nations communities were consulted, however the only response received was from the Chippewas of Rama First Nation to advise that the letter was shared with Council and provided to the Williams Treaties First Nation Process coordinator. Two PICs were held throughout the Study to receive input from agencies, the public and stakeholders regarding the proposed recommendations.

## **Potential Environmental Impacts and Mitigations**

There are a number of recommendations to reduce the impact based on the proposed improvements. To reduce the potential impact to breeding birds, vegetation removal should not take place during the core local breeding bird season from April 1<sup>st</sup> to August 31<sup>st</sup>. In addition, no in-water works are to occur between October 1<sup>st</sup> and July 15<sup>th</sup> of any given year. No construction or grading is to occur outside of the development envelop once it is confirmed during detailed design. Erosion and sediment control measures should be implemented to avoid impacts to woodlands, PSWs and unevaluated wetlands.

A Tree Inventory and Preservation Plan is recommended to be completed by a Certified Arborist during detailed design. Efforts should be made for the protection of wildlife during construction, using erosion fencing. The installation of new culverts or the replacement should follow guidelines as prescribed by the relevant agencies including to be constructed in a manner that does not impeded fish passage.

A Noise Control measure should be considered to reduce the noise levels by 5 dB to 60 dBA at OLA #6.

## **Commitments to Further Work**

During detailed design, recommendations include consideration for compensation related to loss of woodlands, as well as to limit impact to tree and vegetation, and to follow the City of Barrie tree removal policies. Work along the creeks should consider the recommendations included in the geomorphology report, related to realignment of creeks and other recommendations. Water quality control treatments including Low Impact Development measures should be reviewed during detailed design. Permits



and Approvals may include: LSRCA Permit under Ontario Regulation 179/06; MOECC Permit to Take Water; Tree Preservation By-law; DFO Self-assessment and Wildlife Scientific Collectors Permit. There are cost sharing opportunities that the City should review and further investigate including Metrolinx, Transport Canada, Infrastructure Canada, Province of Ontario, Town of Innisfil and County of Simcoe.

## **1. Introduction**

### **1.1 Introduction**

The City of Barrie initiated a Schedule C Municipal Class Environmental Assessment (Class EA) Study to recommend improvements to the arterial roadways within the Hewitt's Secondary Plan Area in accordance with the recommendations of the Multi-Modal Active Transportation Master Plan (MMATMP) Study and servicing plans. Figure 1-1 outlines the Study Area which includes the following arterials:

- Mapleview Drive East from Huronia Road to 20<sup>th</sup> Sideroad;
- Lockhart Road from Huronia Road to just west of 20<sup>th</sup> Sideroad;
- Yonge Street from Lockhart Road to Mapleview Drive East;
- Big Bay Point Road from just east of Prince William Way to just west of 20<sup>th</sup> Sideroad;  
and
- Grade separations at Metrolinx's Barrie Corridor at Mapleview Drive East and Lockhart Road to accommodate growth to 2051.

The Study Area is comprised primarily of rural agricultural land in the southern portion of the City of Barrie bordering the adjacent Town of Innisfil.

All municipal road reconstruction or widening projects in Ontario require approval under the *Ontario Environmental Assessment Act* (EA Act). The Municipal Engineers Association (MEA) Municipal Class EA process streamlines the planning and decision making process for municipal infrastructure with an approved procedure designed to protect the environment. The Class EA process provides a decision-making framework that enables the requirements of the EA Act to be met in an effective manner. Further details regarding the Class EA process are described in a later section.

Hatch was retained by the City of Barrie to undertake a Class EA Study for improvements to the roadway sections described above. The Study included the review of the existing work already completed as part of the MMATMP, and the completion of Phases 3 and 4 of the Class EA process.

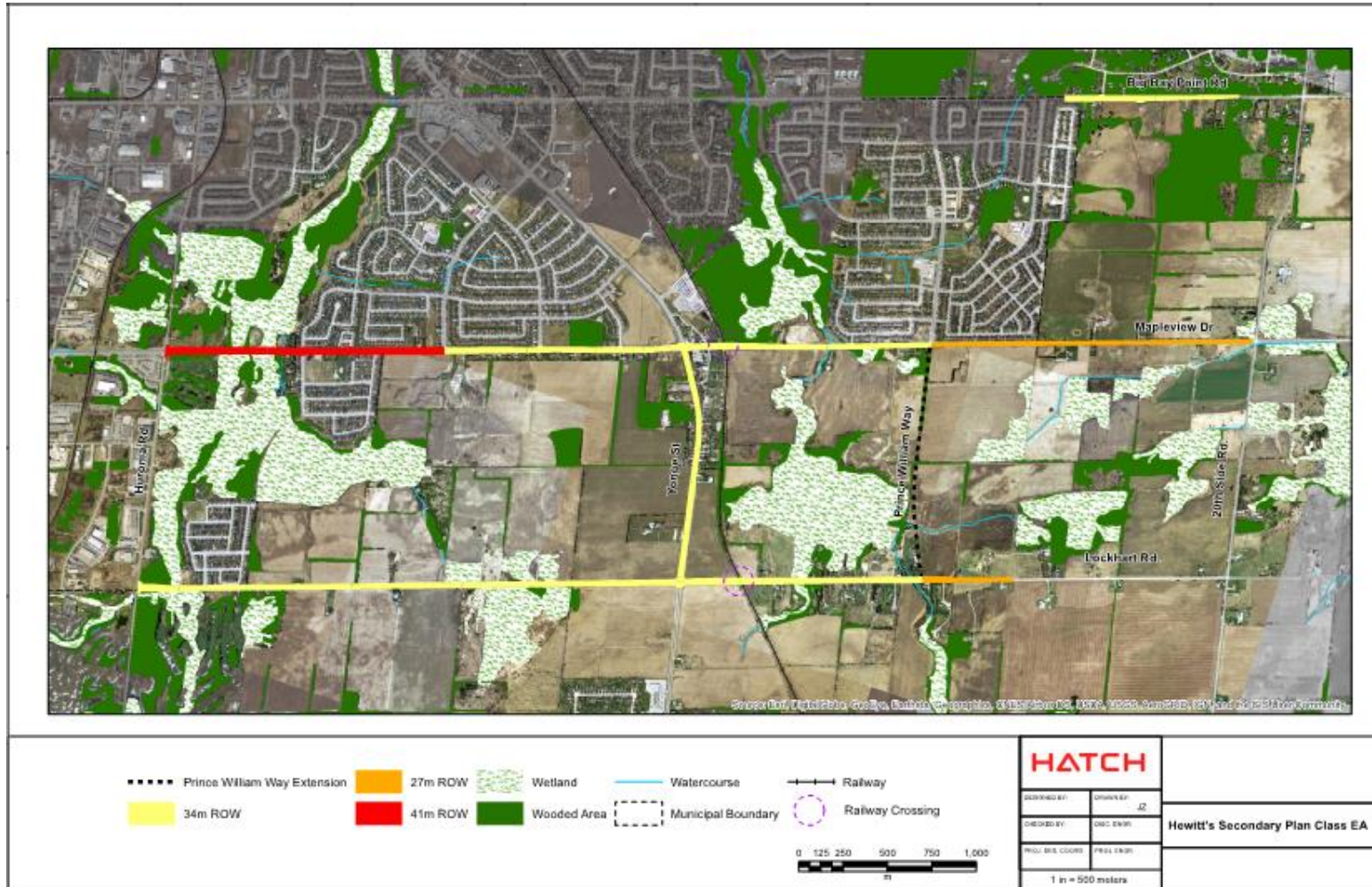


Figure 1-1: Study Area

## 1.2 Background

In 2010 the City of Barrie annexed 2,293 hectares of land from the Town of Innisfil as part of the *Barrie-Innisfil Boundary Adjustment Act, 2009*. This land was then subject to a Master Planning exercise. The land was annexed to provide the City with additional developable residential and employment lands. Two Secondary Plans and associated studies were completed to form the basis for an Official Plan Amendment to the City of Barrie Official Plan (2009). The two Secondary Plans include the Salem Secondary Plan (Official Plan Amendment 38) and the Hewitt's Secondary Plan (Official Plan Amendment 39). These were approved in 2014. The focus of the Secondary Plans and associated studies was to create a vision for the annexed lands and policies for implementation including conceptual designs for future development areas. In addition, a series of six Master Plans were prepared for the City of Barrie in accordance with the Municipal Class EA process. Pertinent to this study a Multi-Modal Active Transportation Master Plan (MMATMP) was prepared and addresses Phases 1 and 2 of the Class EA process.

The MMATMP was completed in January 2014 and identified various projects to address growth in the City of Barrie. The MMATMP outlines the required transportation network to address existing and future needs within the City to 2031. The City has experienced rapid growth and initiated the MMATMP to assist with determining how to address growth sustainably. The MMATMP was conducted in accordance with the Master Plan process as described in the MEA and addresses Phases 1 and 2 of the five-phase Municipal Class EA Process. The Master Plan reviewed the natural, social and economic environment and took into consideration all modes of transportation. The City of Barrie identified the need for a transportation system to accommodate growth to the year 2031 and beyond. The MMATMP reviewed other planned transportation projects to influence the City of Barrie's transportation network including improvements to Highway 400; improvements to Simcoe County's road network and the provision of increased service for GO Train and Bus.

The MMATMP recommended, as it pertains to the Annexed Lands:

- Improved transit to accommodate future transit demand, including good service coverage and frequency.
- Active transportation improvements, including sidewalks on both sides, and integrated pathway networks, including buffered bike lanes on Mapleview Drive East, Lockhart Road, Yonge Street and Big Bay Point Road.
- Road network improvements including the addition of 3 lanes per direction plus median for Mapleview Drive East from Huronia Road to Madelaine Drive; 1 lane per direction plus Two-Way Left-Turn Lane (TWLTL) for Mapleview Drive East from Madelaine Drive to Prince William Way; Lockhart Road from Huronia Road to Prince William Way; Big Bay Point from Prince William Way to Collector 11; and Yonge Street from Lockhart Road to Mapleview Drive East by 2031.

- Policies relating to transportation demand management to encourage modifications to travel behaviours and improved infrastructure and services for transit, carpooling and active transportation, as well as consideration for Smart Commute program.

### 1.3 Phases 1 and 2 Summary

The Opportunity Statement from the MMATMP (covering the requirements of Phases 1 and 2 of the Municipal Class EA process) is as follows:

- The City of Barrie is in need of a transportation system to accommodate growth to 2031 and beyond. An opportunity exists to plan a transportation system which:
  - ◆ Is safe, efficient and accessible with mobility choices;
  - ◆ Fosters the use and development of sustainable transportation network;
  - ◆ Provides a public transit system as a good alternative to private automobile use; and
  - ◆ Provides a network of on-road and off-road pedestrian and cycling facilities that provide active transportation modes as an alternative to the automobile.

Alternative solutions to address the Opportunity Statement included:

- Do Nothing;
- Low modal share - Auto-oriented 'status quo' approach;
- Medium modal share – increased emphasis on non-auto modes; and
- High modal share – strong emphasis on non-auto modes.

Following the completion of Phases 1 and 2 of the Class EA, the following preferred solution was recommended:

- Alternative 3 was identified as the preferred option, to improve existing conditions for active transportation, while being able to serve new developments mostly concentrated in the Annexed Lands and Intensification Areas. The preferred alternative was identified to increase the use of active transportation and transit significantly from existing low levels of active transportation and transit usage. Alternative 3, as it relates to roadway improvements, includes:
  - ◆ Widen Mapleview Drive East to 7 lanes from Huronia Road to Madeleine, 5 lanes from Madeleine to Prince William Way and 3 lanes from Prince William Way to 20<sup>th</sup> Sideroad;
  - ◆ Widen Lockhart Road to 5 lanes from Huronia Road to Prince William Way, and 3 lanes from Prince William Way to east of Collector 11;
  - ◆ Widen Yonge Street to 5 lanes from Mapleview Drive to Lockhart Road;
  - ◆ Widen Big Bay Point Road to 5 lanes to Collector 11 and 3 lanes east of Collector 11;
  - ◆ Sidewalks and buffered bike lanes along all roadways within the project limits; and



- ◆ Grade separations at Metrolinx's Barrie Corridor at Mapleview Drive East and Lockhart Road.

## 1.4 Purpose of the Study

The purpose of the Study is to recommend a preferred design concept for each roadway to address the identified capacity deficiencies within the Study Area. This Study was completed in accordance with the Municipal Class EA process for Schedule C projects, including Phases 3 and 4 of the Class EA process including the following steps:

- Update technical studies pertinent to the Hewitt's Secondary Plan Study Area;
- Identify and evaluate Alternative Design Concepts;
- Present project-specific information to and receive input from the public, property owners and review agencies throughout the Study;
- Select a Preferred Alternative Design Concept; and
- Prepare and file an Environmental Study Report for a minimum 30-day public review period. The ESR documents the Class EA process, including mitigation measures and commitments to implement the recommended improvements.

## 1.5 Municipal Class Environmental Assessment Process

Under the provisions of the *Ontario Environmental Assessment Act* and Regulation 334, certain types of provincial and municipal undertakings can meet the requirements of the Act through the use of an approved environmental planning process referred to as a Class Environmental Assessment (Class EA).

The Class EA process is a self-assessing procedure by which a group or 'class' of undertakings can be planned and implemented in a way that fulfills the requirements of the Act without having to undertake an Individual Environmental Assessment. Upon completion of the appropriate process, the undertaking is considered approved and does not require formal submission to the Ministry of Environment and Climate Changes (MOECC).

The Municipal Class EA prepared by the Municipal Engineers Association (Dated October 2000, as amended in 2007, 2011 and 2015) outlines the approved process for the planning and design of municipal infrastructure.

Figure 1-2 summarizes the five phases of this process. As the figure notes, review agencies and members of the public are contacted to solicit input and comments at key consultation milestones throughout the process. This input is essential to ensure that issues are identified early in the process and can be addressed prior to moving forward and making final recommendations.

The Municipal Class EA process recognizes that there are varying levels of impact requiring a greater or lesser amount of assessment, depending on the nature of the work, the estimated cost and the potential impacts on the environment (which includes natural, social,

economic, cultural and technical). There are four levels or “schedules” of undertakings defined in the Municipal Class EA to account for this variation, being:

- Schedule A: These projects are limited in scale and include emergency operational and maintenance activities. Schedule A projects are deemed pre-approved without the need for further assessment.
- Schedule A+: As introduced in the 2007 amendment to the Municipal Class EA, Schedule A+ projects are also pre-approved, but require the proponent to advise the public of the initiative prior to implementation.
- Schedule B: These projects have the potential for some adverse environmental effects and include improvements and minor expansions of existing facilities. For Schedule B projects, the proponent must undertake a screening process, including consultation with those who may be affected by the undertaking. At the conclusion of the process, a Project File Report is prepared to document the findings.
- Schedule C: These projects have the potential for significant environmental effects and include new facilities and major expansions to existing facilities. Schedule C projects must follow the full planning and consultation process outlined in the Class EA, including the preparation of an Environmental Study Report.

## City of Barrie - Hewitt's Secondary Plan Class Environmental Assessment (Phase 3 and 4) Study Environmental Study Report

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

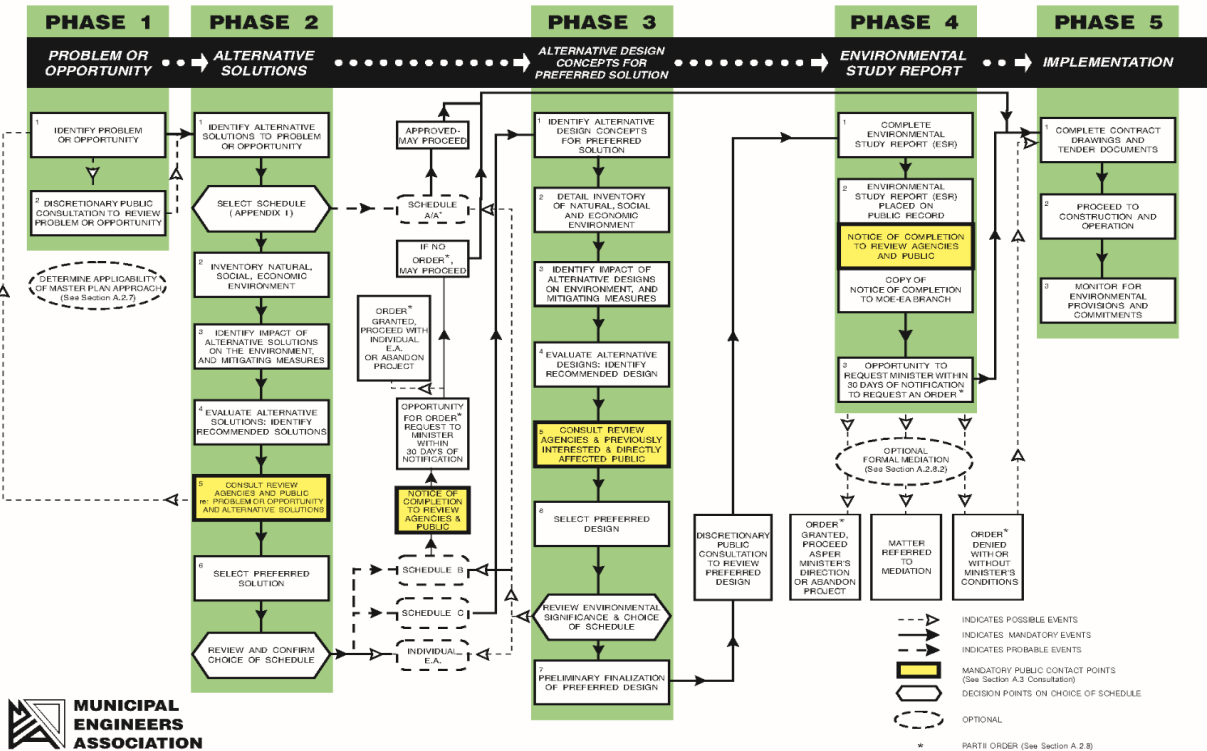


Figure 1-2: Municipal Class EA Planning and Design Process

Source: Municipal Engineers Association, Exhibit A.2 Municipal Class Environmental Assessment Planning and Design Process, October 2000, as amended 2015

### 1.6 Environmental Study Report

The Environmental Study Report (ESR) documents the planning process followed for Schedule C projects through Phases 3 to 4 of the Municipal Class EA. The report clearly documents the steps taken to select the technically preferred design concept. The ESR is finalized with the issuance of a Notice of Study Completion inviting the public, review agencies and First Nation communities to review and provide input on the document within the 30 calendar day review period. The Notice will identify the location(s) where the ESR can be reviewed.

### 1.7 Part II Order

It is recommended that all stakeholders work together to determine the preferred means of addressing the problem. If concerns regarding the project cannot be resolved through discussions with the proponent (for this Study, the proponent is the City of Barrie). The person or party raising the objection may request that the proponent voluntarily elevate the Schedule C project to an Individual EA. If the proponent declines and the person or party with the concern wishes to pursue the matter further, they may write to the Minister of the Environment and Climate Change to request a Part II Order. The request should be copied



to the proponent, and the Director, Environmental Approvals Branch at the same time that the request is submitted to the Minister. The Minister will determine whether or not the request is necessary and the decision is considered final.

A written request must be submitted to the Minister within the 30 calendar day review period after the Notice of Completion has been issued. The Minister of the Environment and Climate Change and the Director, Environmental Approvals can be contacted as follows:

Ministry/Minister of the Environment and Climate Change 77 Wellesley Street West 11 <sup>th</sup> Floor Ferguson Block Toronto, ON M7A 2T5 Fax: 416-314-8452	Director, Environmental Approvals Branch MOECC 135 St. Clair Avenue West, 1 <sup>st</sup> Floor Toronto, ON M4V 1P5
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## 1.8 Study Approach

As discussed in Section 1.3, the Municipal Class EA process consists of five phases. Phase 1 includes the problem identification; Phase 2 includes the identification of the preferred solution; Phase 3 includes the identification of the Preferred Design Concept; Phase 4 includes the documentation of the EA process in an ESR; and Phase 5 includes project implementation, including the detail design and construction of the project. Consultation is a key component of the process and is integrated at key milestones.

## 1.9 Study Organization

The Consultant Team and their roles included the following:

Team Member	Role	
Hatch (Prime Consultant)	<ul style="list-style-type: none"> <li>Project Management</li> <li>EA Planning &amp; Consultation</li> <li>Natural Heritage</li> <li>Traffic and Safety Impact</li> </ul>	<ul style="list-style-type: none"> <li>Noise</li> <li>Drainage and Stormwater Management</li> <li>Structures and Railway Crossing Assessment</li> <li>Watermains and Sanitary Sewer Conceptual Design</li> </ul>
Archaeological Services Inc.	<ul style="list-style-type: none"> <li>Stage 2 Archaeological Assessment</li> <li>Cultural Heritage Assessment Report</li> </ul>	
Golder Associates	<ul style="list-style-type: none"> <li>Geotechnical Investigations</li> </ul>	
Water's Edge	<ul style="list-style-type: none"> <li>Geomorphology</li> </ul>	
J.D. Barnes Limited (JDB)	<ul style="list-style-type: none"> <li>Topographical and Legal Survey</li> </ul>	

## **2. Need and Justification**

### **2.1 Existing Conditions - Traffic**

A Transportation and Traffic Study Report was completed and is contained in Appendix A. All of the existing roadways within the Study Area are classified as Major Arterial with a two-lane cross-section. Twelve of the nineteen intersections currently operate under stop-control (two-way or all-way stop). The remaining seven intersections operate under traffic signal control.

There are three routes which are operated by Barrie Transit within the Study Area, including:

- Route 8 along Maplevue Drive;
- Route 4 along a portion of Maplevue Drive; and
- Route 11 along a portion of Lockhart Road via Huronia Road.

Existing Active Transportation facilities include a few sidewalks along Maplevue Drive and Big Bay, as well as bike lanes along the entire length of Prince William Way.

A mid-block capacity analysis was completed to compare the existing traffic volume to the sectional road capacity to determine the need to increase the capacity of the Study Area roads. A need to add capacity was identified in those road sections where the existing traffic volume compared to the available sectional capacity (volume/capacity ratio (v/c) exceeded 1.0. Through this analysis, it was determined that there is an immediate need to widen Maplevue Drive from Huronia Road to Madelaine Drive from two to four through traffic lanes. This section is currently operating at or approaching effective capacity during both the morning and afternoon peak hours.

An intersection operations and capacity analysis using existing traffic volumes and road network configuration was undertaken. For this analysis, a need to improve intersection operations was identified at locations where the overall intersection Level of Service (LOS) was less than 'D', or had an overall v/c ratio greater than 0.85. This analysis determined that all signalized intersections are operating at LOS of C or better. Similarly, most stop-controlled intersections are operating at acceptable levels of service, with only the following problematic movements:

- The southbound left-turn movement at the Maplevue Drive and Madelaine Drive intersection operates at a LOS of F in the PM peak hour. The movement experiences high delay times, however is operating within its available capacity.
- The eastbound shared through/left turn movement at the intersection of Huronia Road and Saunders Drive is operating at an overall LOS of E in the PM peak hour due to moderate to high delay times. The movement is operating within its available capacity.

### **2.2 Existing Traffic Safety**

In 2015, the City of Barrie prepared a presentation based on 2014 Collision Analysis to allow staff to review up-to-date collision statistics for the City. The presentation identified the top 20

intersections with the highest incidents reported. Mapleview Drive and Huronia Road is the only intersection on the list that is located within the Study Area.

Collision information was provided by the City of Barrie for the intersections and midblock locations for a 5-year period from 2010 to 2015. The reported collisions occurred at 20 intersections and 16 mid-block locations. For the purpose of the analysis, the locations with the highest frequencies of collisions have been analyzed including:

- Intersections:
  - ◆ Lockhart Road and Huronia Road;
  - ◆ Lockhart Road and Yonge Street;
  - ◆ Mapleview Drive East and Country Lane/Stunden Lane;
  - ◆ Mapleview Drive East and Huronia Road; and
  - ◆ Mapleview Drive East and Yonge Street.
- Midblock Locations:
  - ◆ Lockhart Road between Huronia Road and Yonge Street;
  - ◆ Mapleview Drive East between Huronia Road and 20<sup>th</sup> Side Road; and
  - ◆ Yonge Street between Mapleview Drive East and Lockhart Road.

There were a total of 437 collisions, including 329 intersection collisions and 108 midblock collisions reported between 2010 and 2015. The intersection of Mapleview Drive East and Huronia Road experienced the highest number of collisions (108) followed by Mapleview Drive East and Yonge Street (48) and Lockhart Road and Huronia Road (39). The midblock section of Mapleview Drive East between Huronia Road and Yonge Street had the highest number of midblock collisions recorded (73), followed by Yonge Street between Mapleview Drive East and Lockhart Road (11) and Lockhart Road between Huronia Road and Yonge Street (6).

There were no fatal collisions that occurred within the study area between 2010 and 2015 and relatively low number of collisions that resulted in non-fatal injuries. The majority of collisions (320) are classified as property damage only. Approximately half of the non-fatal injury collisions occurred within the midblock section of Mapleview Drive between Huronia Road and 20<sup>th</sup> Sideroad. Along this section there are many access points to Mapleview Drive East, with commercial accesses, residential accesses and connection to collector roads. Approximately 10% of collisions within this section are angle (T-bone) collisions, which are more severe collision types. This could be attributed to drivers speeding and accepting insufficient gaps to enter Mapleview Drive.

The majority of collisions for both intersection and midblock sections were rear end collisions, followed by angle collisions, single motor vehicle and turning movement collisions.

There are a total of 20 intersections which account for 329 collisions representing 75% of the total collisions. No fatal-injury collisions were reported.

The highest occurrence of collisions was found to occur during the midday period, accounting for 38% of total intersection collisions. This is followed by 32% during the PM peak hour, 17% during the AM peak hour, and 13% during the off-peak periods.

The majority of the collisions occurred during daylight conditions (75%) with 17% of collision during dark lighting conditions and the remaining 14% at dusk and dawn.

The collision analysis found that almost half of all intersection and midblock collisions, 48% and 43% respectively, were rear end collisions. These collisions could be attributed to high travel speeds, distracted driving, drivers leaving insufficient gaps and/or poor road conditions. Increased traffic regulation enforcement can be considered as a deterrence for drivers committing the offenses listed above and to mitigate future collisions.

## **2.3 Existing Traffic Safety – Grade Separations**

### **2.3.1 *Lockhart Road***

The Phase 1 and 2 report undertaken for the Annexation Area undertook a calculation of the rail crossing exposure index to identify the warrant and appropriate means of providing protection for the rail crossing of Lockhart Road east of Yonge Street. The analysis identified an exposure index of 181,692. Typically, exposure indexes between 50,000 and 200,000 would receive flashing lights, bells and gates for protection as a level crossing, while an index in excess of 200,000 would warrant a full grade separation. Given the proximity to 200,000 and the uncertainty at the time of producing the Annexation background studies, as future rail operation plans by Metrolinx (GO Transit) a recommendation was made in the MMATMP to replace the level crossing with a grade separation.

### **2.3.2 *Mapleview Drive***

Similarly, an analysis of the level crossing exposure was undertaken during the Phase 1 and 2 components of the Annexation Lands EA for the crossing at Mapleview Drive East. This crossing was found to have an exposure index of 354,396 by horizon year 2031. Typically values in excess of 200,000 are recommended for replacement with a grade separated crossing, while those less than 200,000 will have protection recommended ranging from “cross-bucks and advance warning signs” to “Flashing Lights, Bells and Gates” dependent upon the level of the exposure index.

## **2.4 Future Transportation and Traffic Operations**

Using traffic growth rates provided by the City, future traffic volumes were projected for road network links within the Study Area for the years 2021 and 2031. For segments where growth rates were not provided, growth rates from other links with similar characteristics were used. For each horizon year a ‘Base’ scenario analysis was completed to evaluate the operation of the roads without any modification to the existing road network.

**2.4.1 2021 Horizon Year Requirements**

**2.4.2 Midblock Improvements**

By 2021, based on the projected growth rates, the following conditions are expected:

1. Mapleview Drive, from Huronia to Prince William Way will be operating at capacity for both the westbound and eastbound directions, during both the morning and afternoon peak hours.
2. Big Bay Point, between Prince William Way and The Queensway will be approaching capacity in the eastbound direction during the afternoon peak hour.
3. Huronia Road, between Saunders Road and Lockhart Road will be approaching capacity in the southbound direction during the afternoon peak hour.
4. Yonge Street, between the Barrie South GO Station and Mapleview Drive, will be operating at capacity in the southbound direction during the afternoon peak hour.
5. Yonge Street, between Mapleview Drive and Lockhart Drive, will be operating at capacity in the northbound direction during the afternoon peak hour. Also, this section is approaching capacity in the southbound direction during the morning peak hour.
6. Lockhart Road between Huronia Drive and Yonge Street will be operating at capacity in the eastbound direction during the afternoon peak hour.

The analysis for the 2021 horizon year identified the following improvements to accommodate the anticipated traffic growth:

**Table 2-1: 2021 Midblock Improvements**

Midblock	Proposed Improvements
<b>Mapleview Drive:</b> Huronia Road to Madelaine Drive	Widen to 6 lanes
<b>Mapleview Drive:</b> Madelaine Drive to Prince William Way	Widen to 4 lanes
<b>Big Bay Point Road:</b> Prince William Way to Queensway	Widen to 4 lanes
<b>Huronia Drive:</b> Saunders Road to Lockhart Road	Widen to 4 lanes
<b>Yonge Street:</b> Mapleview Drive to Lockhart Road	Widen to 4 lanes
<b>Lockhart Road:</b> Huronia Drive to Yonge Street	Widen to 4 lanes

**2.4.3 Geometric Improvements at Signalized Intersections**

As part of the future operations analysis, the road improvements were analyzed based on the applied growth rates determined above for the horizon years of 2021 and 2031. The analysis focused on a 'Base' scenario for each horizon year that evaluates the operations of the intersections without any modifications to the existing road network. A subsequent analysis was then completed with the recommendations and improvements to the road network, including any road improvements planned for the road network. This scenario is referred to as the 'Improved' scenario for the respective horizon year.

The analysis indicated that with the anticipated traffic growth, multiple signalized intersections are expected to operate at a LOS of 'F' and operate at effective capacity in the PM peak hour, with multiple problem movements expected during both the AM and PM peak hours. Updating the traffic signal timing plans was considered along with the geometric improvements identified in Table 2-2 to address these capacity deficiencies.

**Table 2-2: 2021 Geometric Improvements at Signalized Intersections**

Intersection	Proposed Improvements
Mapleview Rd @ Yonge St	<ul style="list-style-type: none"> <li>Addition of dedicated southbound right-turn lane</li> </ul>
Yonge St @ Go Station	<ul style="list-style-type: none"> <li>Addition of dedicated northbound right-turn lane</li> </ul>
Mapleview Dr @ Country Lake/Stunden Lane	<ul style="list-style-type: none"> <li>Addition of eastbound and westbound right-turn lanes</li> </ul>
Lockhart Rd @ Huronia Rd	<ul style="list-style-type: none"> <li>Convert existing southbound right-turn lane into a shared through/right lane</li> </ul>
Lockhart Rd @ Yonge St	<ul style="list-style-type: none"> <li>Reconstruct intersection to include dedicated right, through and left travel lanes on all four approaches</li> </ul>
Big Bay Point Rd @ The Queensway	<ul style="list-style-type: none"> <li>Addition of dedicated eastbound right-turn lane</li> </ul>
Big Bay Point Rd @ 20 <sup>th</sup> Sideroad	<ul style="list-style-type: none"> <li>Installation of traffic signals; or</li> <li>Consider a modified form of traffic control, such as a roundabout</li> </ul>
Mapleview Dr @ 20 <sup>th</sup> Sideroad	<ul style="list-style-type: none"> <li>Installation of traffic signals; or</li> <li>Consider a modified form of traffic control, i.e., roundabout</li> </ul>
Mapleview Dr @ Prince William Way	<ul style="list-style-type: none"> <li>Installation of traffic signals</li> <li>Reconstruct intersection to include dedicated right, through and left travel lanes on all four approaches</li> </ul>
Mapleview Drive @ Dean Ave	<ul style="list-style-type: none"> <li>Installation of traffic signals</li> <li>Reconstruct intersection to include dedicated right, through and left travel lanes on all four approaches</li> </ul>
Mapleview Dr @ Madelaine Dr	<ul style="list-style-type: none"> <li>Installation of traffic signals</li> <li>Reconstruct intersection to include dedicated right, through and left travel lanes on all four approaches</li> </ul>
Huron Rd @ Saunders Dr	<ul style="list-style-type: none"> <li>Installation of traffic signals</li> <li>Installation of auxiliary lanes for north and south approaches</li> <li>Installation of dedicated left turning lane for west approach</li> </ul>
Lockhart Rd @ 20 <sup>th</sup> Sideroad	<ul style="list-style-type: none"> <li>Installation of traffic signals; or</li> <li>Consider modified form of traffic control, such as roundabout</li> </ul>

With the incorporation of the proposed improvements, per Table 2-2, all intersections are expected to operate at LOS of 'D' or better in both AM and PM peak hours. All movements are expected to operate within their available capacity.

#### 2.4.4 **Geometric Improvements at Unsignalized Intersections**

The analysis indicates that most of the unsignalized intersections show operational problems in both the AM and PM peak hours. With the additional traffic added to the road network, several movements are expected to operate at a LOS of 'F' with high delays and v/c ratios in excess of 1.00. These operational deficiencies result from fewer gaps in main street traffic

due to higher traffic volumes, which cause stop-controlled turning movements to experience higher delays and queuing.

Consideration was given to several existing locations with low volumes of pedestrians and cyclists to determine where modified forms of traffic control, including roundabouts would be suitable. Geometric constraints were also considered to ensure there were no steep grades, drainage issues and sight distance problems that could impede the installation of a roundabout. The improvements listed in Table 2-3 have been considered to address the operational problems.

**Table 2-3: 2021 Geometric Improvements at Unsignalized Intersections**

Intersection	Proposed Improvements
Big Bay Point Rd @ The Queensway	<ul style="list-style-type: none"> <li>Addition of a dedicated eastbound right turning lane</li> </ul>
Big Bay Point Rd @ 20 <sup>th</sup> Sideroad	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Consider modified form of traffic control – convert intersection to a single lane roundabout</li> </ul>
Mapleview Dr & 20 <sup>th</sup> Sideroad	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Consider modified form of traffic control – convert intersection to single lane roundabout</li> </ul>
Mapleview Dr @ Prince William Way	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Reconstruct intersection to include dedicated right, through and left travel lanes on all four intersection approaches</li> </ul>
Mapleview Dr @ Royal Jubilee Dr	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Reconstruction intersection to include a south approach which includes left, through and right travel lanes</li> <li>Addition of eastbound and westbound left turning lanes</li> <li>Addition of a dedicated eastbound right turning lane</li> </ul>
Mapleview Dr @ Goodwin Dr	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Reconstruct intersection to include dedicated right, through and left travel lanes on all four intersection approaches</li> </ul>
Mapleview Dr @ Dean Ave	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Reconstruct intersection to include dedicated right, through and left travel lanes on all four intersection approaches</li> </ul>
Mapleview Dr @ Madelaine Dr	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Reconstruct intersection to include dedicated right, through and travel lanes on all four intersection approaches</li> <li>Eastbound and westbound approaches are to include two through travel lanes</li> </ul>
Mapleview Dr @ Celine Cres	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Addition of a dedicated eastbound right turn lane</li> <li>Addition of a dedicated westbound left turn lane</li> </ul>
Huron Rd @ Saunders Dr	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Addition of auxiliary lanes for north and south approaches</li> <li>Addition of dedicated left turning lane for west approach</li> </ul>
Lockhart Rd @ 20 <sup>th</sup> Sideroad	<ul style="list-style-type: none"> <li>Addition of traffic signals</li> <li>Consider modified form of traffic control – convert intersection to single lane roundabout</li> </ul>

The analysis completed following the above recommended improvements indicates that all intersections are expected to operate at an acceptable LOS of 'D' or better in both the AM and PM peak hours. All movements are expected to operate within capacity.



## 2.4.5 2031 Horizon Year Requirements

The 2031 'Base' scenario analysis was carried out using the recommended improvements for the 2021 'Improved' scenario. The analysis results determined that the majority of intersections, signalized and unsignalized are expected to experience deterioration in traffic operations in the AM and PM peak hours. The following improvements are proposed to accommodate the projected traffic growth to the year 2031.

### 2.4.5.1 2031 Midblock Improvements

For the year 2031, it is assumed that Mapleview Drive has been widened to a 6-lane cross-section between Huronia Road and Madelaine Drive and that all other roads have been widened to 4-lanes except 20<sup>th</sup> Sideroad.

**Table 2-4: 2031 Midblock Improvements**

Midblock	Proposed Improvements
Mapleview Drive: Huronia Road to Country/Stunden Lane	Widen to 8 lanes <sup>1</sup>
Mapleview Drive: Madelaine Drive to St. Paul's Crescent	Widen to 6 lanes
Yonge Street: Lockhart Road to Mapleview Drive	Widen to 6 lanes

### 2.4.5.2 2031 Intersection Improvements

#### Signalized Intersections

The analysis indicates that with the anticipated traffic growth, some of the signalized intersections are expected to operate at a LOS 'F' in the PM peak hour and operating at their effective capacity, with multiple critical movements expected during both the AM and PM peak hours. These movements are expected to operate with high delays, v/c ratios that exceed 1.00 and queuing. Updating the traffic signal timing plans has been considered along with the following geometric improvements to address these operational problems.

The analysis indicates that with the implementation of the following proposed intersection improvements, all intersections are expected to operate at LOS of 'D' or better in both the AM and PM peak hours. For unsignalized intersections, no further improvements are required beyond the proposed road widening.

<sup>1</sup> Although the Traffic Report for mid-block improvements to 2031 (i.e., Table 2-4) recommends roadway improvements to 8 lanes, the City of Barrie recommended that for continuity west of Huronia Road, a maximum of 7 lanes be evaluated for Mapleview Drive. In addition, roadways with more than 7 lanes present operational issues at intersections.



**Table 2-5: 2031 Intersection Improvements**

Intersection	Proposed Improvements
Mapleview Dr @ Prince William Way	<ul style="list-style-type: none"> <li>Convert westbound right-turn lane to a shared through/right travel lane</li> </ul>
Mapleview Dr @ Royal Jubilee Dr	<ul style="list-style-type: none"> <li>Addition of dedicated westbound right-turn lane</li> </ul>
Mapleview Dr @ Yonge St	<ul style="list-style-type: none"> <li>Convert eastbound shared through/right lane to a dedicated through lane</li> <li>Convert northbound shared through/right lane to a dedicated through lane</li> <li>Addition of dedicated eastbound right-turn lane</li> <li>Addition of dedicated northbound right-turn lane</li> </ul>
Mapleview Dr @ Madelaine Dr	<ul style="list-style-type: none"> <li>Convert westbound right-turn lane to a shared through/right travel lane</li> </ul>
Mapleview Dr @ Huronia	<ul style="list-style-type: none"> <li>Addition of dedicated westbound and northbound right-turn lane</li> <li>Addition of a channelized southbound right-turn lane</li> </ul>
Lockhart Rd @ Yonge St	<ul style="list-style-type: none"> <li>Convert westbound right-turn lane to a shared through/right travel lane</li> </ul>
Big Bay Point Rd @ Prince William Way	<ul style="list-style-type: none"> <li>Addition of dedicated eastbound right-turn lane</li> </ul>

#### 2.4.6 *Unsignalized Intersections*

The analysis for most of the unsignalized intersections for the 2031 horizon year, show several additional operational problems in both the AM and PM peak hours. Several movements are expected to operate at a LOS of 'F' with high delays. These operational problems result from fewer gaps in main street traffic, which cause stop-controlled turning movements to experience high delays and extensive queuing. It is anticipated that no further improvements beyond road widening are required for the horizon year.

#### 2.5 **Problem and Opportunity Statement**

The analysis of existing traffic conditions indicates that with the anticipated traffic growth by 2031 the roadways will be operating at or approaching capacity in both directions during the morning and afternoon peak hours. There is an opportunity to improve roadway corridors to support growth and development in the Hewitt's Secondary Plan Area. As well, there is an opportunity to provide public transit and on-road and off-road pedestrian and cycling facilities to promote active transportation modes over the single-occupant vehicle.

### 3. Alternative Design Concepts for Preferred Solution

An integral component of the Class EA process is the identification and evaluation of alternative design concepts for the preferred solution. Based on the recommended planning solution to improve Mapleview Drive East, Lockhart Road, Yonge Street, and Big Bay Point, as well as the provision of grade crossings of the Metrolinx Barrie Corridor at Mapleview Drive East and Lockhart Road, to accommodate future development and growth in the annexed lands (as identified in Section 2.4), the Study Team identified alternative design concepts to be evaluated based on the natural, cultural, socio-economic and transportation/technical environments.

The following preliminary design concepts for each of the Study arterial corridors are outlined below. The corridors were evaluated in segments to reflect the anticipated population and employment increases to be accommodated:

#### Mapleview Drive East

- |  |  |
|--|--|
| Huronia Road to<br>Country Lane <sup>2</sup> | <ul style="list-style-type: none"> <li>• Do Nothing</li> <li>• Alternative 1: 7 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks</li> <li>• Alternative 2: 7 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks and LID features</li> <li>• Alternative 3: 7 lanes, 4.2 m median, 3 m multi-use Trail and 1.6 m sidewalks</li> </ul> |
| Country Lane to<br>Madelaine Drive           | <ul style="list-style-type: none"> <li>• Do Nothing</li> <li>• Alternative 1: 7 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks</li> <li>• Alternative 2: 7 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, LID features</li> <li>• Alternative 3: 7 lanes, 4.2 m median, 3 m multi-use trail, 1.6 m sidewalks</li> </ul>       |
| Madelaine Drive to<br>Yonge Street           | <ul style="list-style-type: none"> <li>• Do Nothing</li> <li>• Alternative 1: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks</li> <li>• Alternative 2: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, LID features</li> </ul>   |

- |   |   |
|---|---|
| 500m East of<br>Yonge Street to<br>Prince William Way | <ul style="list-style-type: none"> <li>• Alternative 3: 5 lanes, 4 m two-way left-turn lane, 3 m multi-use trail, 1.6 m sidewalks</li> <li>• Do Nothing</li> <li>• Alternative 1: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks</li> <li>• Alternative 2: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, LID features</li> <li>• Alternative 3: 4 lanes, 3 m multi-use trail, 1.6 m sidewalk, turning lanes at intersections</li> </ul> |
| Prince William Way<br>to 20 <sup>th</sup> Sideroad    | <ul style="list-style-type: none"> <li>• Do Nothing</li> <li>• Alternative 1: 3 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks</li> <li>• Alternative 2: 3 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, LID features</li> <li>• Alternative 3: 3 lanes, 4 m two-way left-turn lane, 3 m multi-use trail, 1.6 m sidewalk</li> </ul>   |
| <b>Lockhart Road</b>                                  |   |
| Huronia Road to<br>600m East                          | <ul style="list-style-type: none"> <li>• Do Nothing</li> <li>• Alternative 1: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks</li> <li>• Alternative 2: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, 2 m LID features</li> <li>• Alternative 3: 4 lanes, 3 m multi-use path, south side ditch, turning lanes at intersections</li> </ul>  |
| 600m East of<br>Huronia Road to<br>Yonge Street       | <ul style="list-style-type: none"> <li>• Do Nothing</li> <li>• Alternative 1: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks</li> <li>• Alternative 2: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, 2 m LID features</li> <li>• Alternative 3: 4 lanes, 3 m multi-use path, south side ditch, turning lanes at intersections</li> </ul>  |
| 500m East of<br>railway to Prince<br>William Way      | <ul style="list-style-type: none"> <li>• Do Nothing</li> </ul>  |

- Alternative 1: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks
- Alternative 2: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, 2 m LID features
- Alternative 3: 4 lanes, 3 m multi-use path, south ditch, turning lanes at intersections

Prince William Way  
to just east of  
Collector 11

- Do Nothing
- Alternative 1: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks
- Alternative 2: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, 2 m LID features
- Alternative 3: 4 lanes, 3 m multi-use path, south side ditch, turning lanes at intersections

## Yonge Street

Lockhart Road to  
Mapleview Drive  
East

- Do Nothing
- Alternative 1: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks
- Alternative 2: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, 2 m LID features

## Big Bay Point Road

City Boundary to  
Collector 11

- Do Nothing
- Alternative 1: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks
- Alternative 2: 5 lanes, 4.2 m median, 2 m bike lanes, 2 m sidewalks, 2 m LID features
- Alternative 3: 4 lanes, 4 m two-way left-turn lane, 3 m multi-use path south side, north fixed
- Alternative 4: 4 lanes, 2 bike lanes, 1.5 m sidewalk south side (interim)

Collector 11 to  
200m west of 20<sup>th</sup>  
Sideroad

- Do Nothing
- Alternative 1: 3 lanes, 4.2 m two-way left-turn lane, 2 m bike lanes, 2 m sidewalks

- Alternative 2: 3 lanes, 4.2 m two-way left turn lane, 2 m bike lanes, 2 m sidewalks, 2 m LID features
- Alternative 3: 3 lanes, 3 m multi-use path south side, 4 m two-way left-turn lane, north fixed
- Alternative 4: 4 lanes, 2 bike lanes, 1.5 m sidewalk south side

### **Mapleview Drive Rail Crossing**

- Do Nothing
- Alternative 1: Overpass with 5 lanes, centre median, 2.5 m sidewalks, 2 m side clearance and 1.5 m bike lanes
- Alternative 2: Underpass with 4 lanes, centre pier, 2.5 m sidewalks, 2 m side clearance and 1.5 m bike lanes

### **Lockhart Road Rail Crossing**

- Do Nothing
- Alternative 1: Overpass with 4 lanes, 1.5 m sidewalks, 2 m side clearance and 1.5 m bike lanes
- Alternative 2: Underpass including 4 lanes, median, 2.5 m sidewalks, 2 m side clearance and 1.5 m bike lanes

## 4. Existing Environment

### 4.1 Natural Heritage Policies

#### 4.1.1 ***Provincial Policy Statement – Planning Act***

Natural Heritage Policy 2.1 of the Provincial Policy Statement (PPS) (Ministry of Municipal Affairs and Housing (MMAH) 2014) provides direction to regional and local municipalities regarding planning policies for the protection and management of natural heritage features and resources for applications pursuant to the *Planning Act*. The PPS defines seven natural heritage features and provides planning policies for each. The Natural Heritage Reference Manual (MNR, 2005), is a technical document used to help assess the natural heritage features listed below, in addition to the province's Significant Wildlife Habitat Criteria Schedules for respective Ecoregions (2015):

- Significant wetlands;
- Significant habitat of endangered and threatened species;
- Fish habitat;
- Significant woodlands;
- Significant valleylands;
- Significant ANSIs; and
- Significant wildlife habitat.

Each of these features is afforded varying levels of protection subject to guidelines, and in some cases, regulations. Significant woodlands and valleylands and even wetlands can be designated by municipalities and/or the Ministry of Natural Resources and Forestry (MNR) (e.g., Ontario Wetland Evaluation System). Fish habitat information can be identified by Conservation Authorities, the MNR and Fisheries and Oceans Canada (DFO); however, the management of fish habitat is governed by DFO. Significant wildlife habitat, habitat of endangered and threatened species and ANSIs are designated by MNR.

Based on a review of available mapping from the MNR Make a Natural Heritage Mapping Tool (2015a), provincially significant wetlands (PSWs), unevaluated wetlands, fish habitats, and woodlands are located within the Study Area.

#### 4.1.2 ***Lake Simcoe and Region Conservation Authority***

The Lake Simcoe Region and Conservation Authority (LSRCA) regulates watercourses, wetlands, and hazard lands (valleylands, shorelines, floodplains) through application of Ontario Regulation 179/06, as made under Section 28 of the *Conservation Authorities Act*. The main purpose of this regulation is to ensure public health and safety, as well as protection of life and property in relation to natural hazards. This regulation establishes guidelines for development, interference with wetlands and alterations to shorelines and watercourses.

Based on a review of the project, a number of areas within the Study Area are regulated by LSRCA.

#### **4.1.3 Provincial Endangered Species Act**

*Ontario's Endangered Species Act, 2007 (ESA)* was passed into law in 2007 and came into effect on June 30, 2008. Under the ESA there are more than 200 species in Ontario that are identified as extirpated, endangered, threatened, or of special concern. Section 9 of the ESA prohibits the killing or harming of a threatened or endangered species, as well as the destruction of its habitat. Section 10 of the ESA prohibits the damage or destruction of the habitat of all endangered and threatened species.

The MNR provided a list of Species at Risk (SAR) that are known to the Study Area. Through consultation, no targeted surveys for SAR were required by MNR with the exception of Butternut.

#### **4.1.4 Federal Fisheries Act**

The *Federal Fisheries Act* was established in 1985; with amendments made came into effect on November 25, 2013. This Act provides protection to fish and fish habitat such that:

*“No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational, or Aboriginal fishery, or to fish that support such a fishery” (Section 35 (1)).*

Fish habitat is defined by the Act as “spawning grounds, and any other areas, including nursery, rearing food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes”.

If mitigation measures cannot be applied, and residual effects will cause serious harm to fish then a request for review by Fisheries and Oceans Canada (DFO) must be submitted. If DFO identifies that approval for the project is needed, offsetting measures may be required.

#### **4.1.5 Simcoe County**

The County of Simcoe Official Plan was adopted by Council in 1997, and has since been amended with consolidation in 2007. The policies that pertain to natural heritage features are contained mainly in Section 4.5 of the Plan (Natural Heritage Conservation Guidelines). Specific policies as they relate to certain features (e.g. watersheds, groundwater, floodplains, conservation authority jurisdictions) are identified within their respective sections.

According to the Simcoe County Interactive Mapping Tool, there are MNR evaluated wetlands located north and south of Maplevue Drive East just east of Huronia Road, north and south of Lockhart Road just east of Huronia Road, west of Yonge Street and north of Lockhart Road, east of Yonge Street.

Provincially Significant Wetlands (PSWs) are located south of Maplevue Drive East, just east of Huronia Road, and locally significant wetlands are located north of Lockhart Road, just east of Yonge Street, which also serve as Greenlands.

#### 4.1.6 **City of Barrie**

The City of Barrie Official Plan was adopted by City Council in 1994 and was approved by the Minister of Municipal Affairs and Housing (MMAH) in July 1997, and has since been amended and further consolidated in February 2014. The policies that pertain to natural heritage features are contained mainly in Section 3.5 of the Plan (Natural Heritage, Natural Hazards and Resources) and Section 4.7 of the Plan (Environmental Protection Areas (EPA)).

Environmental Protection Areas are defined as:

- Aquifer recharges, headwaters;
- Wetlands;
- Rare species including unique plants;
- Important ecological functions;
- Significant habitat of threatened and endangered species;
- Areas of natural and scientific interest life science and earth science (ANSI);
- Significant woodlands;
- Significant valleylands;
- Significant wildlife habitat;
- Surface water features, valley and stream corridors; and,
- Fish habitat.

As such, no buildings or structures are permitted in the EPAs other than those necessary for flood and erosion control or for conservation purposes as approved by the City with approval from applicable agencies. Additional policies and permissions as they relate to certain features (e.g. wetlands, habitat of threatened and endangered species) are identified within their respective sections.

According to Schedules (F and H) of the Official Plan:

- Watercourses that transverse the Study Area include: Lovers Creek and Hewitt's Creek;
- 30 metre setback limits have been established for both creeks and associated tributaries;
- Areas associated with the floodplain of these creeks are regulated by Lake Simcoe Region Conservation Authority (LSRCA);
- There are Level 1, 2 and 3 resources within the Study Area which include:
  - ◆ Level 1
    - Provincially Significant Wetlands;
    - Non-provincially Significant wetlands greater than 0.5 hectares;



- Significant Woodlands greater than 10 hectares;
- Significant habitat of endangered and threatened species;
- Watercourses with minimum vegetation protection zones and connectivity linkages; and,
- Lands identified as EPAs.
- ◆ Level 2
  - Significant Valleylands;
  - Life Science ANSI;
  - Significant Wildlife Habitat; and,
  - Woodlands greater than 4 hectares but less than 10.
- ◆ Level 3
  - Regionally significant life science ANSI;
  - Woodlands greater than 0.5 hectares but less than 4;
  - Woodlands that are within 30 m of Level 1 and 2 features;
  - Cultural thicket or meadow that are contiguous with woodland or wetland patches; and,
  - Connectivity linkages.

It is important to note that along the roadway each of the mapped features has been heavily disturbed, and any impacts to these features can likely be mitigated using best management practices (BMPs) during the road construction.

#### 4.1.6.1 *Hewitt's Secondary Plan*

As noted in Section 1.2, the Hewitt's Secondary Plan was approved in 2014. It provides a planning framework for urban development of the Hewitt's Secondary Plan Area.

Section 9.3.2 (Natural Heritage System Components) is comprised of four components:

- Natural Core Area;
- Natural Linkage Area;
- High Constraint Stream Corridor Area and High Constraint Stream Corridor Area Special; and
- Medium Constraint Street Corridor Area.

Additional policies and permissions as they relate to these four components are provided in their respective sections along with permitted and non-permitted uses within the natural heritage system.

According to the Schedules 9A and 9B, natural heritage system components in terms of natural core areas and high constraint street corridor areas are mapped for areas along Lockhart Road, east of the rail corridor (east of Yonge Street) which transverse north towards Mapleview Drive East, along with a section just north of Lockhart Road, west of Yonge Street.

#### **4.1.6.2** *City of Barrie Multi-Modal Active Transportation Master Plan*

The Multi-Modal Active Transportation Master Plan (MMATMP) identifies how the City of Barrie will address transportation challenges associated with growth and rapid development and expansion in a sustainable manner within the City. The MMATMP was completed in 2014 and includes an assessment of all transportation infrastructure including cycling, sidewalks, trails, paths, bus networks and terminals, train stations, current road networks and parking. This plan focused on the lands that the City of Barrie annexed from the Town of Innisfil. The MMATMP provides the basis for the Hewitt's Secondary Plan Schedule C ClassEA.

#### **4.1.7** *Town of Innisfil*

The Town of Innisfil Official Plan was adopted by Town Council on July 26, 2006 and approved by the Ontario Municipal Board (OMB) in 2009, 2010 and 2011 (Town of Innisfil (TOI), 2006). There are portions of the plan that may not have been approved which require reference to the 1993 Official Plan (TOI, 2006). Additional amendments were submitted in 2013 and 2014 (TOI, 2006).

Within the Official Plan (2006), sections that pertain to natural heritage features are outlined in Section 2.3.7 (Natural Environment) and Section 4.4 (Environment), whereby the Town promotes protection and enhancement of the natural environment by ensuring development considers effects on the natural environment and surrounding land use including no loss of provincially significant wetlands, to preserve other wetlands that are not provincially significant and to protect regionally and locally significant wetlands, deer wintering areas and other natural areas (TOI, 2006).

According to the Natural Areas mapping (Appendix A of the Official Plan) wetlands are located north of Lockhart Road, just east of Yonge Street and at the north, east, west and south corners of Mapleview Drive East and 20th Side Road. Additionally, stream corridors are located north and south of Lockhart Road, and along the south side of Mapleview Drive East, with Significant Woodlands located north of Lockhart Road, just east of Yonge Street, the south west corner of Lockhart Road and Huronia Road, and the north east corner of Mapleview Drive and 20th Side Road.

## **4.2** *Natural Environment*

A Natural Heritage Impact Assessment Report was prepared and is included in Appendix B.

### **4.2.1** *Topography and Soils*

The topography associated with the Study Area is mainly flat with a rolling hill serving as a ditch in most areas.

According to the Canadian Land Inventory Soil Class available on the Simcoe County interactive mapping tool (2016), there are three soil classes within the Study Area which include Class 1, 2 or 3 soil, Class 5, 6 or 7 Soil, and Organic Soil. These classes are associated with agricultural capability, whereby Class 1 lands have the highest and Class 7 has the lowest to support agricultural land use.

The Soil Map of Simcoe County (1962) identifies the Study Area as having good to imperfect drainage soils with the exception of a few areas characterized by muck soils where drainage is poor (Hoffman et al., 1962). Soils dominantly consist of loam and sandy loam, with a slight to moderate level of stoniness and grey calcareous outwash sand and loam, sandy loam till material of the Podzolica and Grey-Brown Podzolic Great Soil Group (Hoffman et al., 1962). Acidity in these areas are dominantly neutral with some pockets of medium acidity (Hoffman et al., 1962). The areas classified as Muck are associated with known wetland communities south of Mapleview Drive East, north of Lockhart Road, just east of Huronia Road and the areas associated with Hewitt's Creek.

#### **4.2.2 Terrestrial**

The organizational framework contained within the Ecological Land Classification (ELC) protocol (Lee et al., 1998) describes communities according to six nested levels: Site Region, System, Community Class, Community Series, Ecosite, and Vegetation Type. These nested levels vary in spatial scale, with the Site Region classifying communities at the largest spatial scale, and Vegetation Type describing communities at the finest spatial scale (Lee et al., 1998).

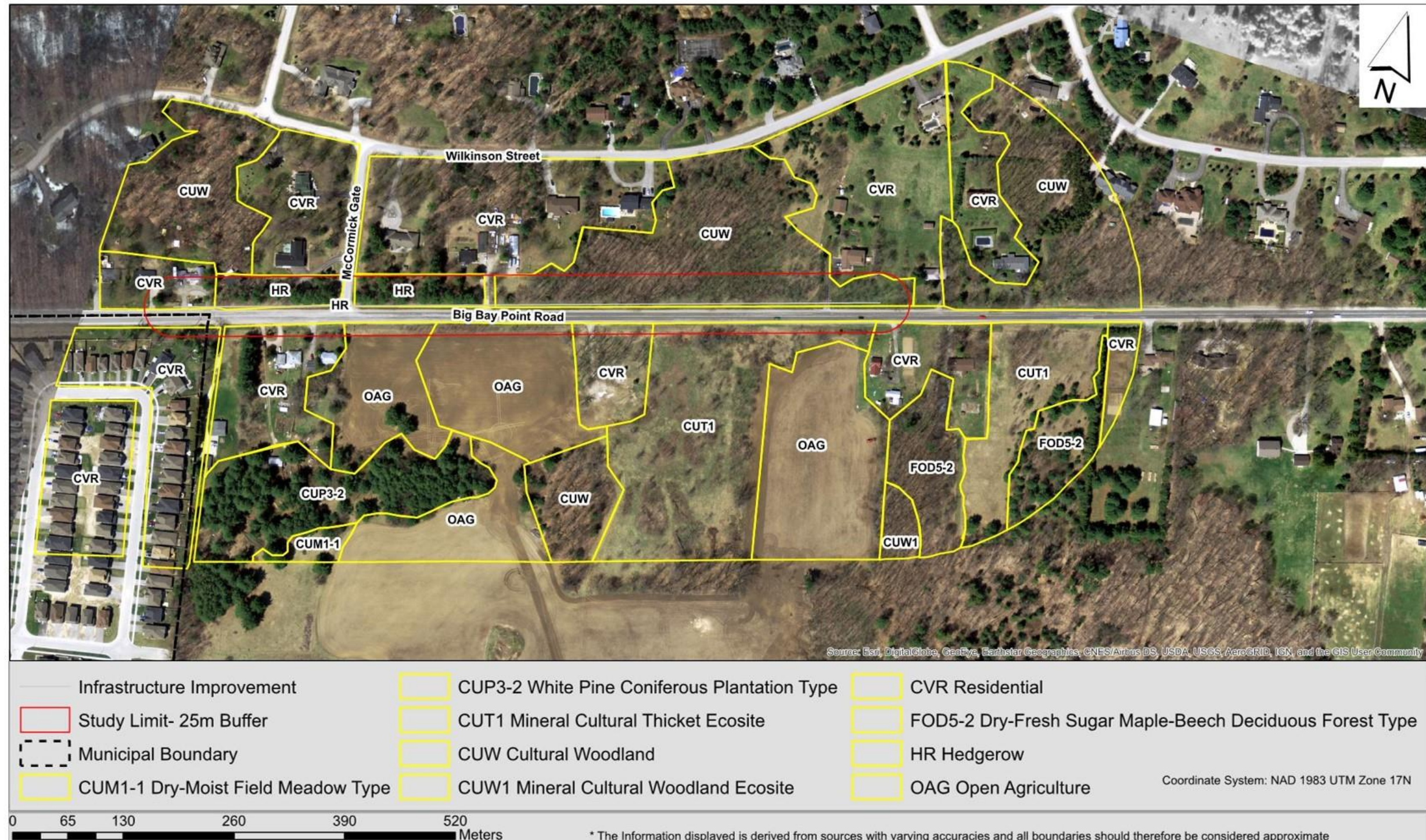
There are two Site Regions in Southern Ontario: 6E and 7E (after Lee et al., 1998). The two Site locations are situated within Site Region 6E, the Lakes Simcoe-Rideau Site Region, which occupies the northern portion of Southern Ontario. The updated ELC codes (2008) were also applied for communities that were not categorized by the 1998 field book.

An Ecological Classification map was prepared for the Study Area (Refer to Figure 5a-f). Due to access, classification of vegetation communities was made from the road side and additional information was collected from the 2012 Characterization Report (NSRI & DA, 2012) and ELC boundaries as provided by LSRCA. Prior to conducting the field investigations, the field surveyor reviewed the background findings including the LSRCA ELC map. Field investigation routes were undertaken to confirm, refine and fill in data gaps. Due to limited access, classification and characterization of vegetation communities was made from the road side.

#### **4.2.3 Vegetation Communities**

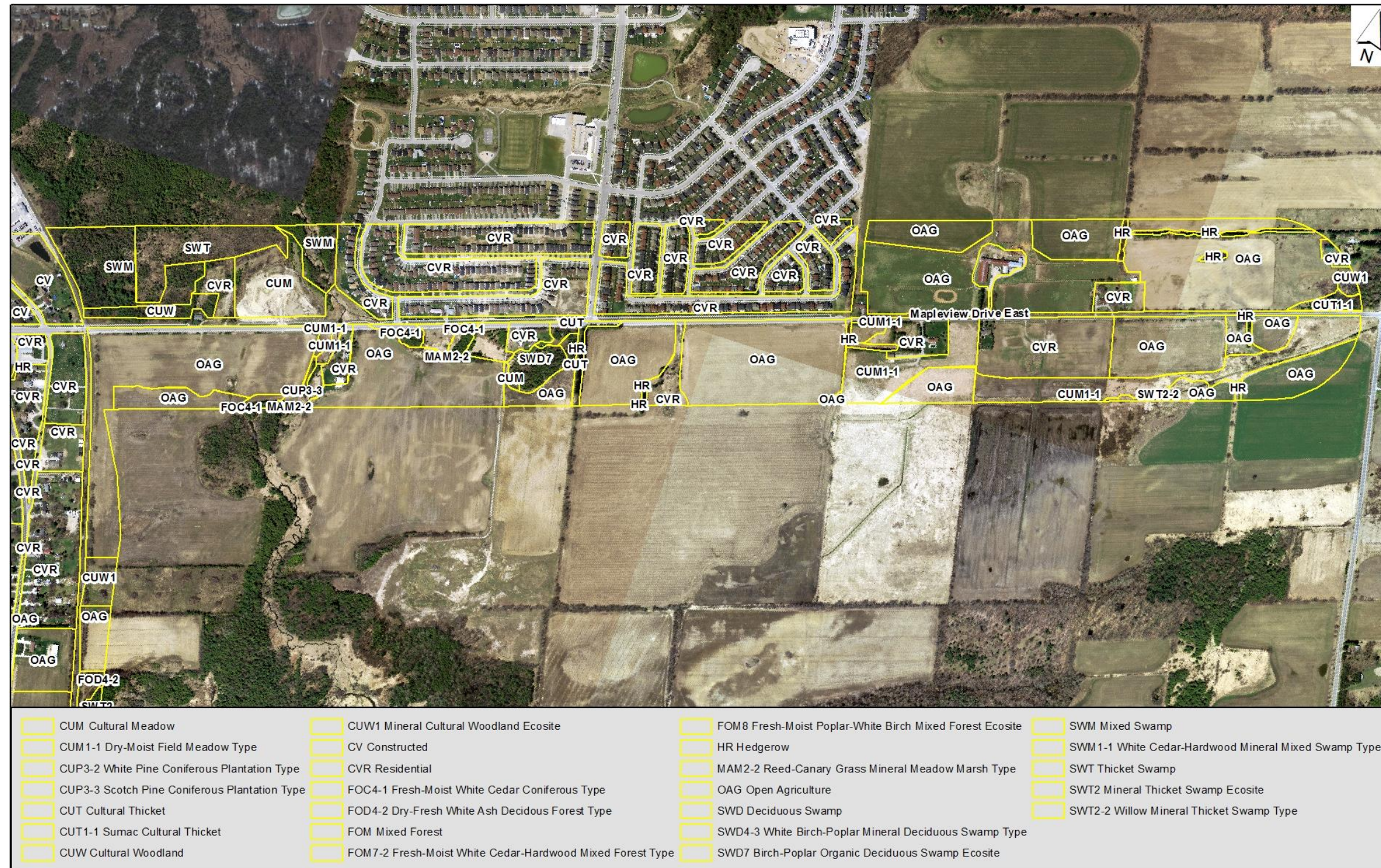
Characterization of the vegetation observed was undertaken by compiling a generalized botanical inventory then using that information to classify and characterize the vegetation communities according to the ELC protocol (Lee et al., 1998). Plant species were identified in the Spring and early Summer 2016. The locations of vegetation communities are depicted in Figures 4-1 through to Figure 4-6.





**Figure 4-1: Ecological Land Classification Map – Big Bay Point Road**





**Figure 4-2: Ecological Land Classification Map – Mapleview Drive East of Yonge**



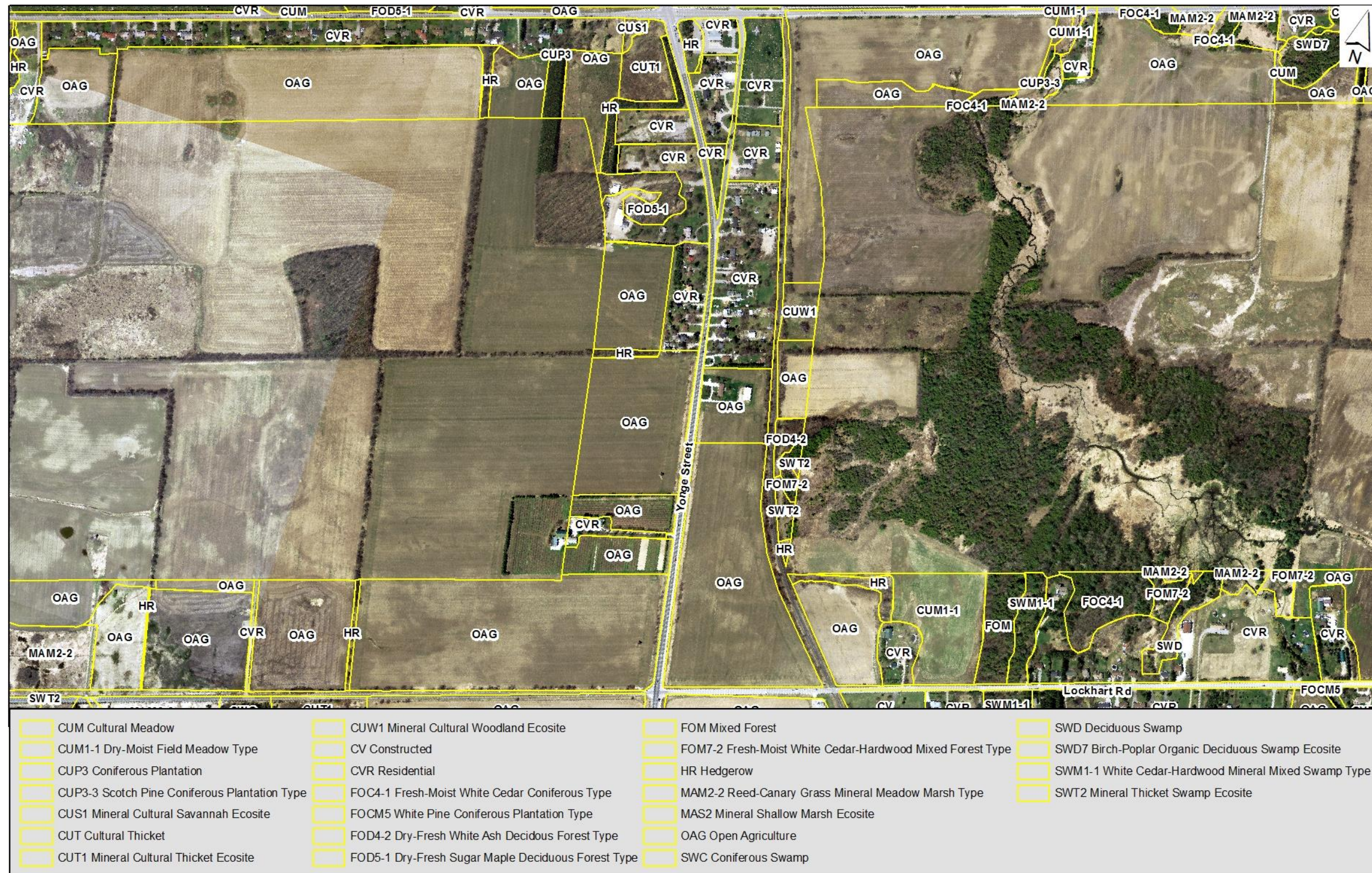


Figure 4-3: Ecological Land Classification Map – Yonge Street



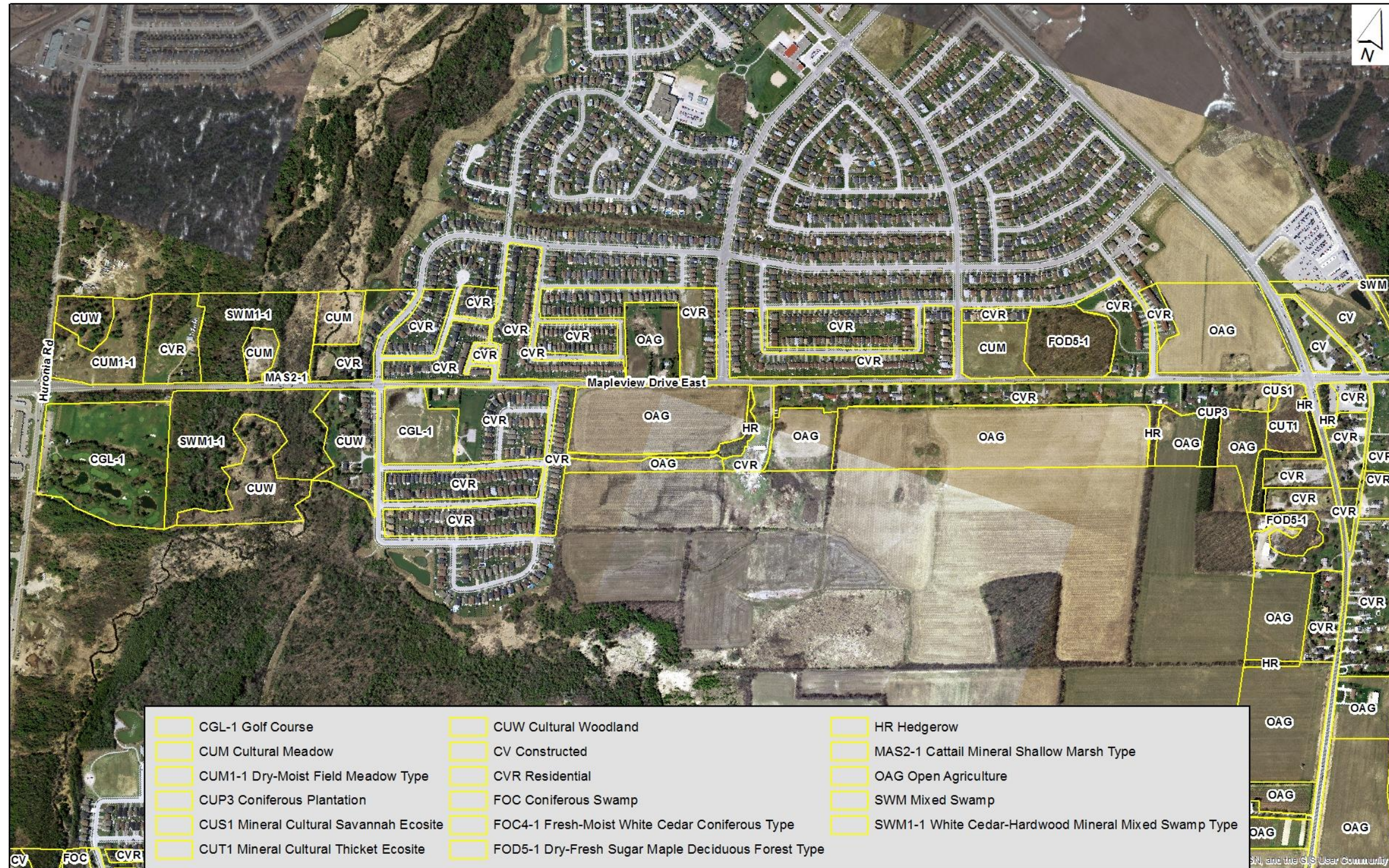


Figure 4-4: Ecological Land Classification Map – Mapleview Drive West of Yonge



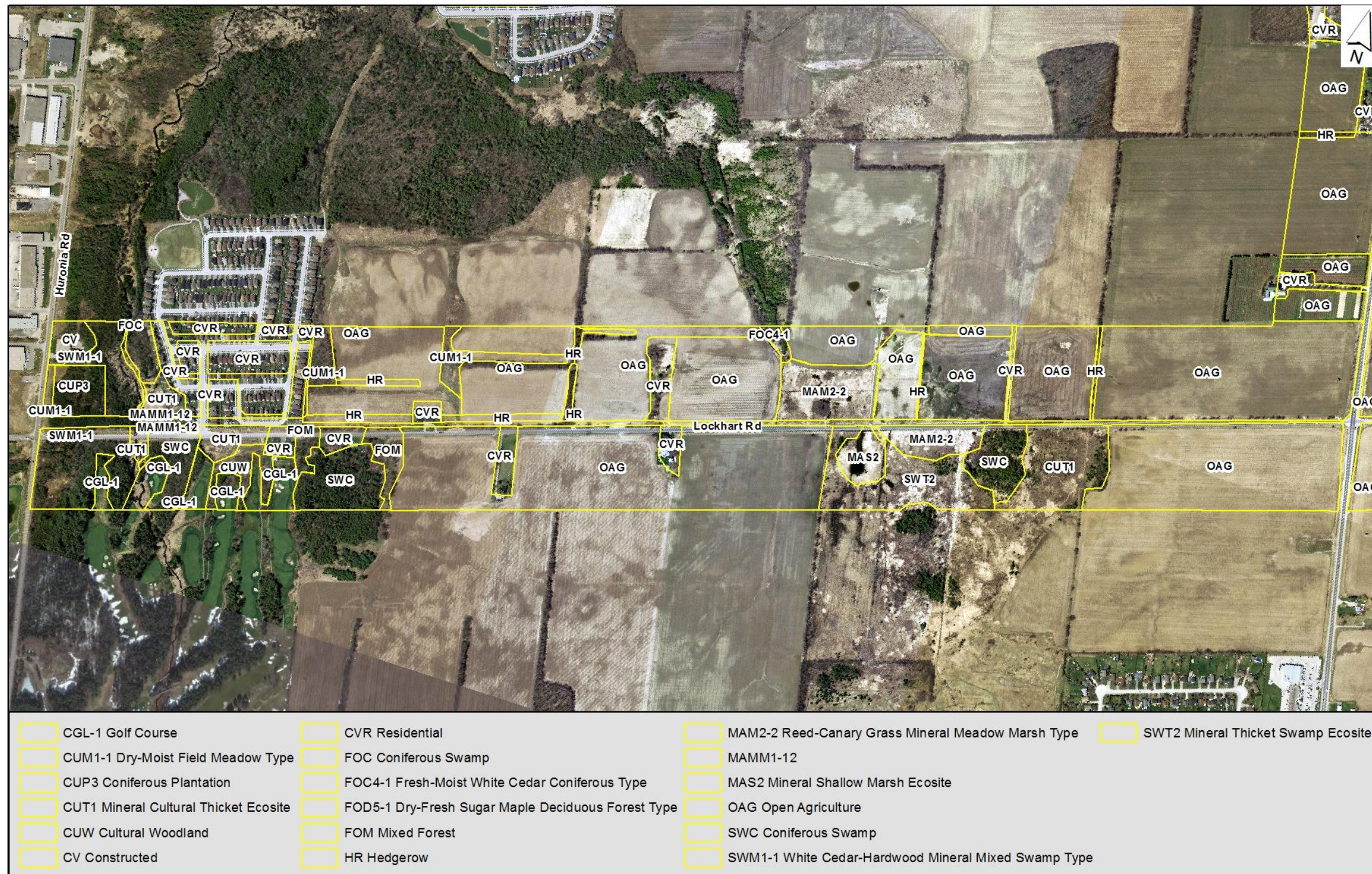


Figure 4-5: Ecological Land Classification Map – Lockhart Road West of Yonge Street



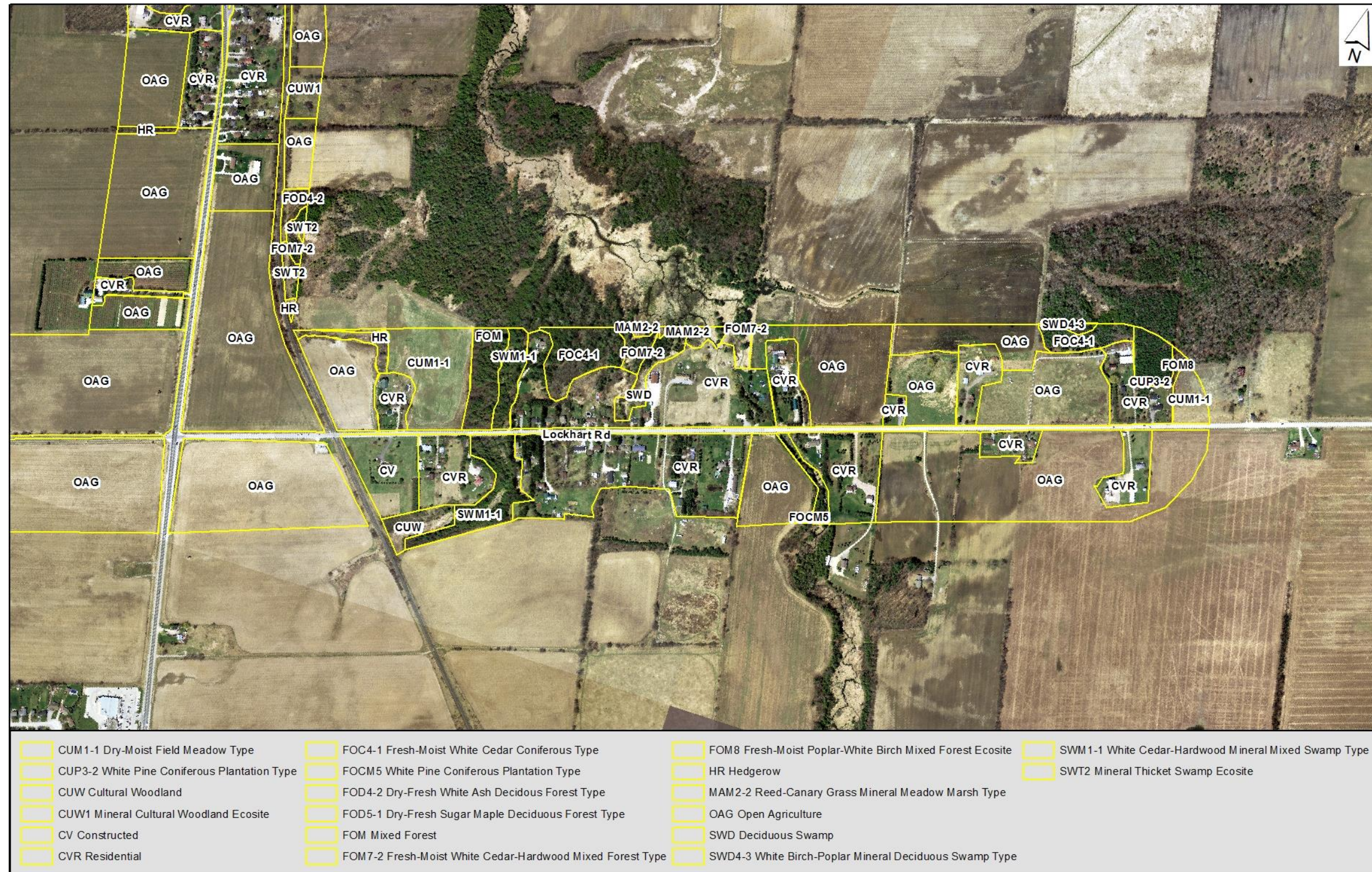


Figure 4-6: Ecological Land Classification Map – Lockhart Road East of Yonge Street



For the purposes of this NHIA, those areas not previously surveyed as part of the Characterization Report (NSIA & DA, 2012) were assessed. A list of dominant vegetative species is provided below. Additional information relating to communities can be found in Appendix B (B). It is important to note that vegetation communities often have variations within their boundaries, these variations have not been mapped except where necessary to depict a significant vegetation community or feature.

There are four different vegetation community classes identified within the Study Area which include Cultural, Forest, Swamp and Marsh.

In each of the four areas, residential landscapes are dominantly comprised of manicured lawns with ornamental plantings and native hedgerows. Rural residential is also a dominant coverage which consists of mainly cash crops of soy and corn fields. A large amount of disturbance was observed in each of the communities along the ROW, which lead to sporadic and occasional occurrences of different species.

#### **4.2.4 Aquatic**

There are a number of watercourses that transverse the Study Area as part of the Lake Simcoe Watershed, which contains both the Lovers Creek and Hewitt's Creek subwatersheds and the Innisfil Creeks subwatershed.

Lovers Creek within the Study Area contains a range of aquatic habitats with sections of high quality cold water fish habitat that can support Brook Trout to lower quality warmer temperature areas which can support species more tolerable to urban settings such as Brook Stickleback and Creek Chub. Lovers Creek flows through woodland, wetlands, agricultural fields and golf courses.

The Hewitt's Creek subwatershed originates in agricultural land and flows north into Lake Simcoe at Kempenfelt Bay. Sections of this creek have been identified as good quality coldwater fish habitat that can support Brook Trout. The St. Paul's Swamp is also within this subwatershed and extends to the ROW along the north side of Lockhart Road.

Sandy Cove Creek, as part of the Innisfil Creeks Subwatershed, is the northern most creek in the subwatershed (NSRI & DA, 2012). Only a section of this creek is in the vicinity of the Study Area as it travels along Mapleview Drive East through the intersection of 20th Side Road on the south side. It is considered a cold water creek supporting cold water fisheries. Sections of this creek have been identified to provide habitat for Brook Trout.

Aquatic characterizations for each of these watercourses were not part of the 2016 field investigations, as confirmed and discussed with LSCRCA. It was determined that information provided within the 2012 Characterization Report (NSRI & DA, 2012) would be used to document the aquatic features. Field investigations completed as part of the 2012 Characterization Report were completed between Spring and Fall 2011 and consisted of an aerial survey, roadside reconnaissance, headwater origin surveys, Brook Trout spawning surveys and site-specific surveys for landowners (NSRI & DA, 2012).

There are three documented sensitive fish species, Brook Trout, Darter Species and Sculpin Species. Rainbow Darter has been known to Lovers Creek and Johnny Darter has been captured in Hewitt's Creek. Slimy Sculpin is known to both Lovers and Hewitt's Creek, and Mottled Sculpin was historically captured in Lovers Creek, but is only now known to inhabit Hewitt's Creek (LSCRCA, 2012). Johnny Darter and Mottled Sculpin have been known to inhabit Sandy Cove Creek along with Brook Trout.

#### 4.2.4.1 *Brook Trout Spawning Habitat*

According to field investigations completed in 2011 as part of the 2012 Characterization Report, there was one location within Lovers Creek, and two locations within Hewitt's Creek that had actively spawning Brook Trout, and four locations (including Sandy Creek Cove) where there could be potential spawning within the Study Area (NSRI & DA, 2012).

Brook Trout are often associated with clean, clear, cold watercourses where there are groundwater seepages and springs (NSRI & DA, 2012). Spawning for Brook Trout typically occurs between September and November in Southern Ontario. Nested areas are called redds and are usually constructed in the areas near groundwater seepages (LSRCA, 2012a). Brook Trout will then lay the eggs, but do not protect the redds after spawning occurs. During 2011, two field investigations were completed (NSRI & DA, 2012). Spawning confirmation was determined by the presence of Brook Trout and redds, and potential spawning was determined by the documentation of redds. Additional areas that seem suitable were also categorized as potential spawning; however, Brook Trout and redds were not observed at the time of the field investigation.

#### 4.2.4.2 *Sculpin Documented Habitat*

According to the Barrie Creeks, Lovers Creek and Hewitt's Creek Subwatershed Plan (2012a), historic and current Mottled Sculpin observations have been confirmed in the Study Area. There was no historic documentation of Mottled Sculpin in Sandy Creek Cove (LSRCA, 2012b). Currently, Sculpin are present in Hewitt's Creek at Mapleview Drive East and Lockhart Road, as well as in Lovers Creek at Mapleview Drive East.

#### 4.2.5 *Wildlife*

During the field investigations, the only mammals observed within the Study Area were Squirrels. The lack of additional mammalian species might be due to the proximity to the road, which creates barriers for crossings.

A summary of the additional wildlife investigations including amphibians and breeding birds is provided in the following sections.

##### 4.2.5.1 *Amphibian Field Investigation Results*

A total of three amphibian field investigations were completed in Spring and early Summer 2016 on April 21, May 17 and June 22 during the respective timeframes for this area of the Province according to the MMP protocol.

Spring Peeper and Green Frog were the only two documented species within the Study Area.

When comparing data collected in the Characterization Report 2011, only point count location 10 overlapped which documented a total of four species which included American Toad, Northern Leopard Frog, Spring Peeper and Western Chorus Frog (NSRI & DA, 2012), see Figure 4-7.

#### **4.2.6 Breeding Birds**

The majority of birds observed were considered as possible breeders within the Study Area. The number of birds is consistent with surveys conducted along road-sides due to the habitat normally associated with road edges, and vehicle traffic which often times may deter birds from breeding near the roadway due to sounds and the ability for males and females to communicate. It is important to note, that although surveys were conducted 30 minutes after sunrise around 6a.m., traffic along each of the roadways was quite high.

All birds documented are common to southern Ontario and for the most part are not considered rare. There were four species that had regional conservation status which included the Eastern Wood Pewee, Eastern Kingbird, Savannah Sparrow, and Hooded Warbler (Ontario Partners in Flight (OPIF), 2008). One of the birds is listed as special concern in Ontario, Eastern Wood Pewee. No additional SAR were observed both audibly and visually during the 2016 field investigations. Species considered of special concern are not considered endangered or threatened but may become threatened or endangered due to a combination of biological characteristics and identified threats (e.g. habitat loss). Eastern Wood Pewee was recently listed in June 2014. As this species is listed as special concern it does not receive species or habitat protection under the ESA, and is not of concern.

#### **4.2.7 Reptiles**

Background sources of information were reviewed to determine reptile occurrences within the Study Area. Based on information collected in the 2011 Characterization Report (NSRI & DA, 2012), Snapping Turtles were documented by MNRF in the St. Paul's Swamp while completing the wetland evaluation.

Additionally, two snake species were observed during the 2011 field investigations as noted in the 2012 Characterization Report which include Eastern Gartersnake and Dekay's Brownsnake (NRSI & DA, 2012). Each of these observations was made outside of the Study Area. Both species of snake are considered widespread and abundant in Ontario (NRSI & DA, 2012).

Only one Eastern Gartersnake was noted during the 2016 field investigations within Area 4, along Lockhart Road by amphibian point count location 10.





Figure 4-7: Amphibian Map



### 4.2.8 *Species-at-Risk*

An endangered species screening information request was submitted to the Midhurst District Office on December 17, 2015. A total of three SAR were identified by the MNRF to be potentially located in the Study Area. A summary of these species is provided in Table 4-1 which identifies the species, their preferred habitat, whether that habitat is present within the Study Area, and if observations during the 2016 field investigation documented this species. Table 4-2 provides a list of SAR that were documented during the 2016 field investigation.

**Table 4-1: SAR Records provided by MNRF ESA Screening**

Scientific Name	Common Name	SARO	Preferred Habitat	Habitat Present within Study Area
<i>Juglans cinerea</i>	Butternut	END	Commonly associated with riparian habitat with rich moist, well-drained soils. They are intolerant to shade.	Potential habitat within the Study Area. During the field investigations completed on June 9 and 24, 2016 no Butternut were documented.
<i>Chelydra serpentina</i>	Snapping Turtle	SC	Snapping Turtles prefer shallow waters so they can bury themselves in the soft substrate and/or leaf litter.	Suitable habitat may be located within the Study Area. One was documented to be within St. Paul's Swamp associated with Area 4 of this project (NSRI and DA, 2012).  No designated Turtle Surveys were required by MNRF, and no evidence of Snapping Turtles were observed along the roadway corridors during the 2016 field investigations.
<i>Somatochlora hineana</i>	Hine's Emerald	END	Prefers groundwater fed wetlands with grassy vegetation.	MNRF indicated there have been a number of observations of Emerald Dragonflies in the area, however, Hine's Emerald is the only species that is protected under the ESA.  Through communication with MNRF, no targeted surveys for Hine's Emerald were required. During the field investigations no observations of damselflies were made, but habitat is present within the Study Area.

**Table 4-2: Species at Risk Documented during 2016 Field Investigations**

Scientific Name	Common Name	SARO	Preferred Habitat	Habitat Present within Study Area
<i>Contopus virens</i>	Eastern Woodpeewee	SC	Prefers to reside in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate to mature forest stands that have little understory vegetation.	Suitable habitat is located within the Study Area. Eastern Wood Peewee was heard during both breeding bird surveys completed on June 9 and June 24, 2016 in areas of suitable breeding habitat.

#### **4.2.9 Surface Water Features, Wetlands and Fish Habitat**

Wetlands are defined as areas that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface (Lee et al., 1998). A Provincially Significant Wetland (PSW) is identified by the MNR using evaluation procedures established by the Province, as amended from time to time (Lee et al., 1998).

Fish habitats are identified as spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly and or indirectly in order to carry out their life processes (Lee et al., 1998). Fish habitats commonly occur in many other natural heritage areas such as wetlands, valleylands, woodlands and ANSIs.

Two PSWs are located within the Study Area, which include St. Paul's Swamp and Lovers Creek Swamp along Lockhart Road, and along Mapleview Drive East.

There are a number of watercrossings within the Study Area. A total of four are located along Mapleview Drive East, and six along Lockhart Road. There is one additional culvert along Mapleview Drive East, just west of Goodwin Drive; however, it was dry at the time of the field investigations.

As noted previously, these watercourses are known to provide habitat to Brook Trout and Mottled Sculpin. Both of which are coldwater fish that are typically associated with areas where there are springs and/or groundwater upwellings.

#### **4.2.10 Woodlands**

Woodlands are treed areas that provide environmental or economic benefits such as erosion prevention, water retention, recreation and the sustainable harvest of woodland products. Woodlands include treed areas, woodlots or forested areas, and vary in their level of significance (MMAH, 2014). Woodland significance is typically determined by evaluating key criteria which relate to woodland size, ecological function, uncommon woodland species, and economic and social value.

Larger woodlands are more likely to contain a greater diversity of plant and animal species and communities than smaller woodlands, and are better buffered against edge effects or agricultural and urban activities.

Woodlands are located within the Study Area. Woodlands are located along the north and south sides of Big Bay Point Road, Mapleview Drive East and Lockhart Road. Woodlands pertain to Cultural Woodlands, Deciduous Forests and Cedar Swamps (See Figure 4-1 to Figure 4-6).

#### **4.2.11 Valleylands**

The PPS (MMAH, 2014) identifies significant valleylands as a "natural area that occurs in a valley or landform depression that has water" for some period of the year.

According to data provided by the LSRCA, significant valleylands are located within the Study Area. Two are located along the south side of Lockhart Road associated with Hewitt's Creek and Hewitt's Creek tributary. There is a third significant valleyland located as part of Lovers Creek tributary on the north side of Lockhart Road.

#### **4.2.12 Areas of Natural and Scientific Interest**

Provincially significant ANSIs are defined as areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education. The ANSIs are divided into two types: a life science ANSI and an earth science ANSI. Specifically, a life science ANSI can contain specific types of forests, valleys, prairies and wetlands of ecological importance. That is, they represent examples that are relatively undisturbed in terms of vegetation community and/or landforms associated with that vegetation. Those listed as provincially significant life science ANSIs are the best examples of the particular natural heritage features in the province. In contrast, earth science ANSIs are representative examples of geological processes in Ontario (i.e., exposed bedrock on road cuts, fossils and landforms).

There are no ANSIs located within the Study Area.

#### **4.2.13 Wildlife Habitat**

Wildlife habitat is defined as areas where plants, animals and other organisms live and are able to find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitat of concern may include areas where species concentrate at a point in their annual life cycle, and those areas which are important to migratory and non-migratory species.

A wildlife habitat is referred to as significant if it is deemed ecologically important in terms of feature, function, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System (MMAH, 2014). Significant wildlife habitat may consist of:

- Seasonal concentration areas;
- Rare vegetation communities;
- Specialized habitats; and,
- Habitats for species of special conservation.

**Seasonal Concentration Areas** may consist of Waterfowl Stopover and Staging Areas, Bat Hibernacula, Reptile Hibernacula.

Due to the high level of disturbance (i.e., proximity to roadway noise) seasonal concentration areas associated with the Study Area were observed to be absent.

It is important to note that there is a probability that Bat Roosting or Reptile Hibernacula are present within the communities along the road corridor, however they would be outside the Study Area, and thus not impacted by the future proposed infrastructure improvements.

**Rare Vegetation Communities** are those that contain provincially rare vegetation communities, or those which are rare to the area. Based on a review of the vegetation observed, none of the communities were considered rare.



**Specialized Habitats** consist of those which support wildlife that have highly specific habitat requirements (e.g., interior forest habitat), those areas that contain high species and community diversity and those which provide habitat that can greatly enhance species survival (MNR, 2000).

A summary of specialized habitat presence and absence is provided below:

- Based upon documented Brook Trout spawning, it is likely that seeps and springs are located within the Study Area within locations as documented in Figure 4-8 along both Hewitt's and Lovers Creek.
- The data collected during the 2016 field investigation revealed amphibian breeding along Mapleview Drive East (Area 2) and Lockhart Road (Area 4); however, due to the number of calls observed they were not sufficient enough to deem these locations as significant wildlife habitat.
- Documented Snapping Turtle by MNR through the wetland evaluation of St. Paul's Swamp (NSRI & DA, 2012), would indicate that turtle nesting is present within this area. However, areas suitable for nesting are considered outside of the Study Area.

**Habitats for Species of Conservation Concern** are those that contain species that are rare or substantially declining, or have high percentage of their global population in Ontario and are rare or uncommon in the planning area. These habitats are often associated with special concern species as identified under the ESA or the SAR Ontario list.

The woodlands located along the north and south sections of Mapleview Drive East, and Lockhart Road just east of Huronia Road likely serve as habitat for species of conservation concern, as does St. Paul's Swamp located along Lockhart Road. Typically, habitats associated with these species are found within the interior of the woodlands and swamp habitats, and as such, they are not anticipated to be impacted by the proposed improvements.

#### **4.2.14 Wildlife Movement Corridors**

Wildlife movement corridors are habitats that link two or more other wildlife habitats that are critical to the maintenance of a population of a particular species or group of species. The key ecological function of wildlife movement corridors is to enable wildlife to move to and between areas of significant habitat or core natural areas with minimum mortality. Wildlife movement corridors can provide critical links between shelter, feeding, watering, growing and nesting locations (Lee et al., 1998).

Wildlife and/or habitat corridors can help increase genetic diversity and aid in the re-establishment of populations after random events such as fires or disease outbreaks. These corridors can help to increase biodiversity and population stabilization (Lee et al., 1998).

According to the Significant Wildlife Habitat Ecoregion 6E Criterion Schedule animal movement corridors to be considered include amphibian and deer movement corridors (MNR, 2012).

The LSRCA has documented deer wintering habitat along Mapleview Drive East within the Study Area. Additionally, amphibians were documented within wooded areas in proximity to those that are inundated with water during certain times of the year. As such, both amphibian and deer movement corridors are within the Study Area.



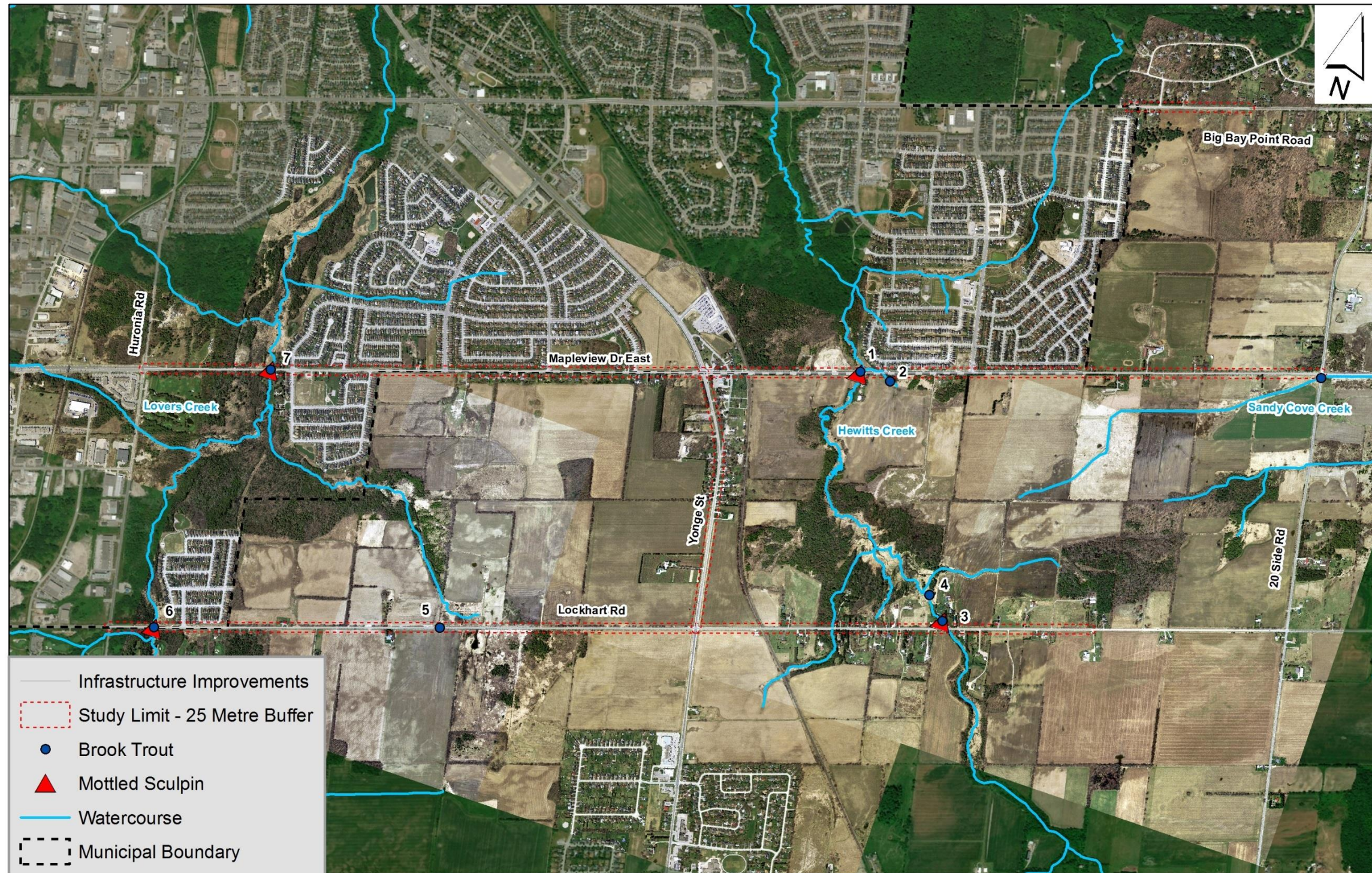


Figure 4-8: Fisheries Map



#### **4.2.15 Geomorphology**

A Fluvial Geomorphological and Meander Beltwidth Assessment was undertaken by Water's Edge for Hewitt's Creek, Lovers Creek and Sandy Cove Creek, where they cross Maplevue Drive and Lockhart Road. The report is contained in Appendix C.

There are eight road crossings in total for the current environmental assessment.

Lovers Creek is a 4<sup>th</sup> order stream with a drainage area of 17.5 km<sup>2</sup> while Hewitt's Creek is a 3<sup>rd</sup> order stream with a drainage area of 58.5 km<sup>2</sup>. The investigation includes fourteen sites on Lovers Creek for a stream bank stability assessment and five sites were chosen on Hewitt's Creek.

Hewitt's Creek originates southwest of the site and is predominantly agricultural lands, with north of the study area, it is community/infrastructure dominated. The channel extends northwards to Kempenfelt Bay, approximately 2.5 km downstream of the study area.

Lovers Creek originates south of the City of Barrie and flows north into Kempenfelt Bay of Lake Simcoe. The headwaters are primarily rural and agricultural, while the downstream portion is urbanized.

Sandy Cove Creek is a single threaded channel of which the majority has been straightened in the past for agricultural purposes. The creek flows from west to east. The channel does not exhibit typical bankfull characteristics but general channel dimensions were observed. The reach cannot be classified because of its lack of bankfull characteristics.

Rosgen Channel Classification is used to classify streams. There are two levels, including Level 1 – broad characterization of geomorphic conditions including longitudinal profiles, valley and channel cross-sections and planview patterns. As well as Level 2 including detail and more specific characterization using data from the field such as bed material, entrenchment, width/depth ratio, sinuosity and slope. Table 4-3 is a summary of the geomorphology of all 8 crossings within the Study Area.

**Table 4-3: Geomorphology Summary of Watercourse Crossings**

Crossing	Channel Characterization	Creek Stability	Impact of Urbanization on Watercourse	Final Meander Beltwidth
1	Single-thread channel, slightly entrenched with very low width-depth ratio; high sinuosity, gravel channel material. Some sections have moderate to high width to depth, and moderate to high sinuosity. Realignment proposed as part of previous study to facilitate construction of new bridge.	Transitional/ Stressed	Fair	30 m
2	Single-thread channel, slightly entrenched with very low width-depth ratio; high sinuosity, gravel channel material.	Transitional/ Stressed	Good	29 m
3	Channel regularly cleaned as part of road drainage or farm drainage. Banks steep and high which constrain channel and restrict meandering. Not sinuous but well vegetated with grasses. Typical sands and small gravels.	Transitional/ Stressed	Poor	21 m
4	Single-thread channel, slightly entrenched with very low width-depth ratio; high sinuosity, gravel channel material.	Transitional/ Stressed	Good	39 m
5	Single-thread channel, moderately entrenched with moderate sinuosity and gravel channel material.	Transitional/ Stressed	Poor	18 m
6	Single-thread channel, slightly entrenched with very low width-depth ratio; high sinuosity, gravel channel material.	Transitional/ Stressed	Good	52 m
7	Single-thread channel, slightly entrenched with very low width-depth ratio; high sinuosity, gravel channel material. Some sections have moderate to high width to depth, and moderate to high sinuosity.	Transitional/ Stressed	Fair	36 m
8	Sandy Cove Creek is a single threaded channel of which the majority has been straightened in the past for agricultural purposes. The channel does not exhibit typical bankfull characteristics but general channel dimensions were observed. The reach cannot be classified because of its lack of bankfull characteristics	Transitional/ Stressed	Fair	36 m

### 4.3 Cultural Heritage Environment

#### 4.3.1 Stage 2 Archaeological Assessment

A Stage 1 Archaeological Assessment was completed in 2011 as part of the Hewitt's Secondary Plan area, which outlined areas that required Stage 2 Assessment. The Stage 1 report identified that Stage 3 Archaeological Assessments are required at each of the identified archaeological sites to more fully identify the character, extent and significance of archaeological deposits. The Stage 1 report also recommends that individual developments within the Secondary Plan are subject to Stage 1-2 Archaeological Assessment prior to any land disturbing activities to identify archaeological remains that may be present.

A Stage 2 Archaeological Assessment will be completed following the issuance of the Environmental Study Report (ESR) but prior to Detailed Design. Given the size of the properties that need to be assessed, the required Stage 2 Archaeological Assessment involves plowing the land followed by weathering for the archaeologists to complete their pedestrian survey by foot. Given that the land needs to be ploughed as part of the preparation, the Stage 2 Archaeological Assessment cannot be completed until the majority of the lands have been harvested.

#### **4.3.2 Cultural Heritage Resource Assessment**

Archaeological Services Inc. (ASI) was retained to complete a Cultural Heritage Resource Assessment (CHRA) for the Study Area. The CHRA Report is contained in Appendix D. The purpose of the report is to provide a built heritage and cultural landscape inventory of cultural heritage resources and to recommend mitigation measures. A cultural heritage assessment considers cultural heritage resources in the context of improvements to specified areas, pursuant to the *Environmental Assessment Act*. This assessment addresses above ground cultural heritage resources over 40 years old. A cultural landscape includes a collection of individual built heritage resources and other related features that together form farm complexes, roadsides and settlements. Built heritage resources typically include individual buildings or structures that may be associated with human activities, including historical settlement and patterns of architectural development.

The City of Barrie Official Plan, Hewitt's Secondary Plan Area, and the Town of Innisfil's Official Plan all have goals and general policies related to Cultural Heritage Conservation and Archaeology that pertain to this Study Area.

A map from 1928 shows that the Study Area is an active agricultural area with the roadways and railways in their existing alignment and locations. Yonge Street is identified as being central to the area with Mapleview Drive and Lockhart Roads identified as important circulation routes for farms. In 1954, an aerial photograph shows minor development at the intersection of Yonge Street and Mapleview Drive, including church and schoolhouse according to other maps. A 1986 topographical map continues to show support for a rural agricultural setting with limited residential development at Yonge Street and Mapleview Drive, including the label St. Paul's. Growth in the City of Barrie to the north, continues to show development.

Based on a review of secondary registers, inventories and published research, there are 20 previously identified features of cultural heritage value within the Hewitt's Secondary Plan Study Area. Following a review of the background research, one additional cultural heritage resource was also noted: 2114 Lockhart Road (CHR 3).

Within the Study Area is St. Paul's Historic Settlement Area, which includes properties along St. Paul's Crescent and Yonge Street, including a cluster of houses, a church, a former school and a cemetery. There is also a post WWII residential subdivision on St. Paul's Crescent including lots along the roadway.

### 4.3.2.1 Identified Cultural Heritage Resources

Based on the background research and field review, there are 32 Cultural Heritage Resources within the Study Area, including:

- Nine farmscapes;
- Ten residences;
- Four remnant farmscapes;
- One historic settlement area;
- One church with cemetery;
- One former school;
- One watercourse;
- Four roadscaapes; and
- One railscape.

Two Cultural Heritage Resources were listed by the Town of Innisfil, however, were not transferred to the City of Barrie following the annexation of the land by the City in 2008.

The following table is a summary of the Cultural Heritage Resources identified within the Study Area, based on the report prepared by ASI.

**Table 4-4: Cultural Heritage Resources identified in the Study Area**

Future	Location	Recognition/Description/Comments
CHL 1	793 Mapleview Dr	Formerly listed by Town of Innisfil. Farmscape including red brick farmhouse, formerly listed by Town of Innisfil, but not included when area annexed by City of Barrie in 2008.
CHL 2	43 St. Paul's Cres	Church and cemetery; formerly listed by Town of Innisfil. St. Paul's Anglican Church and cemetery was established in 1851 (date plaque on structure) with the extant church constructed in 1903. Formerly listed by Town of Innisfil, but not included when area was annexed by City of Barrie in 2008.
CHL 3	750 Lockhart Rd	Identified during desktop data review. Farmscape featuring a one-and-a-half storey frame residence with an intersecting gable roof, active agricultural fields and established circulation routes. Depicted on 1928 Topo Map.
CHL 4	1039 Big Bay Point Rd	Identified in previous assessment. Mid-twentieth-century one-storey frame residence with a side gabled roof.
CHL 5	694 Mapleview Dr	Identified in previous assessment. Located within community of St. Paul's, this residence is an early-twentieth-century two-storey red brick house with rectangular massing and a hipped roof.
CHL 6	Community of St. Paul's	Identified in previous assessment. Community located at intersection of Mapleview Drive and Yonge St, including group of houses centered around St. Paul's Anglican Church and a school. Former alignment of Penetanguishene Rd/Yonge St.

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Future	Location	Recognition/Description/Comments
CHL 7	929 Yonge St	Identified in previous assessment Mid-late nineteenth-century one-and-a-half storey dichromatic brick residence featuring a cross gabled roof, located in settlement of St. Paul's
CHL 8	1012 Yonge St	Identified in previous assessment Farm complex featuring a two storey red brick residence built in the late nineteenth-century. 'Carpe Diem Farm' grounds also include a gambrel barn, silo, and an active apple orchard
CHL 9	883 Mapleview Dr	Identified in previous assessment Remnant farmscape featuring agricultural fields, and abandoned silo, mature treelines
CHL 10	1006 Mapleview Dr	Identified in previous assessment Ranch-style residence constructed ca. 1970 clad in rounded cobblestones featuring a cross-gabled roof
CHL 11	3320 20 <sup>th</sup> Sideroad	Farmscape features a late nineteenth-century one-and-a-half storey brick farmhouse with a cross gabled roof, a gambrel roofed barn, silo, outbuildings, agricultural fields, mature plantings and circulation routes.
CHL 12	1000 Lockhart Rd	Farmscape featuring a one-and-a-half storey late nineteenth-century frame residence, gable roof barn, mature plantings and agricultural fields.
CHL 13	1750 Lockhart Rd	Farmscape features a one-and-a-half storey nineteenth-century residence obscured by vegetation with a gambrel roof barn and other outbuildings.
CHL 14	1757 Lockhart Rd	Farmscape includes a farmhouse, gambrel roof barn, silo and other outbuildings.
CHL 15	912 Lockhart Rd	Farmscape features a one-and-a-half storey nineteenth-century with intersecting gable roof, gable roofed barn, concrete silo and outbuildings
CHL 16	1914 Lockhart Rd	Farmscape includes a residence obscured by trees, a gable roof barn, outbuildings and fenced activity and livestock areas
CHL 17	620 Lockhart Rd	Remnant farmscape features agricultural fields and established circulation routes
CHL 18	560 Lockhart Rd	Remnant farmscape features barn ruins, a concrete silo, agricultural fields and established circulation routes.
CHL 19	460 Lockhart Rd	Remnant farmscape features barn ruins, a concrete silo, agricultural fields and established circulation routes.
CHL 20	2647 Lockhart Rd	Farmscape features a one-and-a-half storey nineteenth-century red brick residence with a cross gable roof, silo, mature plantings and agricultural fields.
CHL 21	Barrie Rail Line	Established as the Northern Railroad in 1853
CHL 22	Hewitt's Creek	Hewitt's Creek subwatershed runs through Study Area, emptying into Kempenfelt Bay
CHL 23	75 St. Paul's Cres.	Property is associated with St. Paul's Anglican Church, located to the northwest across the street from cemetery, and with community of St. Paul's.
CHL 24	Big Bay Road	Composed of two lanes of divided vehicular traffic bordered by narrow gravel shoulders and shallow ditches. Roadway is lined with mature trees, vegetation and agricultural fields.
CHL 25	Lockhart Rd	Lockhart Rd is composed of two lanes of divided vehicular traffic bordered by narrow gravel shoulders and shallow ditches. The roadway is lined with hydro poles, vegetation and agricultural fields.
CHL 26	Mapleview Rd	Composed of two lanes of divided vehicular traffic bordered by narrow gravel shoulders and shallow ditches. Roadway lined with hydro poles, mature trees, vegetation and agricultural fields.



Future	Location	Recognition/Description/Comments
CHL 27	St. Paul's Cres	St. Paul's Cres formerly part of Yonge St is composed of two lanes of divided vehicular traffic bordered by narrow gravel shoulders.
BHR 1	99 St. Paul's Cres	Former school associated with settlement of St. Paul's and located within historic settlement area.
BHR 2	926 Yonge St	Located within settlement of St. Paul's and associated with historic settlement area. A stone Arts & Crafts Bungalow with six over one wood windows, enclosed porch and red roof with central chimney.
BHR 3	920 Yonge St	Located within settlement of St. Paul's and associated with historic settlement area. A contemporary two storey bungalow house with two large dormers, and detached carriage house style garage.
BHR 4	908 Yonge St	Located within settlement of St. Paul's and associated with historic settlement area. Early 20 <sup>th</sup> -century one-and-a-half storey side gable bungalow house, centre hall plan with two large windows and angel stone façade.
BHR 5	921 Yonge St	Located within settlement of St. Paul's and associated with historic settlement area. Early 20 <sup>th</sup> -century 1.5 storey side gable bungalow house, centre hall plan, two large windows on front façade with two small dormers in roofline and front porch.

## 4.4 Engineering Environment

### 4.4.1 Structural Assessment

In April 2016, Hatch inspected the watercourse crossings along Mapleview Drive and Lockhart Road within the Study Area. The details of the assessment are included in Appendix E. Table 4-5 is a summary of the culvert crossings.

**Table 4-5: Structural Integrity Assessment of Culvert Crossings**

Crossing	Watercourse	Location	Type	Span	Condition	Action
1 (Lovers Creek)	Lovers Creek	0.1km west of Country Lane/ Stunden Lane	Concrete, rigid frame	6.3 m	Fair	Rehabilitate and extend
2 (Lovers Creek)	Lovers Creek	0.2km east of Huronia Road/ 10 Sideroad	Concrete, rigid frame	6.1 m	Fair	Rehabilitate and extend
3 (Farm ditch/ Lovers Creek)	Farm Ditch/ Lovers Creek	1.3km west of Yonge Street	CSP, round	0.9 m	Fair	Replace
4 (Hewitt's Creek)	Hewitt's Creek	0.1km west of Royal Jubilee Drive	Concrete, rigid frame	4.3 m	Good	Repair and extend
5 (Hewitt's Creek Tributary)	Hewitt's Creek Tributary	<0.1km west of Royal Jubilee Drive	CSP, round	0.9 m	Good	Extend
6 (Hewitt's Creek Tributary)	Hewitt's Creek Tributary	0.7km east of Yonge Street	HDPE, round	0.9 m	Good	Extend
7 (Hewitt's Creek)	Hewitt's Creek	1.3km east of Yonge Street	Steel plate corrugated round pipe	3.6 m	Fair	Replace

#### 4.4.2 **Noise Impact Assessment**

A Noise Impact Assessment Study was undertaken to assess the impact of expanding the roadways within the Study Area. The Noise Assessment was carried out based on the guidelines outlined in the *Ontario Ministry of Transportation (MTO) publication Environmental Guide for Noise*, specifically for the selection of Outdoor Living Area (OLA) receptors, limitations in noise controls and the projected future impact timelines.

The Study evaluated the noise impact at select representative sensitive points of reception resulting from changes in road traffic volume within the Study Area. The noise impact as a result of current traffic, projected traffic following the network improvements in 2021 and 10 years following construction completed were evaluated for road and rail improvements over these periods. Traffic volumes were based on the predicted volumes outlined in the *Summary of Traffic Data for Noise and Air Quality Analysis*, appended to the Noise Impact Assessment Report contained in Appendix F.

The noise contribution of the rail corridor that runs through the Study Area is further included. The rail volume and anticipated modification to rail locomotives over the evaluation period of up to 2031, are incorporated into the Study. Current and anticipated rail volumes were provided by Metrolinx.

The City of Barrie By-law 2006-140 outlines the municipal noise criterion that is applicable to the improvement or expansion of municipal roads. By-law 2006-140 mainly references MOECC NPC guidelines (i.e., Environmental Noise Guideline). However, the City of Barrie has elected to impose the MTO Environmental Guide for Noise as the criteria for mitigation requirements. The criteria is summarized below in Table 4-6.

**Table 4-6: MTO Mitigation Effort Required for Projected Noise Level with Proposed Improvements**

Change in Noise Level Above Ambient / Projected Noise levels with Proposed Improvements	Mitigation Effort Required
<5 dBA change AND >65dBA	Nothing
≥ 5 dBA Change OR ≥ 65 dBA	<ul style="list-style-type: none"> <li>• Investigate noise control measures on right-of-way.</li> <li>• Introduce noise control measures within right-of-way and mitigate to ambient if technically feasible, economically and administratively feasible.</li> <li>• Noise control measures, where introduced, should achieve a minimum 5 dBA attenuation, over first row receivers.</li> </ul>

The criteria outlined in Table 4-6 are applicable over an averaged 16 hour daytime period Leg (07:00 to 23:00) at a noise sensitive location of 1.5 m representing an Outdoor Living Area (OLA). The restriction to solely address the noise impact of daytime OLAs at grade is limited by the City of Barrie Urban Design Manual and the allowable height of an acoustic fence. Since the height of the standard acoustic fence is limited to 2.15 m above grade, this design will not effectively mitigate night time exposure at a second story bedroom window. Therefore, the night time noise impact is not evaluated.

The study assesses the increase of road and rail vehicular traffic noise and compares it to the prediction of existing ambient traffic noise. Road traffic noise is calculated based on vehicle size, speed and volume for day and for night.

Seven Outdoor Living Amenities (OLAs) were chosen to represent locations that would be most affected by the road improvements. All OLAs were yards of one or two storey private residential houses or townhouses. Each OLA was selected as an at-grade area directly behind or beside the dwelling and positioned at the centre of the house.

At east OLA, a noise level was evaluated at a height of 1.5 m, 3 m from the 'most exposed side' that could warrant a barrier.

Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) and the Sound from Trains Environmental Analysis Method (STEAM) algorithms were automated through the latest software version of STAMSON to summarize the predicted sound pressure level at a receptor from all contributing road and rail segments.

The predicted noise levels at each OLA are summarized in the table below.

**Table 4-7: Predicted Daytime Traffic Noise Levels at each OLA**

		OLA#1	OLA#2	OLA#3	OLA#4	OLA#5	OLA#6	OLA#7
2016 L <sub>eq</sub> (dBA)	Road	56.4	60.9	59.0	58.7	38.3	64.6	48.4
	Rail	-	-	-	-	33.3	34.7	-
	<b>Total</b>	<b>56.4</b>	<b>60.9</b>	<b>59.0</b>	<b>58.7</b>	<b>39.5</b>	<b>64.6</b>	<b>48.4</b>
2021 L <sub>eq</sub> (dBA)	Road	57.1	61.2	59.6	58.9	38.6	65.2	48.7
	Rail	-	-	-	-	34.7	34.7	-
	<b>Total</b>	<b>57.1</b>	<b>61.2</b>	<b>59.6</b>	<b>58.9</b>	<b>39.7</b>	<b>65.2</b>	<b>48.7</b>
2031 L <sub>eq</sub> (dBA)	Road	56.9	61.1	59.5	59.0	38.7	65.1	48.6
	Rail	-	-	-	-	32.6	32.6	-
	<b>Total</b>	<b>56.9</b>	<b>61.1</b>	<b>59.5</b>	<b>59.0</b>	<b>39.4</b>	<b>65.2</b>	<b>48.6</b>
2031 L <sub>eq</sub> With Mitigation (dBA)	Road	-	-	-	-	-	59.5	-
	Rail	-	-	-	-	-	32.6	-
	<b>Total</b>	-	-	-	-	-	<b>59.5</b>	-
Difference (dB)	2016 to 2021	0.6	0.4	0.6	0.2	0.2	0.6	0.3
	2016 to 2031	0.5	0.2	0.5	0.3	-0.1	0.5	0.2
	w & w/o Mitigation						-5.7	-

Based on the results, sound level predictions show that 1 of the 7 representative OLAs (i.e., OLA #6) requires an investigation into mitigation efforts as predicted levels exceed 65 dBA. Using the 2031 sound level predictions, noise attenuation was optimally sized to reduce noise levels to 60 dBA at the OLA. Typically the attenuation is positioned within the ROW as close as possible to the property line to optimize the its effectiveness. The details of a sample noise wall are included in Appendix F. It should be noted that the type of noise attenuation selected should be consistent with the City's urban design standards and guidelines.

The contribution of rail noise does not significantly impact noise levels over the day-time due to the limited number of trains that pass over this 16-hr period. Train volumes are anticipated

to increase following the completion of rail upgrades by Metrolinx in 2025. The modifications in 2025 will include changing the locomotive type from diesel to electric. Despite the increase in the number of trains in 2031, the locomotive will be quieter, electrically drive vehicles, thus reducing the noise impact of the rail corridor between 2021 and 2031.

#### 4.4.3 ***Drainage and Stormwater Management***

The drainage and stormwater management report is included in Appendix G. The current drainage patterns for the Hewitt Study Area have been reviewed and documented for the four roadways, Mapleview Drive East, Lockhart Road, Yonge Street, and Big Bay Point Road. The current drainage for each roadway features both road ROW and external catchments conveyed within and through the Study Area. The following features summarize the existing drainage patterns and outlets:

##### 4.4.3.1 ***Drainage Design Criteria***

The drainage design conveyance and control features shall be designed in accordance with the following criteria for both the preliminary and detailed design:

- The following is a summary of the City of Barrie Storm Drainage and Stormwater Management Policies and Design Guidelines (November, 2009):
  - ◆ The minor system shall convey the 5 year storm event allowing connection of the front and rear roof leaders and foundation drains;
  - ◆ The major system is to be designed to address flows larger than the minor system up to the greater of the 100 year storm or the regular event; and
  - ◆ Culvert Hydraulics – 100 year storm (or Regional if required by the City) conveyance for Arterial Roads, 50 year storm for Collector and Urban Local Roads.
- MTO Highway Drainage Design Standards (2008).
- MTO Drainage Management Manual (1997).
- MOE Stormwater Management Planning and Design Manual (2003).

##### 4.4.3.2 ***Existing Drainage Conditions***

The current drainage patterns can be divided by roadway corridor, location of outlet and the particular crossing type located within Table 4-8. In summary:

- The middle portion of the Mapleview Drive East corridor is currently serviced by approximately 2.07 km long storm sewer system, which extends from just west of Yonge Street to Succession Crescent.
- The rest of the study corridor is currently drained via overland sheet flow to low spots, eventually discharging to the two receiving watercourses.

**Table 4-8: Existing Project Site Drainage Conditions**

Corridor	Location	Cross-section Type	Existing Minor Drainage System	Existing Major Drainage System
Mapleview Dr. Corridor	From Huronia Rd. to Yonge St.	Rural	Stormwater runoff is directed to roadside ditches to outlet.	
	From Yonge St. to Succession Cres.	Urban	Urban curb & gutter, catch basins to convey minor flow to storm sewer.	Roadside ditches to convey stormwater runoff to outlet.
	From Succession Cres. to Sideroad 20	Rural	Stormwater runoff is directed to roadside ditches to outlet.	
Lockhart Rd. Corridor	From Huronia Rd. to Yonge St.	Rural	Stormwater runoff is directed to roadside ditches to outlet.	
	From Yonge St. to Sideroad 20	Rural	Poorly defined swales/ditches.	
Yonge St. Corridor	From Lockhart Rd. to Mapleview Dr.	Rural	Stormwater runoff is directed to roadside ditches to outlet.	
Big Bay Point Road Corridor	From McCormick Gate to the future Collector 11	Rural	Stormwater runoff is directed to roadside ditches to outlet.	

#### 4.4.3.3 Culvert Hydraulics

Within the Study Area there are two watersheds including Hewitt's and Lovers Creek, which feature a total of 4 and 3 culverts respectively. Currently, a number of these structures have been identified from the Master Drainage Plan (MDP) and confirmed through the current study as hydraulically deficient. The existing hydraulic analysis for the major culvert structures is summarized below in Table 4-9. The culverts MAP1, LOC3, and LOC4 are unable to convey the 100-yr event. Therefore, these three structures have been identified as hydraulically deficient, which is consistent with the MDP (AMEC, 2013).

**Table 4-9: Culvert Design Information**

Outlet ID	HEC-RAS ID	Crossing Type	Dimensions [m]	U/S Invert [m]	D/S Invert [m]	Top of Road [m]	50-yr WSEL [m]	100-yr WSEL [m]	Regional [m]
MAP 1	4525.098	Concrete	6.25 x 2	239.43	239.26	241.00	241.75	241.80	241.98
LOC 1	6614.672	Concrete Box	6.1 x 2.4	242.9	242.89	246.37	245.93	246.13	247.82
LOC 2	1924.424	CSP	0.9	251.03	250.97	252.91	252.81	252.69	253.04
MAP 2	3430.69	Concrete Box	4.8 x 1.65	245.09	244.93	247.99	247.76	247.63	247.88
MAP 3	NA	CSP	0.9	-	-	-	-	-	-
LOC 3	550	CSP	0.9	256.99	256.89	260.19	259.50	260.44	260.44
LOC 4	5592.374	CSP	2.45	252.5	252.3	255.75	255.39	256.01	256.31

#### 4.4.3.4 Minor System

The existing roadways are drained via a combination of roadside ditches and urbanized storm sewer networks at specific locations along Yonge Street and Hewitt's Creek. Table 4-10 demonstrates and documents the outlet locations, sewershed, watershed, and description of each drainage network.

**Table 4-10: Existing Storm Sewer Information**

Location	Sewershed	Outlet	Watershed	Description
From just west of Yonge St	Sewershed 1	Yonge St. Storm Sewer	Lovers Creek	Tie in to the existing storm sewer system along Yonge St at MH16997
From Yonge St. to Hewitt Creek Culvert MAP 3	Sewershed 2	Hewitt Creek Culvert MAP 3	Hewitt's Creek	Outfall into Hewitt Creek at the downstream end of Culvert MAP 3
From Succession Cres To Hewitt Creek Culvert MAP 3	Sewershed 3	Hewitt Creek Culvert MAP 3		Outfall into Hewitt Creek at the downstream end of Culvert MAP 3

#### 4.4.4 **Geotechnical Investigation**

A geotechnical investigation was undertaken in September 2016, and is included in Appendix H. All of the watercourse crossing locations, as well as the two potential structures at Mapleview Drive Railway crossing and Lockhart Road Railway crossing had boreholes drilled and monitoring wells installed.

The subsoils consistent of non-cohesive fill underlain by interlayered native strata comprised of silt sand to sand and silty sand glacial till.

##### 4.4.4.1 **Pavement Investigation**

All of the boreholes penetrated through a layer of non-cohesive fill, in places through the existing asphalt overlying the fill. The asphalt thicknesses encountered generally ranged in thickness from 80 mm to 130 mm, except at one of the boreholes east of the railway crossing where the borehole encountered an asphalt thickness of 650 mm.

A 2.3 m thick layer of silty sand topsoil was encountered underlying the fill at a depth of about 2.3 m below ground surface at Borehole BH16-04; and a 0.5 m thick layer of silt clay fill was encountered within the overall fill deposit at the borehole.

A cohesive deposit comprised of silty clay was encountered in Boreholes BH16-03 and BH16-06 underlying the fill deposit. The silty clay deposit is 0.6 m and 1.1 m thick in the respective boreholes, grey to black in colour and contains a trace sand or trace organics.

Glacial till was encountered in Boreholes BH16-01, BH16-03, BH16-06, BH16-07, BH16-08 and BH16-10 directly underlying the cohesive fill, the topsoil deposit and the silty sand deposit. The till deposit ranges in composition from silty sand to a silt and sand, is brown to grey and contains trace to some gravel content and is moist to wet.

A silty sand to silt and sand to sand deposit was encountered in BH 01, 05, 07, 09 and 10 underlying the silty sand till deposit. The silty sand to sand is generally moist to wet, brown to grey and contains trace to some gravel. Where fully penetrated, the deposit is about 1 m to 5.3 m thick.

#### 4.4.4.2 Groundwater Conditions

As part of the geotechnical investigation groundwater levels were monitored to identify the anticipated impact on the road structure and underground infrastructure along the corridors. The groundwater conditions were generally found to be within 1.5 to 3 m of the surface, although one borehole located at approximately the intersection of Mapleview Dr and 20<sup>th</sup> Sideroad did exhibit an artesian condition. Groundwater conditions identified during the initial installation and subsequent follow-up are shown in Table 4-11.

**Table 4-11: Groundwater Levels Field Investigation**

Borehole No.	Ground Elevation (m)	Groundwater Levels			
		Upon Completion		July 14, 2016	
		Depth (m)	Elevation (m)	Depth (m)	Elevation (m)
BH16-01	241.8	1.8	240.0	2.0	239.8
BH16-02	247.8	5.7	242.1	2.4	245.4
BH16-03	248.6	4.1	244.5	1.6	247.0
BH16-04	246.5	Dry	--	2.7	243.8
BH16-05	260.2	2.4	257.8	2.5*	257.7*
BH16-06	255.5	5.1	250.4	2.6	252.9
BH16-07	267.4	3.6	263.8	4.7	262.7
BH16-08	267.3	4.9**	262.4**	--	--
BH16-09	260.6	2.8	257.8	3.1	257.5
BH16-10	260.0	4.8**	255.2**	--	--

\* Groundwater was measured on August 15, 2016 in Borehole BH16-05

\*\* Measured within open borehole

While the measured groundwater levels were found to be generally well below surface it is anticipated that the water level will fluctuate seasonally as a result of precipitation and runoff amounts. It should be noted that boreholes were drilled at specific watercourse crossings where groundwater levels would be anticipated to be closer to the ground surface.

#### 4.4.5 Existing Utility Infrastructure

Within the existing road corridors existing utility infrastructure is a mix of public and Third Party Utilities. Public infrastructure consists primarily of City of Barrie owned water, wastewater and storm sewer piping and associated manholes, catchbasins, valves and valve chambers. Third Party Utilities include primarily overhead telephone and cable along shared hydro/streetlight poles.

On Mapleview Drive public utilities consist of a 300 mm diameter watermain and varying sizes of storm sewer piping providing drainage to outlet at the existing watercourses. The watermain currently crosses under the existing rail corridor and is encased within a steel casing pipe.

Overhead hydro and streetlighting on the corridor is primarily located along the north side of the road corridor with occasional crossings to the south side to provide power feeds to private residences. Telephone and cable share the pole lines along the corridor. Underground natural gas service is also located within the corridor.

Along Lockhart Road a short section of 300 mm diameter watermain is provided from Huronia Road to a point approximately 600 m east. No sanitary or storm sewer lines are located along Lockhart Road. Similar to Mapleview overhead hydro is provided primarily along the south side of the corridor, with a short, approximately 600 m duplicate stretch located along the north side of the road with shared streetlighting.

Along Yonge Street and Big Bay Point Road the existing infrastructure consists of short stretches of watermain, primarily at the intersections with major roadways and overhead third party utility lines.



## 5. Evaluation of Alternative Design Concepts

The alternative designs were evaluated to determine which would best achieve the goals and objectives of this study, while also minimizing the impact on the engineering/operational environment, natural environment, social environment, cultural heritage and economic environment. The evaluation of the various alternative designs is presented in Appendix I. Lane configurations presented and analysed are those identified within the traffic analysis as resulting in the best operational characteristics for the roadway. Based on the detailed analysis, the initial preferred design alternative is a blend of the best features taken from the reviewed alternatives, based on input received from the public and through discussions with City of Barrie staff. It includes widening the road to provide the required through lanes in each direction with appropriate turning lanes to meet the anticipated 2031 travel demand. In addition, and where appropriate the elimination of auxiliary turning lanes, reductions of boulevard widths and median widths have been included in an effort to mitigate the impacts on the adjacent properties to the greatest extent possible while still addressing the need for access to existing properties. These modifications, evaluated as “Preferred Alternative Design”, include:

- Minimum 1.0 m boulevard and 1.5 m sidewalk;
- Provision of a raised non-traversable median;
- Provision of 3.5 m wide lanes; and
- Provision of a 3 m wide multi-use trail.

This preferred alternative will:

- Accommodate future traffic volumes;
- Provide for sidewalks and minimal impacts on emergency access times;
- Have less impact on existing abutting properties; and
- Have less impacts on surrounding vegetation/trees.

The various road corridors were subdivided into segments using existing and/or proposed intersecting roads as a basis for the identification of the segments. To that end the preferred design concepts were also subdivided using the same segments.

### 5.1 Impacts of Design Alternatives

In order to develop a preliminary preferred alternative, the impact of the design alternatives were evaluated and are noted in Appendix I and are discussed further in the following sections. Although there will be impacts to other environments, it is expected that impact to the adjacent properties will be the primary focus and generally govern the evaluation and the selection of a preferred design alternative.

Wherever possible, the alternatives will follow applicable City of Barrie standards. Where modifications to the standards are required they have been identified in this document.

Where property constraints exist, other design alternatives may be pursued to reduce the impacts associated with land acquisition. Prior to receiving input and comments regarding the preferred design alternative from stakeholders through the public consultation process, certain assumptions have been made with respect to property acquisitions which are subject to change following PIC 2.

## 5.2 Assessment of Design Alternatives

Each of the design alternatives presented at PIC No 1 were evaluated against criteria covering all aspects of the environment, both natural and cultural, and specific design and cost elements in order to identify the nature and extent of the impact. A rating from “Most Negative” to “Most Positive” was applied against each alternative and criteria in order to identify a preliminary preferred alternative. The evaluations are shown in Appendix I.

Very little variation was found between the alternatives, however, there are specific areas where observable differences were found. Specific details associated with each road segment are presented in the following sections.

### 5.2.1 *Mapleview Drive*

**Huronia Road to Country Lane** – Within this road segment the preferred design concept is a widening to 7 lanes, including a 4.2 m median, a 3 m multi-use trail on the north side and 1.6 m sidewalk on the south side. This alternative was the preferred alternative design concept because it provides the safest opportunity for cyclists and pedestrians given the width and speed of the travelled portion of the roadway. In addition, it has the least impact on the existing structures, and has the least impact on the adjacent properties along the corridor. Impacts to the natural and social environment can be mitigated through appropriate mitigation measures.

**Country Lane to Madelaine Drive** – Within this road segment the preferred design concept is a widening to 7 lanes, including a 4.2 m median and a 3 m multi-use trail and 1.6 m sidewalk. This alternative is the preferred alternative design concept because it provides the safest opportunity for cyclists and pedestrians. This alternative has less impact on the vegetation and existing and future land uses. In addition, it has less impact on potential archaeological, as well as life-cycle costs and land acquisition costs.

**Madelaine Drive to Yonge Street** – Within this road segment the preferred design concept includes widening to 5 lanes, 4 m two-way left-turn lane, 3 m multi-use trail and a 1.6 m sidewalk. This alternative is the preferred alternative design concept because it provides the safest opportunity for cyclists and pedestrians. This alternative has a greater impact on wildlife and wildlife habitat, however less impact on vegetation and existing and future land use. In addition, it has less impact on property acquisition, cultural heritage resources and life-cycle costs.

**Yonge Street to Prince William Way** - Within this road segment, the preferred design concept includes widening to 4 lanes, 3 m multi-use trail, 1.6 m sidewalk and turning lanes at intersections. This alternative is the preferred alternative design concept because it provides the safest opportunity for cyclists and pedestrians. This alternative has less impact on the

watercourses; however, a greater potential impact on the vegetation. In addition, it has less impact on property acquisition, and life-cycle costs.

**Prince William Way to 20<sup>th</sup> Sideroad** – Within this road segment, the preferred design concept includes widening to 3 lanes, 4 m two-way left turn lane, 3 m multi-use trail and 1.6 m sidewalk. This alternative is the preferred alternative design concept because it provides the safest opportunity for cyclists and pedestrians. Although this alternative has a greater impact on adjacent vegetation, it has less property acquisition required. It also has less life-cycle costs.

### 5.2.2 **Lockhart Road**

**Huronia Road to 600m East** – Within this road segment, the preferred design concept is Alternative 3, which includes 4 lanes, a 3 m multi-use trail, south side ditch and turning lanes at intersections. This option was the preferred alternative design concept because it provides the safest opportunity for pedestrians and cyclists. Although it has a greater potential effect on vegetation, it has less impact on wetlands within the Study Area compared to other alternatives. Although there are greater land acquisition costs, the overall life-cycle cost is less than other alternatives.

**600 m East of Huronia Road to Yonge Street** – Within this road segment, the preferred design concept is Alternative 3, which includes 4 lanes, a 3 m multi-use trail, south side ditch and turning lanes at intersections. This option was the preferred alternative design concept because it provides the safest opportunity for pedestrians and cyclists. Overall, it has less impact on watercourses, wildlife and wetlands than the other alternatives, however has a greater impact on existing and/or future land uses. This alternative has less life-cycle costs than other alternatives.

**800 m East of Yonge Street to Prince William Way** – Within this road segment, the preferred design concept is Alternative 3, which includes 4 lanes, a 3 m multi-use trail, south side ditch and turning lanes at intersections. This option was the preferred alternative design concept because it provides the safest opportunity for pedestrians and cyclists. Overall, it has less impact on the natural environment, including watercourses, wildlife, and wetlands; however, it has a greater impact on existing and future land use. It has a greater impact on property acquisition; however, less impact on life-cycle costs.

**Prince William Way to Phase 1 Boundary** – Within this road segment, the preferred design concept is Alternative 3, which includes 3 lanes, a 4 m two-way left-turn lane, 3 m multi-use trail on the south side and a 1.6 m sidewalk. This option was preferred because it provides the safest opportunity for pedestrians and cyclists. This alternative has the least impact on life cycle costs and land acquisition costs.

### 5.2.3 **Yonge Street**

**Lockhart Road to Mapleview Drive East** – Within this road segment the preferred design concept is Alternative 2 which includes 5 lanes, a 4.2 m median, 2 m bike lanes, 2 m sidewalks and LID features. This option was preferred because it provides the best alternative to address stormwater management and drainage within the Study Area.

#### 5.2.4 **Big Bay Point Road**

**City Boundary to Collector 11** – Within this road segment, the preferred design concept is Alternative 3, which includes 5 lanes, with a 4 m two-way left-turn lane, and 3 m multi-use trail on the south side. This option was the preferred alternative design concept because it provides the safest opportunity for pedestrians and cyclists and has minimal impact on the wildlife habitat, species at risk and vegetation. In addition, it has moderate property required. The life-cycle costs are considered to be less than other alternatives.

**Collector 11 to Phase 1 Boundary** – Within this road segment, the preferred design concept is Alternative 3 which includes 3 lanes with a 4 m two-way left-turn lane, a 3 m multi-use trail on the south side. This option was the preferred alternative design concept because it provides the safest opportunity for pedestrians and cyclists and has minimal impact on vegetation compared to the other alternatives. In addition, it has less life-cycle costs than the other alternatives.

### 5.3 **Land Acquisition**

The widening of existing roads has the potential for direct social/cultural effects such as property requirements and dislocation and, disturbance from construction activities. It is expected though that through proper design, mitigation measures and compensation, that these impacts can be avoided and/or reduced in their severity. Each of the alternative designs were evaluated at a high level with respect to the extent of property impacts and acquisition requirements. The high level evaluation of the preliminary alternatives was undertaken on a comparative basis in relation to the “Do Nothing” alternative and as such, the greater the required property the more negative the evaluation as changes will continue to the concepts in order to mitigate the impacts.

### 5.4 **Construction Costs**

Similar to property acquisition the preliminary alternatives were evaluated on a comparative basis against the “Do Nothing” alternative. In addition, the costing was also evaluated on a net present value to account for the ongoing maintenance and operation costs associated with the works. It was found that all alternatives had similar moderate to high initial capital costs save for the interim construction option, which by its nature of requiring less construction, i.e. fewer initial lanes, which had a comparatively lower cost. Net present value was also found to have a similar pattern, although the ongoing and increasing maintenance requirements associated with the “Do Nothing” alternative allowed for that option to have a higher value.

## **6. Mapleview Drive East Railway Crossing**

### **6.1 Objectives**

An analysis of the feasibility of grade separation alternatives to replace the existing level crossings along GO Transit's Barrie Rail Corridor along Mapleview Drive East. Further details on the Railway Crossing Assessment are included in Appendix M.

### **6.2 Existing Conditions**

At present, a single GO Transit railway track crosses Mapleview Drive East at grade. Mapleview Drive East is currently comprised of two traffic lanes, two bicycle lanes and a sidewalk along the north side at this location. The existing warning system includes cross-bucks, flashing lights, bells, cantilevers and gates.

### **6.3 Grade Crossing Warrants**

An analysis of the level crossing exposure was undertaken during the Phase 1 and 2 components of the Annexation Lands EA. The crossing at Mapleview Drive East was found to have an exposure index of 354,396 by horizon year 2031. Typically values in excess of 200,000 are recommended for replacement with a grade separated crossing, while those less than 200,000 will have protection recommended ranging from "cross-bucks and advance warning signs" to "Flashing Lights, Bells and Gates" dependent upon the level of the exposure index.

### **6.4 Assessment of Existing Conditions**

Hatch conducted a preliminary comparative assessment of the overpass and underpass alternatives for the proposed grade separation at Mapleview Drive East. The advantages and disadvantages are summarized in Table 6-1.

**Table 6-1: Advantages and Disadvantages of Alternatives**

Factor	Overpass Alternative	Underpass Alternative
Socio-Economic Environment	<ul style="list-style-type: none"> <li>• Fill creates a visual barrier, especially being next to an historic church.</li> <li>• Anticipated effect on cemetery in south-west quadrant (due to embankments) is small.</li> <li>• Increase in projected noise due to elevated roadway.</li> <li>• Truncation of existing routes and some property acquisition required.</li> </ul>	<ul style="list-style-type: none"> <li>• Aesthetically pleasing.</li> <li>• Significant road offset from cemetery in south-west quadrant or intricate shoring is required to avoid encroachment.</li> <li>• Decrease in projected noise due to sunken roadway.</li> <li>• Truncation of existing routes and more substantial property acquisition required, in order to provide offset from cemetery.</li> </ul>
Natural Environment	<ul style="list-style-type: none"> <li>• Existing slope in road profile not well-suited to overpass.</li> <li>• Simple drainage system due to elevated roadway.</li> <li>• Effects on wildlife and vegetation can be minimized through standard mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>• Existing slope in road profile well-suited to underpass.</li> <li>• Simple drainage system due to roadway profile.</li> <li>• Effects on wildlife and vegetation can be minimized through standard mitigation measures.</li> </ul>
Transportation/ Construction	<ul style="list-style-type: none"> <li>• Access to adjacent developments would not be viable.</li> <li>• Volume of embankments for overpass would be greater than volume of cut for underpass.</li> <li>• Re-grading of Yonge Street not required.</li> <li>• Rail operations unaffected during construction.</li> <li>• Detour can be accommodated within final right-of-way if bridge is constructed in stages, if road remains open.</li> <li>• Traffic delays reduced.</li> </ul>	<ul style="list-style-type: none"> <li>• Access to adjacent developments would be viable.</li> <li>• Volume of cut for underpass would be less than volume of embankment for overpass.</li> <li>• Re-grading of Yonge Street required.</li> <li>• Diversion track required to maintain rail operations during construction.</li> <li>• Additional land required to accommodate detour road during construction, if road remains open.</li> <li>• Traffic delays reduced.</li> </ul>

From this assessment, an underpass (road under rail) was recommended for the proposed grade separation at Mapleview Drive East. Although an underpass would cost more (at least costs directly associated with the grade separation would be higher), potentially require more property and would create more challenges with respect to protection of the cemetery, the overriding factor is access to adjacent developments, which would not be viable with an overpass. Access to the adjacent developments would be severely hampered as a result of the construction of a road over rail overpass, including the requirement to close an access which had been agreed to at the Ontario Municipal Board between the City of Barrie and the adjacent developers. Construction of an overpass would require significantly more land if embankments were provided as opposed to use of retaining walls for slope stability. If retaining walls are proposed at this location they would be in excess of 7m tall at some sections of the



crossing presenting a very negative visual, in addition to being at a very short distance from both the church on the south side and proposed new developments on the north side.

For construction staging, with respect to road traffic, a full closure of Mapleview Drive East would be preferable, given the complexity of the site. It is theoretically possible to keep Mapleview Drive East open to traffic throughout construction by building the rail bridge in four segments and the road cut in three. However, doing so would necessitate elaborate shoring, and would therefore lead to significantly higher costs and an extended schedule. A dedicated detour road north of the work zone is also possible, but would not be practical due to property constraints.

For rail traffic, assuming a full closure of Mapleview Drive East, construction would be staged as follows:

- Close Mapleview Drive East and re-locate utilities, as required;
- Construct bridge and walls for new track alignment;
- Construct diversion track;
- Divert rail traffic to diversion track;
- Construct bridge and walls for existing track alignment;
- Reinstatement of rail traffic to existing track and re-open Mapleview Drive East; and
- Metrolinx to install second permanent track when ready.

## 6.5 Grade Crossing Warning System

In advance of grade separation construction, it is recommended that the following improvements will be required for the level crossing at Mapleview Drive East:

- Installation of rubber flange guards as per RTD-10 and GCS 2014 specifications;
- Reduction of grade to 2% or less within 8 m of crossing on east approach, if practical;
- Reinstatement of "X" markings as per MUTCD Figure C1-5 on both approaches; and
- Upgrade of warning signals and cantilever light units as per RTD-10 and GCS 2014 specifications.

## 6.6 Cross-Section

Although Section 3.0 identifies that the options include either a 4-lane cross-section or a 5-lane cross-section, the preferred design concept will include a 7-lane cross-section given that this segment of Mapleview Drive East has the potential for a 7-lane cross-section by 2051 based on the preliminary analysis from the MMATMP.

## **7. Lockhart Road Railway Crossing**

### **7.1 Objectives**

Hatch conducted an analysis of the feasibility of grade separation alternatives to replace the existing level crossing at Lockhart Road, which also traverses GO Transit's Barrie Rail Corridor. As stated previously, the purpose of the Schedule C Class EA is to evaluate alternative design concepts to accommodate future growth in the City of Barrie to the year 2031. Further details on the Railway Crossing Assessment are included in Appendix M.

### **7.2 Existing Conditions**

Currently, a single GO Transit railway track crosses Lockhart Road at grade. Lockhart Road is currently comprised of two traffic lanes and two unpaved shoulders at this location. The existing warning system includes cross-bucks, flashing lights, bells and gates.

### **7.3 Grade Crossing Warrants**

In the Phase 1 and 2 report undertaken for the Annexation Area the rail crossing exposure index was calculated to identify the warrant and appropriate means of providing protection for the rail crossing of Lockhart Road east of Yonge Street. The analysis identified an exposure index of 181,692. Typically, exposure indexes between 50,000 and 200,000 would receive flashing lights, bells and gates for protection as a level crossing, while an index in excess of 200,000 would warrant a full grade separation. Given the proximity to 200,000 and the uncertainty at that time as to the timing of the increase in GO Transit service, a recommendation was made in the MMATMP to replace the level crossing with a grade separation.

### **7.4 Assessment of Existing Conditions**

Hatch conducted a preliminary comparative assessment of the overpass and underpass alternatives for the proposed grade separation at Lockhart Road. The advantages and disadvantages are presented in Table 7-1.

**Table 7-1: Advantages and Disadvantages of Alternatives**

Factor	Overpass Alternative	Underpass Alternative
Socio-Economic Environment	<ul style="list-style-type: none"> <li>• Fill creates a visual barrier.</li> <li>• Little anticipated effect on electrical sub-station in south-west quadrant.</li> <li>• Increase in projected noise due to elevated roadway.</li> <li>• Service road(s) and property acquisition required.</li> </ul>	<ul style="list-style-type: none"> <li>• Aesthetically pleasing.</li> <li>• Protective measures required for electrical sub-station in south-west quadrant.</li> <li>• Decrease in projected noise due to sunken roadway.</li> <li>• Service road(s) and property acquisition required.</li> </ul>
Natural Environment	<ul style="list-style-type: none"> <li>• Simple drainage system due to elevated roadway.</li> <li>• Effects on wildlife and vegetation can be minimized through standard mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially complex drainage system due to sunken roadway.</li> <li>• Effects on wildlife and vegetation can be minimized through standard mitigation measures.</li> </ul>
Transportation/ Construction	<ul style="list-style-type: none"> <li>• Rail operations unaffected during construction.</li> <li>• Detour can be accommodated within final right-of-way if bridge is constructed in stages, if road remains open.</li> <li>• Traffic delays reduced.</li> </ul>	<ul style="list-style-type: none"> <li>• Diversion track required to maintain rail operations during construction.</li> <li>• Additional land required to accommodate detour road during construction, if road remains open.</li> <li>• Traffic delays reduced.</li> </ul>

From this assessment, Hatch recommends an overpass (road over rail) for the proposed grade separation at Lockhart Road.

With respect to construction staging, Hatch understands that a full closure of Lockhart Road may be permitted, in which case staging considerations would be minimal. However, if a full road closure is not desired, the bridge and embankments could be constructed in two stages to keep a portion of Lockhart Road open throughout construction. Such staging would negate temporary acquisition of additional land for a dedicated detour road, but additional costs would be incurred for support of the embankments during construction.

In any case, rail operations could continue uninterrupted during construction, with no track diversion required, although flagging would be required for work above the track, such as girder erection.

## 7.5 Grade Crossing Warning System

In advance of grade separation construction, Hatch anticipates the following improvements will be required for the level crossing at Lockhart Road:

- Installation of rubber flange guards as per RTD-10 and GCS 2014 specifications;
- Ongoing brush removal to maintain sightlines; and
- Upgrade of warning signals as per RTD-10 and GCS 2014 specifications.

## **7.6 Recommended Postponement of Overpass Post 2031**

At completion of this EA the phasing of the adjacent development, whose growth will drive the need for increased capacity along the Lockhart corridor, appears to be focused initially on access to and from the Mapleview Corridor. Further, the proposed service improvements and tracking twinning by Metrolinx are also not clearly defined at this time. It should also be noted that during PIC 2 several local residents raised concern with respect to the impact of the grade separation and required local service roads on their properties and residences. As a result, it is possible that the City may wish to delay implementation of the grade separation at this location and provide flashing lights, bells and gates for protection as an interim measure. Property requirements for the future grade separation should be pursued in due course, in order to protect for a future grade separation.

## 8. Description of Preferred Design Concept

All of the alternatives ranked very closely in the analysis of alternatives as described above. The preferred design alternative presented in this section takes the best elements from each alternative, while maintaining the original focus and direction from Council and the Phase 1 and 2 EA report. In addition, the preferred design concepts take into consideration the comments received from the public, review agencies and First Nation communities.

The Preferred Alternative is to widen Mapleview Drive, Lockhart Road, Yonge Street and Big Bay Point Road, including the provision of additional travel lanes, and turning lanes at intersections to address the traffic requirements. As the public and City Council expressed a desire to include sidewalks and a multi-use trail, provision will be made for the inclusion of a minimum 1 m boulevard and 1.5 m sidewalk, as well as a 3 m multi-use trail.

The preferred design concepts presented in this section consider the mitigated option, which reduces property impacts, as well as impact to the natural and cultural environments in locations deemed to be of significance. In some locations, the roadway alignment was shifted slightly and adjustments made to minimize impacts to property wherever possible.

It should also be noted that significant safety concerns are prevalent by continuing to allow left turn movements into and out of the existing entrances across three lanes of traffic along with the additional width of roadway resulting from the provision of, in some cases, a two-way left-turn lane. As a result, a raised median will be recommended to restrict left turn movements mid-block.

Storage lengths for left and right turn lanes were identified from the Traffic Operational Analysis report, for the Weekday PM peak 95<sup>th</sup> Percentile Queue Length.

Three areas in which the City may wish to consider interim solutions are the Lockhart Road Grade Separation, Lockhart Road east of Yonge St and Big Bay Point Road. With respect to Lockhart Road Grade Separation as indicated timing of the Metrolinx rail corridor and service improvements are such that the City may wish to delay this structure, thus Lockhart Road should be kept at-grade in the short term until further details are confirmed with Metrolinx. Similarly for the section of Lockhart Road east of Yonge Street, the traffic analysis indicated a 5 lane cross-section was warranted, timing of development of adjacent lands is still in its infancy and as such the City may wish to consider the implementation of an interim 3 lane cross-section. This would also be the case with the Big Bay Point Road cross-section.

A detailed description of the preferred design is provided in the following sections, with drawings in Appendix K and Cost in Appendix O.

### 8.1 Design Criteria

The Design Criteria for the three roadways including Mapleview Drive East, Lockhart Road, Yonge Street and Big Bay Point Road is included in the Table below.



**Table 8-1: City of Barrie Design Criteria**

<b>PRELIMINARY</b>			
<b>HEWITT'S SECONDARY PLAN AREA ROAD DESIGN CRITERIA</b>			
<b>CITY OF BARRIE</b>			
DESCRIPTION	MAPLEVIEW DRIVE EAST LOCKHART ROAD BIG BAY POINT ROAD		
	DESIGN STANDARD TAC	COB STANDARD	EA STANDARD
<b>CLASSIFICATION</b>			
ROAD CLASSIFICATIONS	UAU 80	UAU 80	UAU 80
DESIGN SPEED (km/h)	80	80	80
POSTED SPEED (km/h)	60	60	60
<b>HORIZONTAL ALIGNMENTS</b>			
NC NORMAL CROWN (-0.02m/m) $R_{min.}$ (m)	2130		2130
CURVE RADIUS WITH SUPERELEV. RATE $e=0.06$ $R_{min}$ (m)	250		
RC REMOVE CROWN (+0.02m/m) $R_{min}$ (m), for $e=0.06$	450		
CURVE RADIUS WITH SUPERELEV. RATE $e=0.04$ $R_{min}$ (m)	280		
RC REMOVE CROWN (+0.02m/m) $R_{min}$ (m), for $e=0.04$	400		
TRANSITION BETWEEN 4-LANE AND 2-LANE :			
PARALLEL LANE (m)	140-215		
MERGING TAPER (m)	130		130
DIVERGING TAPER (m)	70		70
RIGHT TURN TAPER	60-84	60-84	60-100
LEFT TURN TAPER	95-190	95-190	60-100
LEFT & RIGHT TURN PARALLEL	60-130	60-130	40-60
<b>CROSS SECTIONS</b>			
THROUGH LANE WIDTH (m)	3.7	3.50	3.5
LT LANE WIDTH (m)	3.5-3.3	3.5	3.5
RT LANE WIDTH (m)	3.5-3.3	3.5	3.5
CURB LANE WIDTH (m)	3.5-3.3	3.5	3.5
TANGENT SECTION CROSS FALL	2%	2%	2%
Sidewalk Width (m)		2.00	2.00
Kill strip width			0.50
bike path			2.00
Multi-use Trail		3.00	3.00
Driveway grades (max %) behind sidewalk		7.00%	7.00%
Driveway grades (max %) b/w curb and sidewalk		7.00%	7.00%
sidewalk cross fall (%)		2%	2%
<b>VERTICAL ALIGNMENTS</b>			
MAXIMUM GRADE (%)	5	5	7.00
MINIMUM GRADE (%)	0.5	0.5	0.30
SAG VERTICAL CURVE $K_{min.}$	12-16		12-16
CREST VERTICAL CURVE $K_{min.}$	24-36		24-36
SAG VERTICAL CURVE $K_{min.}$ @ Grade Separation			10
CREST VERTICAL CURVE $K_{min.}$ @ Grade Separation			12
<b>LAYOUT</b>			
<b>RADIUS OF CURBS AT INTERSECTION</b>			
ARTERIAL TO MINOR COLLECTOR		12.5	
ARTERIAL TO MAJOR COLLECTOR		12.5	12.50
ARTERIAL TO ARTERIAL		15	15-18
ROW WIDTH (m)		36 - 40	27-41
EA Standard to be updated as project progresses			

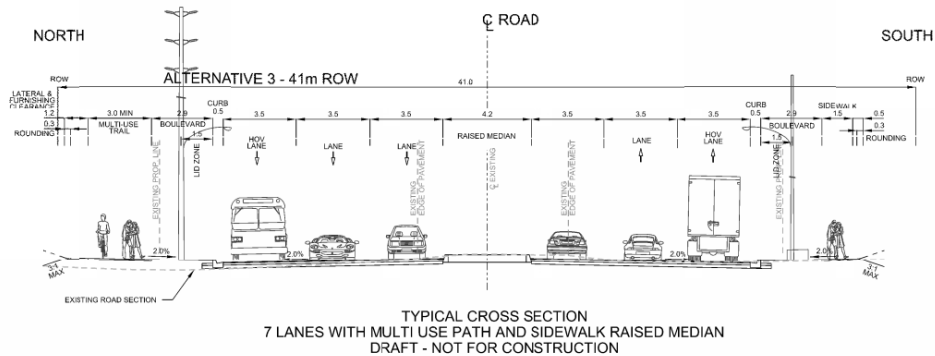
## 8.2 Typical Cross Sections

As discussed previously, each road was divided into segments for evaluation purposes. Based on the evaluation of alternative design concepts which was presented at PIC 1, it was determined based on constraints within the corridor that in some sections the cross-section be mitigated to avoid potentially significant impacts along the right-of-way.

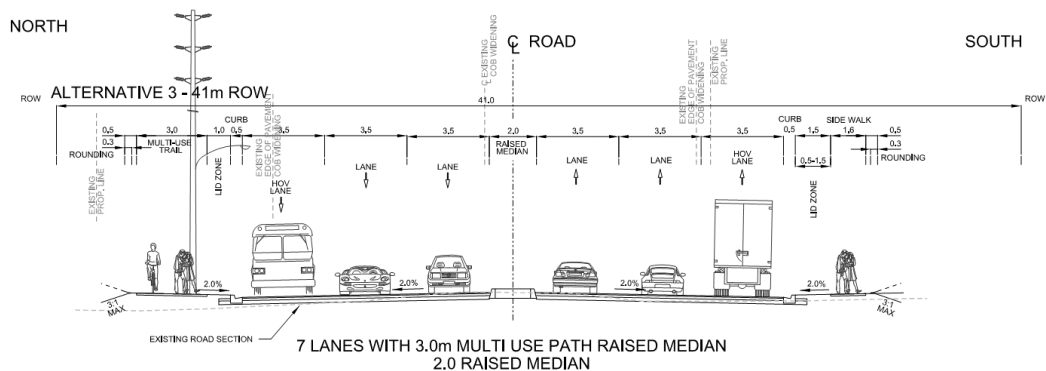
Further mitigation was undertaken after the PIC following comments received at the PIC 2 for the section of Lockhart Road between Yonge Street and Collector 11. This mitigation includes the postponement of the overpass at the rail corridor to after 2031, pending decisions at Metrolinx and including an interim 3-lane cross-section between the railway corridor and the Phase 1 boundary.

The following presents the final mitigated preferred designs for the arterial roadways in the Hewitt's Secondary Plan Study Area.

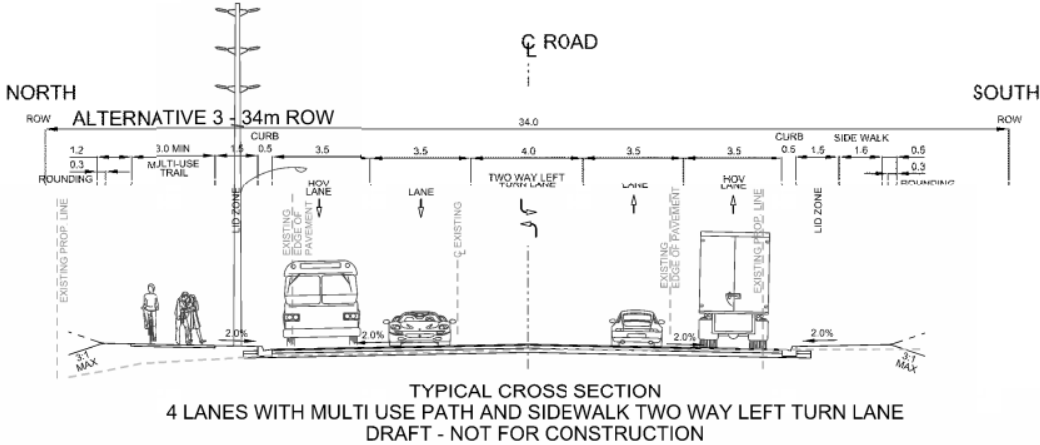
### 8.2.1 *Mapleview Drive East* Huronia Road to Country Lane – Mitigated Preferred Alternative



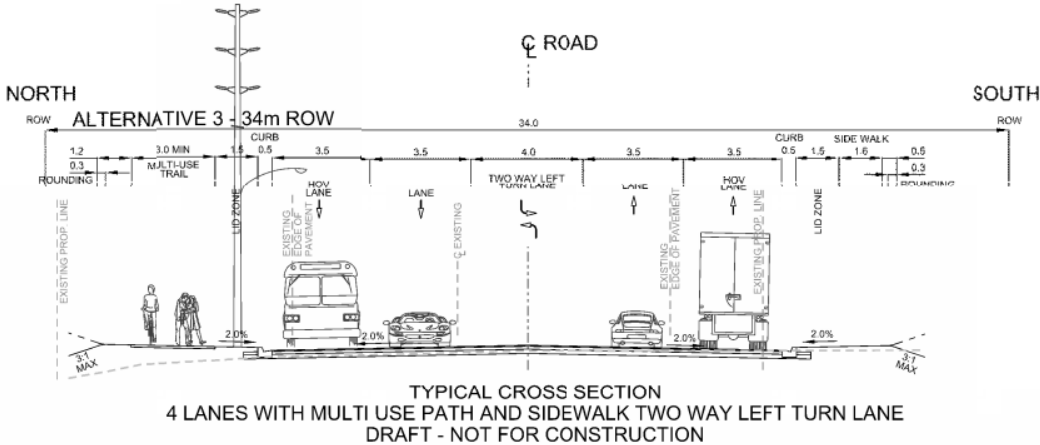
### Country Lane to Madelaine Drive



## Madelaine Drive to Yonge Street – Mitigated Preferred Alternative

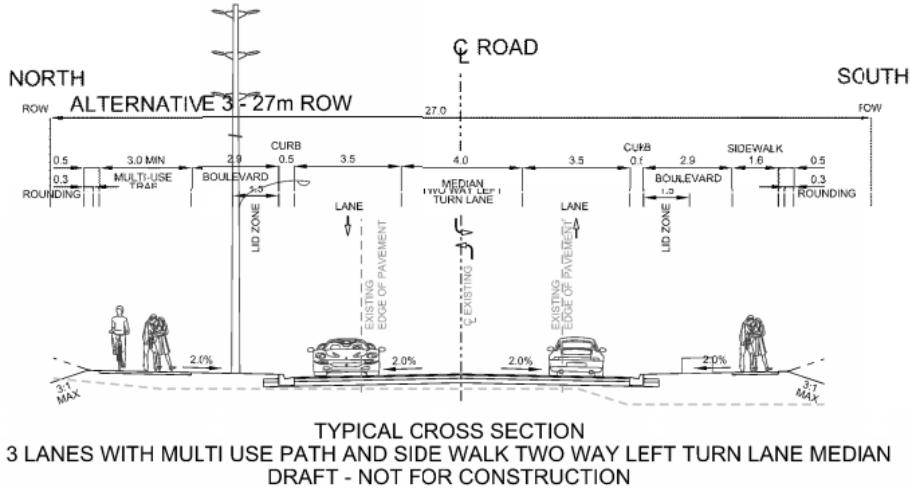


## Mapleview Drive East – Yonge Street to Princess William Way

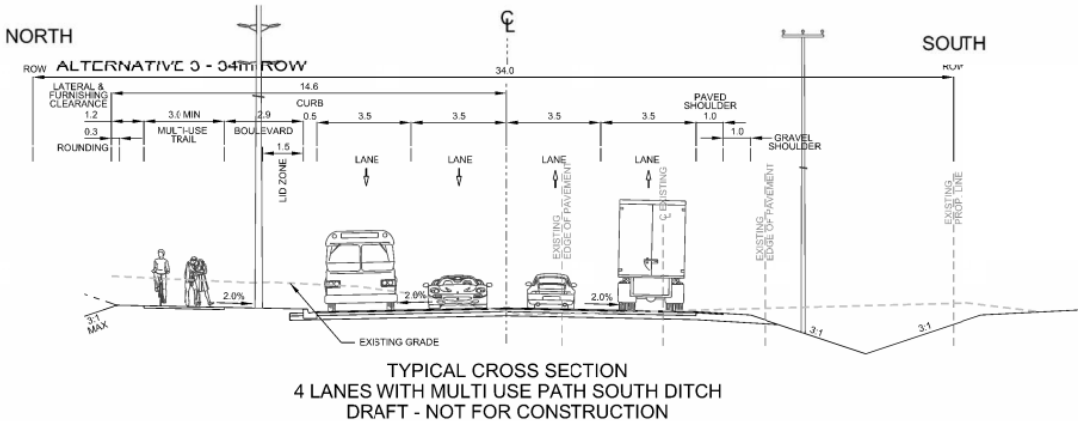




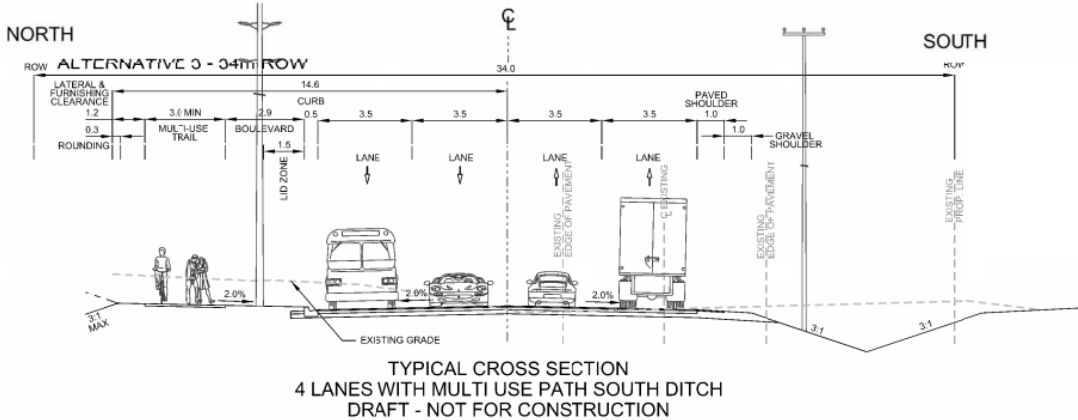
## Mapleview Drive East – Prince William Way to 20<sup>th</sup> Sideroad



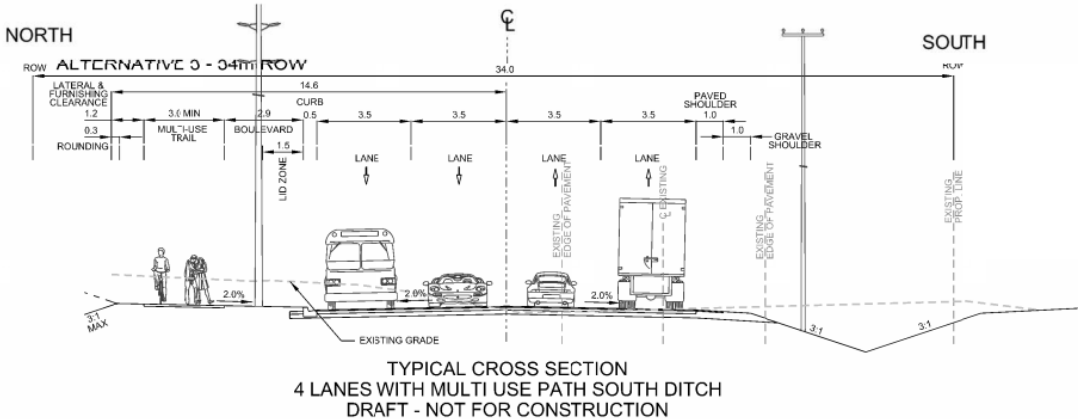
### 8.2.2 Lockhart Road Huronia Road to 600m East of Huronia Road – Mitigated Preferred Alternative



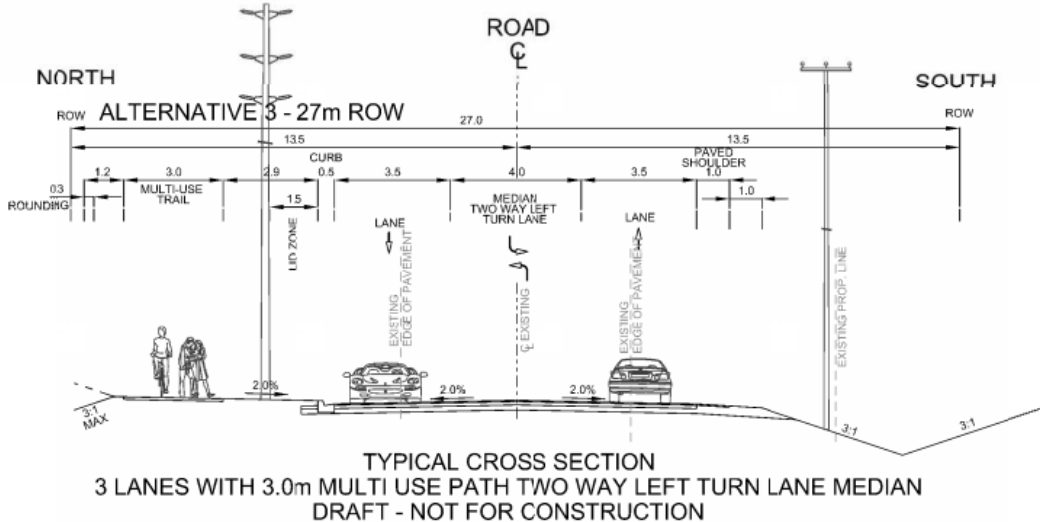
### Lockhart Road – 600m East of Huronia Road to Yonge Street



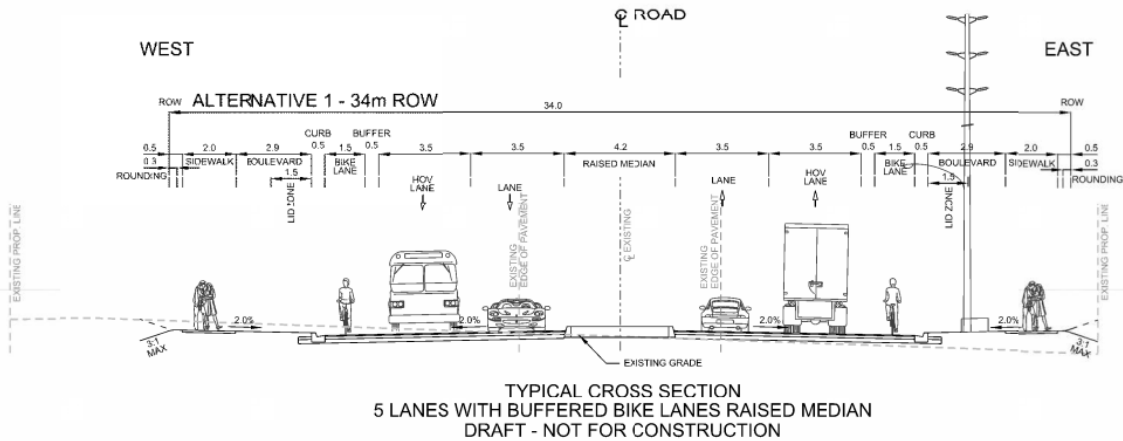
### Lockhart Road – Yonge St to East of Barrie Rail Corridor – Mitigated Preferred Alternative



**Lockhart Road – East of Barrie Rail Corridor to Phase 1 Boundary – Mitigated Preferred Alternative**

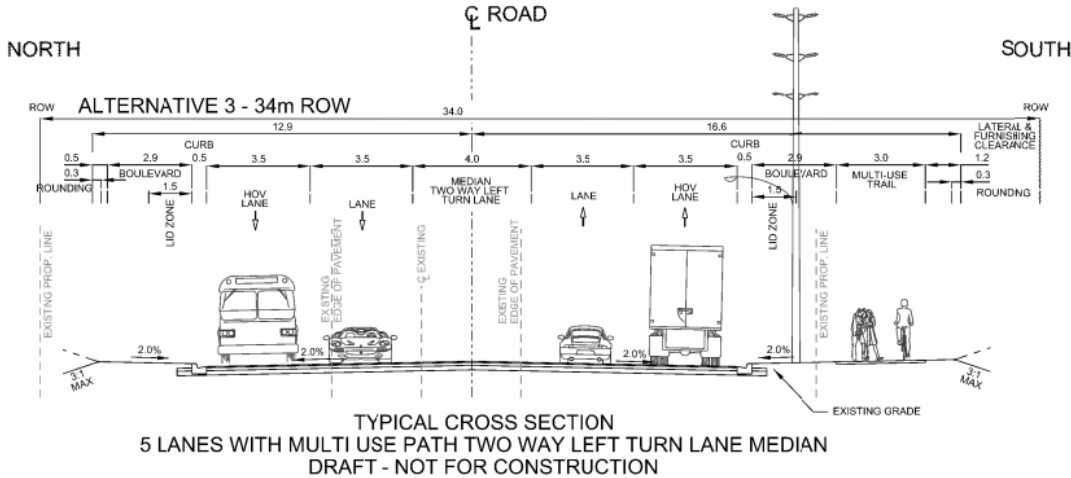


**8.2.3 Yonge Street  
Mapleview Drive East to Lockhart Road**

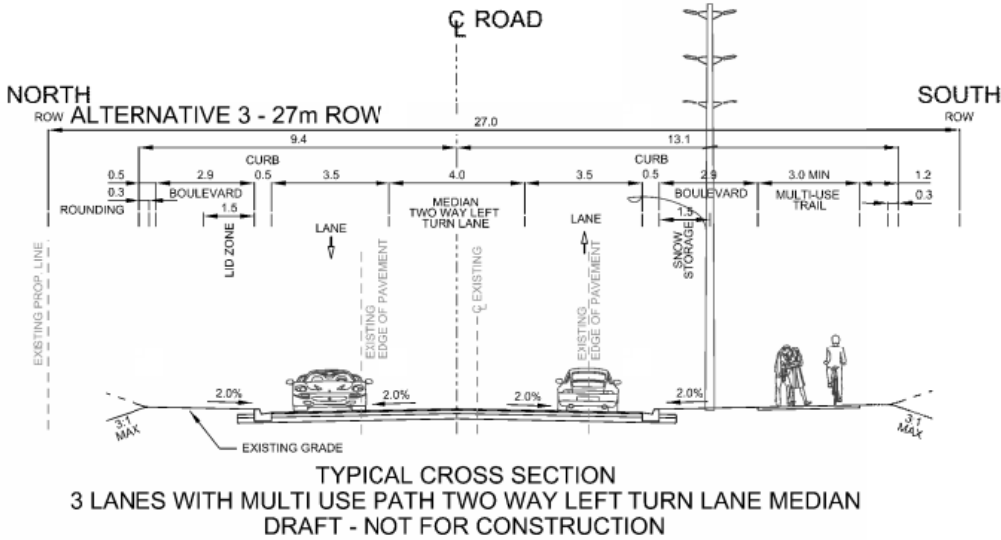




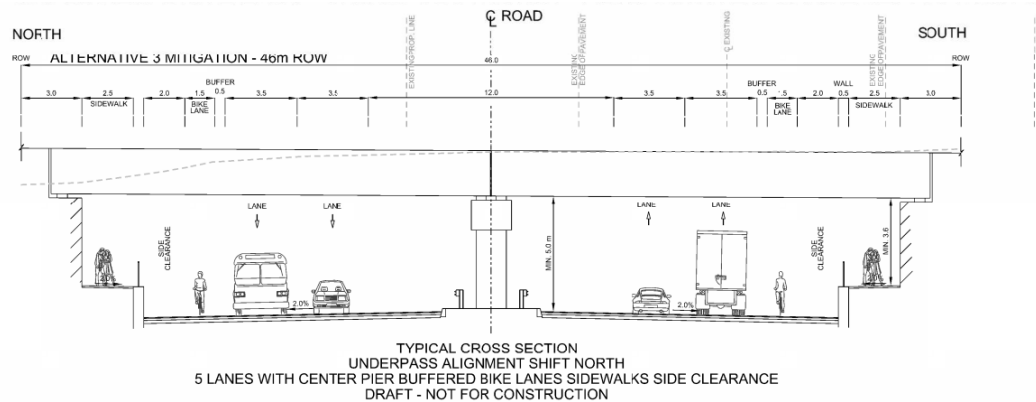
**8.2.4 Big Bay Point Road  
City Boundary to Collector 11**



**Big Bay Point Road – Collector 11 to Phase 1 Boundary**



## 8.2.5 Mapleview Drive Underpass – Mitigated Preferred Alternative



## 8.2.6 Lockhart Road Grade Separation

It should be noted that a Grade Separation at the Barrie Rail Corridor for Lockhart Road is not recommended at this time due to the uncertainty of the Metrolinx Service improvement schedule. Although a Grade Separation was presented at the second PIC, due to the uncertainties of the timing for Metrolinx to double tracking of the railway corridor, as well as impacts on existing residential properties, it is proposed not to grade separate Lockhart Road at this time and to provide an enhanced level of control at the existing at-grade crossing.

## 8.3 Horizontal and Vertical Alignment

The horizontal alignment mostly follows the existing centreline of all of the roadways, based on property constraints to the north and south of the corridor. As discussed previously, the preferred design concept was mitigated at specific sections to remove the potential for impacts along the corridor.

The vertical alignment for the roadways were designed to:

- Minimize raising the grade of the road to reduce impacts on adjacent properties;
- Minimize impact to existing stream crossings and culverts;
- Ensure drainage overtopping requirements at watercourse crossings were met;
- Follow the existing alignment as closely as possible; and
- Satisfy the design criteria and design standards as closely as possible.

Based on these design goals, the vertical alignments generally follow the existing road profile.

## 8.4 Traffic and Transportation

Under the 2021 forecast traffic conditions, the traffic operations analysis indicates a need to widen all of the roads as follows from the existing two lanes.

- Mapleview Drive East: Huronia Road to Madelaine Drive: widen to 6 lanes;
- Mapleview Drive: Madelaine Drive to Prince William Way: widen to 4 lanes;

- Big Bay Point Road: Prince William Way to Queensway: widen to 4 lanes;
- Huronia Drive: Saunders Road to Lockhart Road: widen to 4 lanes;
- Yonge Street: Mapleview Drive to Lockhart Road: widen to 4 lanes; and
- Lockhart Road: Huronia Road to Yonge Street: widen to 4 lanes.

Under the 2031 forecast traffic conditions, with the above recommended lanes for the 2021 horizon, traffic operations analysis indicates a need to widen the roads further to accommodate traffic growth.

- Mapleview Drive: Huronia Road to Country/Sunden Lane: widen to 6 lanes;
- Mapleview Drive: Madelaine Drive to St. Paul's Crescent: widen to 6 lanes; and
- Yonge Street: Huronia Drive to Yonge Street: widen to 6 lanes.

When the improvements are implemented, all roads will operate at an acceptable level of service.

## 8.5 Intersections and Entrances

Following the recommended geometric improvements at signalized intersections by 2021, all intersections are expected to operate at a LOS of 'D' or better in both the AM and PM peak hours. Following the recommended geometric improvements at unsignalized intersections by 2031, all intersections are expected to operate at an acceptable LOS of 'D' or better in both the AM and PM peak hours.

Left and right turn auxiliary lanes have been provided where the turning volumes warrant the additional lanes. Where necessary, right turn lanes have been eliminated at select locations in order to minimize the impacts on adjacent existing residential properties.

During meetings with the City of Barrie Transportation and Traffic staff a number of existing intersections were identified as having operational issues and as such a recommendation was made to include a raised median on specific sections of Mapleview Drive to address this situation. From a traffic operational standpoint for the EA these locations did not negatively impact access to or from the adjacent developments. There may be a requirement to accommodate U-Turns at the major intersections to maintain access for existing homeowners who are no longer able to have direct left turn access to their properties. The major intersections are able to accommodate the movement from a geometric standpoint, however, they may require a protected left turn phase to ensure the movements are made safely.

All intersections were reviewed for adequate sight lines against the City of Barrie sight triangle standards and also against the TAC standards for sight triangles, as a result additional property requirements have been indicated to accommodate the additional space which may be required. This should be confirmed during detailed design.

All existing driveway entrances will be maintained along Mapleview, Lockhart, Yonge and Big Bay Point Road. New entrances for adjacent properties in the area of Mapleview Drive Grade Separation will be provided, or the entrances realigned to an alternate location as



shown on the drawings. St Paul Crescent will require cul-de-sacs at both its north and south legs as a result of the grade differential from the proposed underpass. In addition, the south intersection of Yonge Street and St Paul's Crescent will be realigned to normalize it and align it with the proposed Street K to the west of Yonge Street. This will require the lengthening of approximately three driveways to Yonge Street and one to the new alignment of St Paul's Crescent.

## 8.6 Provision of Cyclists and Pedestrians

Pedestrians and cyclists will be accommodated by way of one of the following combinations, based on the surrounding land uses:

- 1.6 m sidewalk and 3.0 m multi-use trail;
- 3 m multi-use trail;
- 2 m sidewalk and 1.5 m bike lanes;
- 2.5 m sidewalk and 1.5 m bike lanes; and
- 1.5 m sidewalk and 1.5 m bike lanes.

Sidewalks, multi-use trails and bike lanes are provided throughout the Study Area for continuous bicycle network and sidewalk network. The design of bike lanes will be completed in accordance with the requirements of the Ontario Traffic Manual (OTM) Book 18.

The boulevard and the centre median have been reduced in some of the cross-sections to reduce the amount of property required and to mitigate impacts along each of the corridors.

The roadway widths as presented in the Multi-Modal Active Transportation Master Plan (MMATMP) include 41 m, 34 m and 27 m. The recommended design concepts including plan and profile for improvements along Mapleview Drive East, Lockhart Road, Yonge Street, Big Bay Point Road attempt to minimize the requirements for additional property. These are included in Appendix K.

As an alternate the City may wish to consider the use of buffered bicycle lanes in-lieu of the multi-use trail in order to maintain a consistent cross-section along this area. There would be no impact to the property requirements should this change be supported. This should be confirmed during the detailed design stage.

## 8.7 Drainage and Stormwater Management

This report summarizes the Drainage and Stormwater Management Study of the Hewitt's Secondary Plan Area (SPA) Environmental Assessment (EA). The Hewitt's SPA drainage and SWM study reviewed and documented the existing and required proposed minor system hydraulic drainage conditions, potential SWM/LID measures and preliminary volume requirements.

In general, the following goals were completed:

- The study has documented the drainage design criteria and stormwater management (SWM) objectives for the Study Area;

- Existing hydrologic conditions have been evaluated and documented within the ROW and flows conveyed through the Study Area;
- Hydrologic flows and hydraulic capacity of the existing structures have been developed and evaluated for the Study Area;
- The existing and proposed capacity of existing and proposed storm sewer networks as per City of Barrie's Storm Drainage and Stormwater Management Policies and Design Guidelines have been sized and documented; and
- Future potential Low Impact Development (LID) facilities within all four improved road right-of-way (ROW) areas have been documented.

In order to provide adequate conveyance for Hewitt's Creek SPA Study Area for both ROW and external drainage, the following recommendations have been made:

- The Storm Sewer Networks are recommended to safely convey the minor storm events within the road ROW for the 5 year design event in order to meet City of Barrie requirements.
- The major Culvert Crossings within the Hewitt's and Lovers Creek watersheds conveying external flows through the Study Area are recommended to be replaced where applicable following the Master Drainage Plan recommendations.
- The SWM/LID measures are recommended to treat, reduce, and infiltrate road ROW runoff from design events where feasible to assist in meeting the water quality and water quantity requirements.
  - ◆ Water quantity control through the use of a combination of oversized storage pipes and SIS and Centralized SWMFs.
  - ◆ Infiltration volume treatment requirements are to be achieved through the SIS and Centralized SWMFs within the Study Area.
  - ◆ If utilizing an oversized storage pipe or if there is available property within the ROW, implement Linear LIDs underneath the multi-use paths designed to capture and detain road ROW runoff via catchbasins from the 12.5 mm storm event (or net 25 mm event). Runoff from less frequent, larger events (> 25 mm) was expected to overflow through storm sewers to outlets (i.e., culvert crossing and downstream sewer connections).
  - ◆ Water quality control of runoff from paved surfaces is to be implemented through a treatment train approach using catchbasin inserts at curb & gutter prior to directing runoff to underground detention chambers to encourage pollutant settling. Any overflows from the underground detention will be treated via end-of-pipe OGS devices prior to discharge to suitable outlets.
  - ◆ A number of Stormwater management Facilities (SWMF) within the Hewitt's Creek SIS area are recommended to be altered to receive ROW drainage for water quantity

and quality handling. Further coordination will be required to refine the size of the proposed SIS SWMF.

- ◆ Potential centralized facilities are recommended for peak flow control are strategically located where no SWMF currently exists to treat runoff. Note, the City of Barrie has provided the recommended centralized concept design for the current study. Further refinement is required during detailed design.
- ◆ At the detailed design stage, soil infiltration testing at proposed LID feature locations should be conducted in order to determine exfiltration rates from the underground detention chambers and optimize chamber sizing. Additional boreholes at LID feature locations may be considered to understand shallow groundwater water levels that may impact the functionality of LIDs. Erosion and sedimentation control measures must be implemented during construction.

## 8.8 Utilities

As the road corridors are widened and urbanized it will be necessary to relocate the existing underground and above ground utilities. Based on the preferred design and City of Barrie Standard road cross-sections, it should be possible to accommodate all utilities within their standard locations as well as required new infrastructure such as LID facilities should the City decide to use linear LID facilities. The location of all utilities should be finalized during the detailed design stages for the works.

It should be noted that utilities which must cross under the rail corridor will be required to meet acceptable rail loadings and should be encased in steel piping as per the requirements of the rail authority. Similarly, utilities crossing under existing watercourses should be designed to meet the requirements of the LSRCA and MOECC for watercourse crossings.

## 8.9 Street Lighting and Traffic Signals

As part of the detailed design and in conjunction with the relocation of existing overhead hydro, relocation of the existing street lighting will be required. The street lighting should be designed to meet current City of Barrie Standards as presented in the City's Roadway Illumination Policies and Design Guidelines. With the implementation of a Multi-use Pathway along Mapleview and Lockhart the City may wish to consider, during detailed design, the provision of pedestrian level lighting or ensure that sufficient lighting levels are provided for the sidewalks and pathway while ensuring that light spillage into adjacent residential properties is minimized.

The roads within the Study Area are proposed to be widened from their existing two lanes to three lanes or greater. With the additional roadway width, pedestrians will have wider intersections to cross. As there will be new signalized intersections as well as enhancement of several existing signalized intersections it will be necessary to account for the additional pedestrian travel time. During detailed design traffic signals timing should be developed to provide adequate crossing time for pedestrians.

## 8.10 Landscaping and Streetscaping

Streetscaping details will be confirmed during detailed design.

Given the extensive nature of the widening a significant amount of current vegetated area will be impacted, either by the construction of the widened roadway or the installation of the new structures. The removal and replacement of vegetated areas is required to improve the pedestrian realm and to begin to establish a more comfortable pedestrian environment.

Trees will be replaced on a two for one basis under the City's vegetation replacement plan. Enhanced plantings will be installed where feasible to provide a visual screening along residential properties. As part of the detailed design a comprehensive streetscaping plan should be developed. As part of the detailed design process a review of grading should be undertaken to determine if alternatives are available that would minimize the removal of trees. This could include the use of steeper side slopes protected by barriers.

As part of the streetscaping plan the city should consider four additional items:

- Enhanced plantings to act as a visual cue that the widened portions of Lockhart Road, Mapleview Drive and Big Bay Point Road are no longer rural roads, but are now urban streets with lower speed limits. Enhanced plantings should also be considered for the widened portion of Yonge Street to act as a visual cue that you are entering an urban area with lower speeds.
- Enhanced plantings should also be considered to provide for the reduction of noise levels at adjacent properties if required. The City may wish to consider this along Yonge Street where a number of residential properties currently exist and along the south side of Lockhart Road where a rural cross-section is being proposed.
- The use of fencing, plantings or other means to define the limit of the road right of way versus the adjacent properties.
- The use of enhanced plantings as a mean of accommodating both streetscape components and noise mitigation.

## 8.11 Property Requirements

Table 8-2 outlines the property requirements to accommodate the recommended Design Concepts. Full details of property required are presented in Appendix K.



**Table 8-2: Property Required within the Study Area**

Mapleview Drive West	North Property Taking (m <sup>2</sup> )	South Property Taking (m <sup>2</sup> )
M1: Huronia Road to Country Lane	2,014.96	5,676.81
M2: Country Lane to Madelaine Drive	0	6,338.39
M3: Madelaine Drive to Yonge Street	3,038.08	10,482.02
M4: Yonge Street to Prince William Way	14,099.43	8,144.77
M5: Prince William Way to 20 <sup>th</sup> Sideroad	5,602.42	6,287.35
<b>Lockhart Road</b>		
L1: Huronia Rd to 600m East of Huronia	1,865.08	13.05
L2: 600m East of Huronia to Yonge Street	31,399.89	49.84
L3: Yonge Street to Prince William Way	20,761.43	3,054.37
L4: Prince William Way to Phase 1 Boundary	6,128.22	
<b>Yonge Street</b>		
Y1: Mapleview Drive to Lockhart Road	1,484.11	567.39
<b>Big Bay Point Road</b>		
L1: City Boundary to Collector		2,055.75
L2: Collector 11 to Phase 1 Boundary		1,667.58

## 8.12 Noise Assessment

The City completed a noise assessment to review the need to mitigate traffic noise impacts following project build out. The widening of the roadways is predicted to produce a marginal increase over current noise levels. Noise levels at all representative Outdoor Living Areas (OLAs) with the exception of OLA #6 will remain below 65 dBA. OLA #6 is located along Yonge Street between Lockhart Road and Mapleview Drive East, just west of the existing St. Paul's Crescent. The City of Barrie is to investigate reducing noise levels by 5 dB to 60 dBA. This reduction can be achieved by implementing noise controls, which could include methods such as the use of an acoustic fence within the right-of-way, as close as possible to the property line to optimize the barrier effectiveness, or the use of enhanced plantings or other site specific methods consistent with the City's Urban Design Standards and Guidelines. The selection of an appropriate means of noise mitigation at this location should be determined during detailed design and be based on the city's urban design standards and site specific considerations.

## 8.13 Construction Staging Considerations

During construction of the road widenings it should be possible to maintain two lanes of traffic throughout the majority of the project length. This will be especially true for the length of Yonge and Big Bay Point. Isolated locations along Mapleview and Lockhart, specifically the watercourse crossings may require short term closure to facilitate construction.

The two grade separations will require more complex staging involving possible detouring of the rail alignment as well as closure of the road. For the Mapleview Drive crossing a substantial grade differential between the existing road and the new road profile it is recommended that a closure of Mapleview Drive between Yonge St and Prince William Way. Construction of this grade separation will require a relocation of the rails to maintain train traffic while constructing the structure. It may be possible, depending upon the timing of the future Metrolinx corridor improvements to construct the temporary alignment along a possible

final alignment for a second track, thus minimizing the cost of construction as a result of having to place the track back to its original alignment.

A preliminary review of the constructability of the Maplevue Grade Separation was undertaken and a preliminary concept of a possible staging section was developed. Given the proximity of the cemetery on the south side two temporary walls, most likely sheet piles, would be constructed and braced using compressive struts. These walls would need to be sufficiently close enough together such that the struts wouldn't buckle, but yet far enough apart to allow for the construction of the permanent south side retaining wall footing, thus reducing or eliminating the need to disturb the cemetery. Construction of the shoring along the north side should be a much simpler task, as there is no likelihood of disturbing a sensitive site, although care must be taken as adjacent commercial development may proceed prior to the construction of the grade separation. It should be emphasized that the design of temporary works, including tie-backs for shoring of the excavation, is generally the contractor's responsibility, and the length of any tie-back systems would depend on several factors, including the depth of excavation, soil conditions, quantity/spacing of tiebacks and imposed loads. While it is not known at this time the full extent of the length of tiebacks which may be required the City may wish to obtain easements from adjacent property owners on the north side for tie-back installations of up to 20 m for the deeper tie-backs.

Should the City move forward with a grade separation at Lockhart Road and the Metrolinx crossing construction while potentially less complex than an underpass, the overpass will still require careful co-ordinate between the bridge contractor and the rail authority to ensure continued safe operation of the trains during the bridge construction. It may be possible to maintain 2 lanes of road traffic during this construction, along a detoured alignment; however, consideration should be given to closing Lockhart Road between Yonge Street and 20<sup>th</sup> Sideroad, maintaining local access for the residents, in order to minimize the construction period.

It should be noted that as the detailed design of the grade separations progresses it may be necessary to acquire access to additional lands to accommodate construction staging and to facilitate the construction of necessary design and structural elements. The City may wish to consider if the property should be acquired by means of permanent acquisition or by means of temporary easements such as grading and construction access.

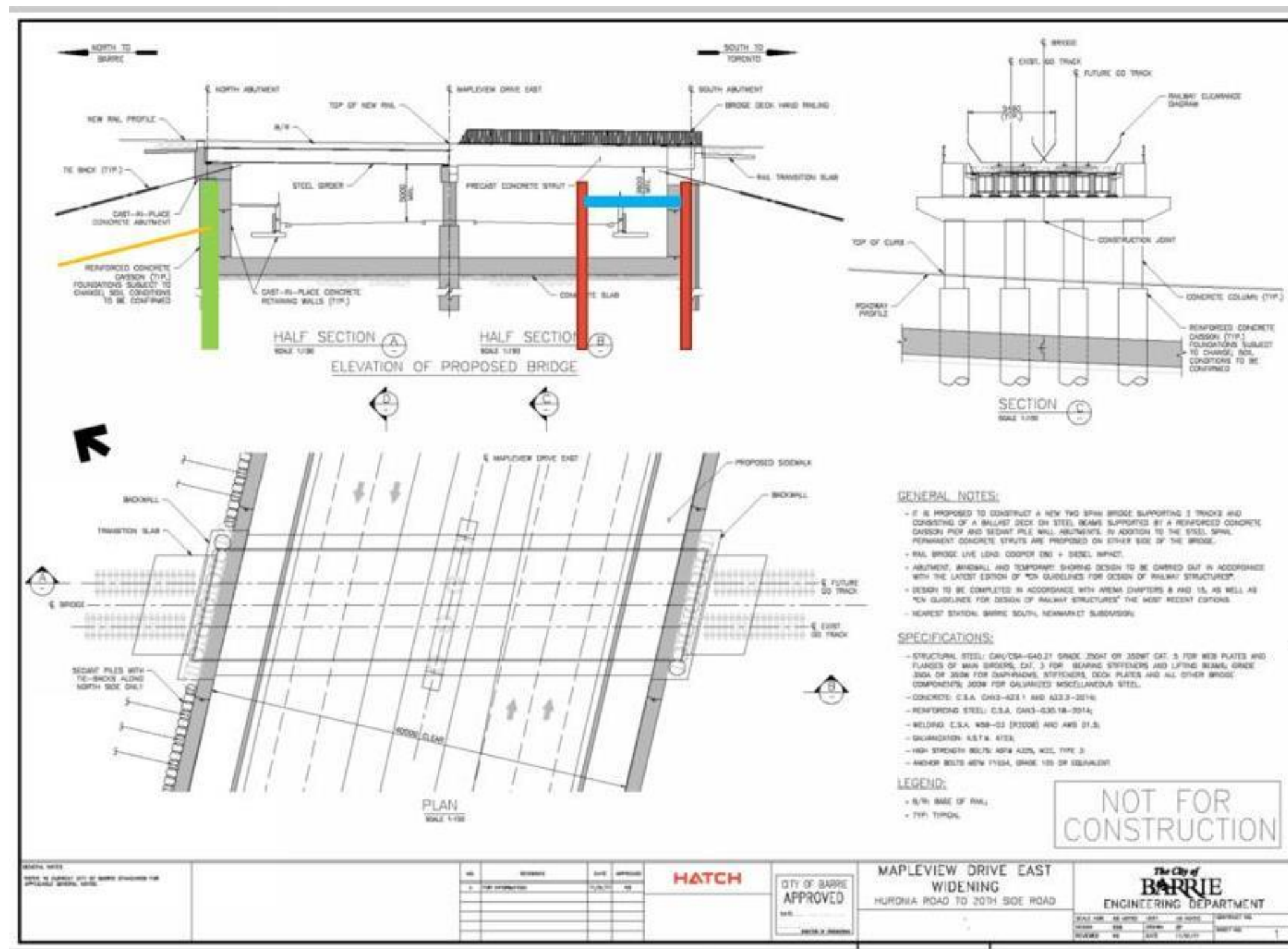


Figure 8-1: Preliminary Construction Methodology

## 8.14 Other Design Elements

### 8.14.1 *St. Paul's Substation*

The Alectra Substation is located at 43/45 St. Paul's Crescent. The design of the closure of the north section of St Paul's Crescent as a result of the grade separation must account for maintaining access to this site. Provision of a cul-de-sac on St Paul's Crescent and realignment of the substation access may be required.

### 8.14.2 *Bank Development Northeast Corner of Yonge Street and Mapleview Drive*

During the EA process the City approved the development of a proposed bank in the north east corner of the intersection of Yonge Street and Mapleview Drive. During the detailed design stage the access to this property from Yonge Street will require realignment and a secondary access to the proposed cul-de-sac on St Paul's Crescent must be provided.

### 8.14.3 *Lockhart Interim Design*

The Grade Separation at the Barrie Rail Corridor for Lockhart Road is not recommended at this time due to the uncertainty of the Metrolinx Service improvement schedule. Although a Grade Separation was presented at the second PIC, due to the uncertainties of the timing for Metrolinx to double tracking of the railway corridor, as well as impacts on existing residential properties, it is proposed not to grade separate Lockhart Road at this time and to provide an enhanced level of control at the existing at-grade crossing.

In order to facilitate the at-grade crossing, the interim design will be required to include the construction of crossing signals and gates as per Transport Canada requirements for at-grade crossings. The City should also consider the process of land acquisition in this area in order to facilitate the future grade separation and accommodate the realignment of adjacent development roads.

## 8.15 Preliminary Cost Estimate

Based on the recommended mitigated preferred alternative design concept, Table 8-3 summarizes the anticipated costs for construction including property acquisition.

**Table 8-3: Civil Works Cost Estimate**

Roadway	Construction Cost
Mapleview Drive East	\$60 million (excluding grade separation)
Lockhart Road	\$28.5 million (excluding grade separation)
Yonge Street	\$13.2 million
Big Bay Point Road	\$6.6 million

Detailed breakdowns of these costs is provided in Appendix O. In addition to the above noted costs the City should allot additional funds for the following items:

Item	Construction Cost
Mapleview Drive Grade Separation	\$51 million
Lockhart Road Grade Separation	\$19 million
Watermain	\$3.0 million
Sanitary Sewer	\$1.5 million



While it is preferred to accommodate the proposed stormwater management ponds for the roads within the ponds being proposed for the adjacent developments, it may not be possible from either a timing or location standpoint. Thus the City should also consider the allocation of additional funds for stormwater management facilities which are independent of the developer's ponds. It is estimated that the facilities could cost (excluding cost of LID's which have been included in the road costs):

<b>Item</b>	<b>Capital and Property Cost</b>
Mapleview Drive Stormwater facilities	\$2.5 million
Lockhart Road Stormwater facilities	\$2.25 million
Yonge Street Stormwater facilities	\$0.6 million
Big Bay Point Road Stormwater facilities	\$0.4 million

## **9. Water and Wastewater**

### **9.1 Conceptual Design of Trunk Watermain**

As part of the Study, a conceptual design study was undertaken using the City of Barrie Design Guidelines in conjunction with the findings and recommendations documented in the City of Barrie Water Storage and Distribution Master Plan (WSDMP) for a trunk watermain. The complete results of this design have been compiled in a technical memorandum attached to this document as Appendix J.

The annexation of 2,293 hectares of land into the City of Barrie through *The Barrie-Innisfil Boundary Adjustment Act, 2009 (Bill 196)* will place additional demands on the City's existing municipal infrastructure. To facilitate this growth, the WSDMP identified a number of system upgrades and expansions within the Hewitt's Secondary Plan Area. These system upgrades included the following projects which form part of the Hewitt's Class EA Study:

- 400 mm east-west feedermain on Big Bay Point Road to east limit of the Study Area (STA 0+000 to STA 0+326);
- 750 mm main on Mapleview Drive from Country Lane (STA. 0+775) to Yonge Street (STA. 2+920); and
- 600 mm main on Mapleview Drive from Yonge Street (STA. 2+920) to Royal Jubilee Drive (STA. 3+863).

Following a meeting with the City of Barrie held on August 22, 2016, the scope of design for the conceptual trunk watermain along Mapleview Drive was divided into three separate segments. The three segments are as follows:

- Segment 1 will form the first part of the trunk watermain service loop in the Hewitt's Study Area and will run from Country Lane (STA 0+775) to Yonge Street (2+920) with a service connection to an existing 600 mm trunk watermain running north on Madelaine Drive (STA 1+565). This segment of 750 to 600 mm concrete pressure pipe, which at the time of preparation of the ESR was in the detailed design phase.
- Segment 2 of the trunk watermain will begin at the terminus of Segment 1 (STA 2+920) and run south on Yonge Street to a point approximately 235 m south of Mapleview Drive at which point it turns east, crossing the Metrolinx Barrie Rail Corridor to the proposed development area east of the rail corridor and south of Mapleview Drive and then follow a northeast alignment back to Mapleview Drive. This alignment was developed in conjunction with the adjacent land development in an effort to expedite construction of the proposed development and avoid the grade separation proposed for the Barrie Rail Corridor and Mapleview Drive crossing. The terminus of Segment 2 will be on Mapleview Drive approximately 250 m west of Royal Jubilee Drive (STA 3+617). The proposed trunk watermain in this segment will be 600 mm in diameter.

- Segment 3 of the trunk watermain will complete the proposed service loop connection from the 600 mm watermain installed as part of Segment 2 to the existing 600 mm trunk watermain running north on Royal Jubilee Drive.

The conceptual watermain sections have been designed in accordance with the City of Barrie Water Transmission and Distribution Policies and Design Guidelines (WTDPDG) with additional guidance from the Ministry of the Environment and Climate Change (MOECC) requirements for the separation of sewers and watermains.

The watermain alignment does not account for existing utility conflicts that may occur in the Mapleview Road and Big Bay Point Road ROWs. It is recommended that a utility circulation and utility conflict assessment be conducted during the detailed design phase.

The watermain sections have been designed to meet the hydraulic design parameters detailed in the WTDPDG which include, among others:

- Maximum Day Demand as determined in the WSDMP;
- Maximum flow velocity of 1.5 m/s;
- Maximum head loss gradient of 2.5 m/km; and
- Minimum slope of 0.5% where possible.

Along Mapleview Drive the proposed 600mm watermain alignment will begin approximately 250 m west of Royal Jubilee Drive at the terminus of Segment 2 of the proposed trunk watermain service connection loop. The alignment will generally be located within the boulevard offset 2.0 m from the north curb from STA 3+617 (250m west of Royal Jubilee Drive) to STA 3+863 (Royal Jubilee Drive). At the Hewitt's Creek crossings, the alignment of the watermain will be in the north portion of the roadway offset 1.0 m south of the curb as there is not adequate space within the boulevard at the creek crossings. An existing 300 mm watermain is located 0.5 m south of the north curb line along Mapleview Drive. A minimum offset of 3.0 m has been provided from the existing 300 mm watermain to the proposed 600 mm trunk throughout the alignment.

On Big Bay Point Road, the proposed 400 mm watermain alignment is generally located within the boulevard offset 2.0 m from the north curb from STA 0+025 (~0.2 km east of The Queensway) to STA 0+267.2 (proposed Collector 11). The alignment of the watermain will be adjusted slightly to suit each proposed ROW layout alternative.

In general, valve chambers for the proposed alignment will be located at the following locations:

- Air valve chambers will be located at all hydraulic high points;
- Drain valve chambers will be located at all low points;
- Isolation valve chambers (in addition to those noted above) will be spaced every +/- 305 m, and will be combined with air and drain valves as appropriate; and

- System Connections as determined in the Master Plan.

Hewitt's Creek has two watercourse tributaries which cross Mapleview Drive. The first creek crossing is a 4.3 m span culvert located 135 m west of Royal Jubilee Drive (STA 3+731). As part of the Hewitt's Class EA, the structural inspection of the culvert determined that the structure was in good condition and recommended extending the culvert to match the selected road design alternative. As a result, the watermain crossing at this location can be installed via jack and bore installation inside of a 1200 mm diameter steel casing. A minimum depth of 1.7 m below the bottom of the culvert should be maintained to provide adequate clearance for the jack and bore installation and minimize disturbance to the existing box culvert. Restrained joints will be required at all joints throughout the crossing extents to prevent separation of the watermain joints during and after the jack and bore installation.

The second Hewitt's Creek watercourse crossing is a 900 mm CSP culvert located 35 m west of Royal Jubilee Drive. The structural and hydraulic analysis of this culvert recommended that it be replaced with a larger sized culvert to carry anticipated flows. Since no invert information is currently available for the depth of the culvert, for the purposes of the watermain conceptual design it has been assumed that the invert of the future up-sized culvert is the same depth as the 4.3m span culvert located 100m to the west. Based on that assumption there is adequate depth available to install the 600mm watermain above the existing culvert with a minimum separation of 0.6m between the top of the culvert and the bottom of the watermain and also maintain a minimum cover of 1.7m over the watermain as required. Installation of the trunk watermain can be conducted via open trench installation in conjunction with the culvert replacement to minimize construction costs. Additional information on the existing culvert and proposed replacement will be required for detailed design of the trunk watermain at this crossing.

## 9.2 Conceptual Design of Trunk Sanitary Sewer

A conceptual design for a trunk sanitary sewer has been developed and the Technical memoranda dealing with the Alternative Design Concepts - Trunk Sanitary Sewer is contained in Appendix J.

The conceptual sanitary sewer has been designed in accordance with the City of Barrie Sanitary Sewer and Collection Systems Policies and Design Guidelines (SSCSPDG) with additional guidance from the Ministry of the Environment and Climate Change (MOECC) Design Guide for Sewage Works. It is worth noting that the sanitary sewer design requires to be checked during detailed design against the City's updated design criteria, currently under development.

The sanitary sewer alignment does not account for existing utility conflicts that may occur in the Mapleview Road right-of-way (ROW). A utility circulation and utility conflict assessment will need to be conducted during the detailed design phase.

The sanitary sewer has been designed to meet the hydraulic design parameters detailed in the SSCSPDG which include:



- Peak domestic flow plus infiltration as detailed in the WCMP and obtained from the WCMP PCSWWM model;
- Flow velocity range of 0.75 m/s to 3.0m/s; and
- Minimum pipe slope of 0.4% for sewers.

The following additional design factors have not yet been examined for the conceptual design and will require analysis during detailed design of the sewer:

- Expected traffic loading based on the location of the sewer, with an H2O loading as a minimum;
- Expected differential settlement based on the geotechnical conditions of the site; and
- Expected soil loading due to depth.

As presented in the technical memoranda and associated drawings, the proposed 250 mm and 375 mm trunk sanitary sewer alignment generally follows the centerline of Mapleview Drive. The alignment is separated into a 250 mm east sewer section and 375 mm west sewer section which both connect to a 1800 mm maintenance hole (STA 3+868) for the proposed 825 mm trunk sewer running within the east side of the Hewitt's Creek Valley.

The 250 mm east sewer alignment begins at STA 2+913.9 (Yonge Street) and flows east to STA 3+820.2 (west of Royal Jubilee Drive). This alignment was finalized at a meeting with the City of Barrie held on August 22, 2016. The original trunk sanitary alignment proposed in the WCMP had its terminus at the Barrie Rail Corridor (STA 3+243).

Due to additional flows being directed to the 850mm trunk sewer, capacity of this sewer will have to be confirmed during detailed design.

The 375 mm west sewer alignment begins at STA 5+437 (proposed Collector 11) and flows west to STA 3+869 (Royal Jubilee Drive).

Maintenance holes (MH) will be located at the following locations.

### **Mapleview Drive**

- Tie-in MH for future Mapleview trunk sanitary connections at the Yonge Street intersection (STA 2+913.9). This MH is the start of the west trunk sanitary alignment.
- Tie-in MH for future south trunk sanitary connection located 0.1km west of the Metrolinx Newmarket Subdivision rail corridor (STA 3+244.2).
- Connection MH west of Royal Jubilee Drive (STA 3+820.2) which will tie-in the proposed 250 mm west sewer and 375 mm east sewer to the 825 mm north trunk sewer on the east side of the Hewitt's Creek Valley.
- Tie-in MH for future south trunk sanitary connection at the intersection of Mapleview Drive and Prince William Way (STA 4+312.9).

- Tie-in MH for future south trunk sanitary connection on Mapleview Drive, 0.18 km east of Prince William Way (STA 4+497.9).
- Tie-in MH for future south trunk sanitary connection on Mapleview Drive, 0.4 km east of Prince William Way (STA 4+725.9).
- Tie-in MH for future south trunk sanitary connection on Mapleview Drive, 0.55 km west of Prince William Way (STA 4+873.9)
- Forcemain outlet MH for the proposed East Pumping Station #1, located 1.1 km east of Prince William Way (STA 5+437).

### **General**

- Maximum maintenance hole spacing will be 110 m for sewer sizes less the 250 mm; and 120 m for sewers sizes between 300 mm and 900 mm.
- Maintenance holes will be located at the beginning of each sewer line, change in alignment, grade, material and at all junctions.

The proposed sanitary trunk alignment will cross both the Barrie Rail Corridor and Hewitt's Creek. At the Barrie Rail Corridor crossing, the preliminary preferred alternative for the grade separation is rail over road. It is proposed that the trunk sanitary sewer will remain within the roadway below the proposed rail bridge, as such the sewer will not be subject to railway loading and a casing pipe will not be required (as per Transport Canada TC E-10 Section 6). It is recommended that the trunk sewer be installed via open trench installation following the centerline of the roadway in conjunction with the construction of the grade separation and adjacent road widening.

In addition to the crossing of the Barrie Rail Corridor there are two crossings of Hewitt's Creek with the study limits. The first creek crossing is a 4.3 m span culvert located 135 m west of Royal Jubilee Drive (STA 3+731). As part of the Hewitt's Class EA, a structural inspection of the culvert was conducted which determined that the structure was in good condition with a recommendation for extending the culvert to match the selected road design alternative. Based on this recommendation, it is proposed that the 250 mm sanitary trunk sewer be placed within a 500 mm steel casing installed below the existing culvert via jack and bore installation. A minimum depth of 1.7 m below the bottom of the culvert should be maintained to provide adequate clearance for the jack and bore installation and minimize disturbance to the existing box culvert.

The second Hewitt's Creek watercourse crossing is a 900 mm CSP culvert located 35 m west of Royal Jubilee Drive (STA 3+845). The structural inspection of the culvert determined that the culvert was in good condition but that it appeared to be undersized for the hydraulic conditions present. As a result, it was recommended that the culvert be replaced with a larger sized culvert. It is recommended that an open trench method of installation be used to reduce construction costs at this location and the works be undertaken in conjunction with the replacement of the existing CSP culvert.

As part of the detailed design process it is recommended that additional information on the existing culvert conditions and proposed replacement options should be obtained prior to detailed design of the trunk sanitary sewer. This will allow for the confirmation of the existing conditions and identify any changes to the area which may have occurred since the completion of the EA.

## **10. Consultation**

### **10.1 Regulatory Agency Involvement**

Review agencies were contacted early in the Study to announce the start of the Study and to identify opportunities to discuss issues/concerns and recommendations. The agencies included local municipal departments, provincial ministries/agencies and federal department/agencies. A summary of the comments received and responses provided are included in Appendix L.

#### **10.1.1 Meeting with Lake Simcoe Region Conservation Authority**

A meeting was held with the Lake Simcoe Region Conservation Authority on December 9, 2015 at the Scanlon Conservation Area in West Gwillimbury. The purpose of the meeting was to provide an update on the Study and to confirm any input and requirements that the LSRCA may have with regards to the Study.

A meeting was held on July 22, 2016 to discuss the recommendations for the arterial roads. The meeting was convened to provide the LSRCA with the opportunity to provide feedback on the recommendations early in the Study. The preliminary stormwater management concepts for each of the arterial road sections were presented, including the proposed stormwater management concepts and Low Impact Development (LID).

A meeting was held with the LSRCA and NVCA on March 31, 2017, to present the SWM Strategy for the Study Area. The Project Team provided an overview of the City's strategy with regards to Centralized and Linear LIDs and provided a copy of the City of Barrie proposed approach/strategy for SWM on Arterial Roads.

The evaluation matrix regarding the two strategies was presented and the various LID measures considered. The various concepts were discussed including the 'Etobicoke' system and the reduction of the centre median to allow for more boulevard space. Overall the LSRCA was in agreement with the City's strategy to provide a conceptual level SWM within the ESRs, with further discussion to occur regarding LID implementation during detailed design.

A follow-up meeting with the LSRCA was held on April 28, 2017, to work to finalize the stormwater management and drainage plans for the Study Area.

#### **10.1.2 Meeting with County of Simcoe**

A meeting was held with the County of Simcoe on July 12, 2016, at the City of Barrie offices to provide an update on the Study. A copy of meeting minutes is contained in Appendix L.

A second meeting was held with the County of Simcoe on March 27, 2017, to present the preferred alternative designs.

#### **10.1.3 Meeting with Town of Innisfil**

The City met with the Town of Innisfil on July 18, 2016, to discuss the roadway Class EAs and to determine preferred methods of communication going forward with the Study.



The City met with the Town of Innisfil on March 24, 2017 to present the preferred alternative designs for Huron Road, Lockhart Road and Big Bay Point Road. The presentation highlighted the City's best effort to minimize impacts on the Town of Innisfil residents on the south side of Lockhart Road.

#### **10.1.4 Meeting with Stakeholders**

A meeting was held with the Landowners Group (LOG) on April 13, 2016, to discuss the Subwatershed Impact Study and the Grading Plans for the Study. The meeting was held at Schaeffer and Associates office in Concord, Ontario.

A second meeting was held with the Landowner's Group on March 16, 2017, to present the preferred alternative designs for the proposed improvements. There were no major comments, except for those about financing and 'tweaking' the ROW requirements, however it was understood that that these were beyond the Class EA objectives and would be addressed in future stages of the Study.

Discussions occurred regarding the Stormwater Management and Low Impact Development strategy and there was agreement to provide the LOG with a draft of the SWM Strategy after the City has reviewed the document.

#### **10.1.5 Meetings with Impacted Property Owners**

The City met with property owners who were significantly impacted by the proposed roadway improvements to discuss the process and options available.

### **10.2 Study Commencement**

Public and regulatory agency consultation is a significant and essential component to the Municipal Class EA process. The City of Barrie was responsible with putting together the notification material for Study Commencement and the announcement of Public Information Centres, given that there were three Class EAs being undertaken concurrently.

### **10.3 First Nations Consultation**

The following First Nations and Aboriginal Communities were consulted as part of this Study:

- Moon River Métis Council;
- Métis Nation of Ontario Head Office;
- Algonquins of Ontario;
- Barrie Friendship Centre;
- Beausoleil First Nation (Christian Island);
- Chippewas of Georgina Island First Nation;
- Chippewas of Mnjikaning (Rama);
- Curve Lake First Nation;
- Georgian Bay Metis Council;

- Hiawatha First Nation;
- Metis Nation of Ontario;
- Mississaugas of Scugog Island First Nation;
- Moose Deer Point First Nation;
- Wahta Mohawk First Nation; and
- William Treaties First Nation.

No comments have been received from any of the identified First Nation communities.

## **10.4 Public Information Centre No. 1**

### **10.4.1 Notification**

A Memo was presented to Council on September 12, 2016 to introduce the Study and the upcoming PIC. Notices were published the week of September 12, 2016 and September 19, 2016, in local newspapers. Notices were sent to property owners immediate adjacent to the corridors and within 120 m of each intersection. Notices were also hand delivered for the properties within the Annexed Lands where there were missing postal codes/addresses not available. Notices were also provided to the area municipalities including the Town of Innisfil and the County of Simcoe. A project website was also created and material was uploaded in a timely manner prior to the PIC.

### **10.4.2 Public Information Centre No. 1**

The Public Information Centre was held on September 22, 2016 at the Liberty North Banquet Hall. The PIC was a joint venture with the other two projects near the Study Area, including McKay Interchange and Salem Secondary Plan Transportation Improvements Class EA.

### **10.4.3 Attendance and Presentation**

Sixty people signed the attendance registry at the PIC; however, well over 90 people were in attendance. The attendance registry was for all three projects, not exclusively for Hewitt's. A copy of the presentation material including boards and design concepts is included in Appendix L.

### **10.4.4 Summary of Input**

There were 23 comments received at and following the Public Information Centre from review agencies, interested members of the public and property owners. The majority of comments came from the Hewitt's Landowner's Group, in relation to specific comments regarding impact to their properties. Other comments related to the following:

- The process and who is responsible for sewer and water hook up at the property line;
- Concern that Low Impact Development (LIDs) can contaminate the watershed;
- Concern about impact on property frontages;
- Clarification about acronyms required (LIDs, MUT, etc.);

- Please let me know options to reduce noise levels in my backyard – speed limits should be enforced;
- Concerned about impact to residents along Mapleview Drive getting to/from houses, especially during construction. Concerned about property impacts and timing of construction;
- Concerned that an underpass for Lockhart Crossing may require water pump and may impact water supply to our wells on the south side of Lockhart Road;
- City of Barrie and Town of Innisfil should be at PICs to address questions related to municipal boundaries; and
- Do not like seeing expansion to south side of Barrie – makes City lopsided.

## **10.5 Public Information Centre No. 2**

### **10.5.1 Notification**

Notices were published in the local newspaper on March 23, 2017 and March 25, 2017. Notices were sent to property owners immediate adjacent to the corridors and within 120 m of each intersection, as well as those on the Study Contact List. Notices were also provided to the area municipalities including the Town of Innisfil and the County of Simcoe, as well as relevant strip plans of the alternative design.

### **10.5.2 Public Information Centre No. 2**

The Public Information Centre was held on April 6, 2017, at the Liberty North Banquet Hall. The PIC was a joint venture with the other two projects near the Study Area, including McKay Interchange and Salem Secondary Plan Transportation Improvements Class EA.

### **10.5.3 Attendance and Presentation**

A total of 53 people signed the attendance registry; however, there were more than 100 people in attendance. The attendance registry was for all three projects, not exclusively for Hewitt's. A copy of the presentation material including boards and design concepts is included in Appendix L.

### **10.5.4 Summary of Input**

Prior to the PIC a letter and supporting signed petition was received from Residents of the Country Club Estates opposing the Salem and Hewitt's Secondary Plan Study Areas. The majority of the comments in the letter opposed the Secondary Plan, and did not relate specifically to the Class EA for the road improvements.

Through discussions with residents the following comments were heard:

- Timing of development north of Lockhart Road and west of 20th Sideroad;
- Rectory previously associated with St. Paul's Church is owned by St. Peter's Church in Churchill;
- The improvements seem very car-focused;

- Concerned about revised access as a result of closure of St. Paul's Crescent (south of Maplevue Drive East);
- Recommend reviewing location of LID placement on Maplevue Drive East, given that there is a wetland on the north side and this location may be an issue; and
- Resident never received notice regarding Study (along Lockhart Road, in Innisfil).

The following is a summary received based on the comment sheets:

- Opposed to overpass at railway tracks – Metrolinx undecided regarding their expansion;
- Overpass will require extensive property and have negative impact on resale value;
- Concerned about impact of construction of overpass to private well, as well as potential contamination as a result of salt and brine;
- Concerned about property impacts;
- Concerned about impacts to private trees; hope that large trees on property will be protected during and after construction;
- Will sewer and water be provided on Lockhart Road;
- Concerned about impact to drainage on private property;
- Shared roads are a bad idea and are the biggest barrier to cycling; reducing road capacity to accommodate cyclists is not a good idea;
- Has bike lanes improved safety on other roads?; and
- Disappointed that preferred concept includes Multi-Use Trail – these are not beneficial to cycling community; pedestrians often block the Trail.



## **11. Potential Environmental Impacts and Mitigation**

### **11.1 Natural Environment**

#### **11.1.1 *Breeding Birds***

Construction timing should consider natural heritage, in particular wildlife. The federal *Migratory Bird Convention Act (MBCA)* protects migratory bird populations by regulating potentially harmful anthropogenic activities. Bird species that are protected are listed under Article I of the MBCA, are native or naturally occurring in Canada and are species that are known to occur regularly in Canada. This includes most native bird species in Canada. The MBCA prohibits harming and/or killing of listed bird species under the MBCA and/or destroying or collecting their eggs, nests or nest shelters.

Vegetation removal should not take place during the core local breeding bird season which is established from April 1 to August 31, as protected by the MBCA. Due to uncertainty that lies with nest sweeps during construction, especially during leaf-on conditions, it is recommended that all tree clearing outside of the breeding bird window.

Due to the presence of Brook Trout and Sculpin spawning activities, the MNRF has recommended that no in-water works occur between October 1 and July 15 of any given year. As such, in-water works can only occur from July 16 to September 30 unless otherwise noted by MNRF and/or DFO.

Discussions with respect to timing confirmation should be made with DFO during the detailed design phase once the design components are better understood.

#### **11.1.2 *Erosion and Sediment Control***

No development, construction or grading should occur outside of the development envelope once it is confirmed during detailed design.

Erosion and sediment control measures should be implemented to avoid impacts to woodlands, PSWs and additional unevaluated wetlands.

Efforts should be made to reduce areas of exposed soils, and all types of erosion and sediment transport during staging and construction. Erosion and sediment controls should be installed prior to construction activities, remain through the entire duration and monitored in order to ensure sufficient controls are in place. All ESC measures should be reflected on all construction drawings with notes on requirements.

#### **11.1.3 *Tree Clearing Protection and Replacement***

To address impacts to trees in the Study Area, a tree inventory and preservation plan is recommended to be completed by a Certified Arborist during Detailed Design.

Those areas associated with woodlands should be assigned a loss on an area basis rather than individual tree count, where as those associated within the ROW and along residential and rural properties should be individually picked up where diameter-at-breast height is equal to or greater than 15 cm.

Tree and vegetation clearing should be limited as much as possible and follow the City of Barrie tree removal policies and By-law not limited to the Tree Preservation By-law 2014-1150 for those situated on private property with further recommendations provided in the City of Barrie's Tree Protection Manual (2010).

All vegetation loss, including woodlands / forests should be compensated at a 3:1 ratio. Specifically, removal of street trees should be replaced at a 3:1 ratio, while forested areas should be replaced at a 3:1 ratio based on the area lost. Additional recommendations are as follows:

- The Contractor should be made aware of tree protection measures and no-go zones for material placement and vehicle use;
- Tree removal should not take place during the core local breeding bird season which is established from April 1st to August 31st, as protected by the MBCA (1994);
- Transportation, handling, and storing of petroleum products and other chemicals should not take place within the areas of the new edge;
- Temporary lay-down areas and storage of materials should not be within the areas of the new edge;
- Additional recommendations provided by a Certified Arborist as part of the tree inventory and Arborist report during detailed design should be followed accordingly; and,
- All trees as regulated by the Canadian Food Inspection Agency (CFIA) for pests such as Emerald Ash Borer (pertaining to Ash species), should be disposed of according to City and CFIA recommended standards.

#### **11.1.4 Wildlife Protection Measures**

Efforts should be made for the protection of wildlife during construction, using erosion fencing. Reference should be made to the MNRF Best Practices Technical Note on Reptile and Amphibian Exclusion Fencing (2013), and the MNRF Species at Risk Handling Manual (2011).

All fencing should be periodically monitored by an environmental monitor who is trained in proper handling of these species should they be encountered in the work area. If a migratory bird happens to nest within the work area, measures should be taken to ensure protection of nest is established such that the fledglings can successfully hatch and requirements under the MBCA are met. Additional guidance on the species observed should be sought from the Canadian Wildlife Service.

The installation of new culverts and/or replacement culverts should follow guidelines as prescribed by the relevant agencies, and should be constructed in a manner that does not impede fish passage. It is recommended that all culverts where feasible be constructed using an open-bottom scenario such that proper substrate can be implemented to sustain and if not improve existing conditions. Depending on discussions with DFO with respect to Brook Trout and Mottled Sculpin spawning, measures for enhancement along the creek banks and

restoration of lost spawning habitat may be warranted. If new habitat is created as part of these discussions, proper monitoring following construction will be required to denote whether the species is utilizing the newly restored areas.

## 11.2 Socio-Economic Environment

### 11.2.1 Cultural Heritage

Each of the 32 cultural heritage resources identified within the Study Area were evaluated against the impact assessment criteria. The following is a summary of the impact screening results:

- CHL 12 and BHR 1 will not be impacted by any of the proposed road and pedestrian realm improvements;
- CHLs 1-3, 7-11, 13-23 and BHR 2-5 will be impacted by the proposed road and pedestrian realm improvements, however the proposed work will not affect the property with any significant magnitude, severity, duration, frequency, range or diversity;
- CHLs 6 and 27 will be impacted by the proposed road and pedestrian realm improvements. The resulting alterations will likely be of significant magnitude, severity and diversity; and
- CHLS 4, 5 and 24-26 will be impacted by the proposed road and pedestrian realm improvements due to their destruction and removal.

The proposed road and public realm improvements as a result of the recommended plan will impact identified cultural heritage landscapes and built heritage resources. As a result, additional work will be required to understand the cultural heritage significance and the impact of this work on the identified resources.

### 11.2.2 Noise

The proposed improvements along Mapleview Drive East, Lockhart Road, Big Bay Point Road and Yonge Street are predicted to produce marginal increase over current noise levels. Noise levels at all Outdoor Living Areas (OLA) with the exception of OLA #6 will remain below 65 dBA. For OLA #6, the City should investigate reducing noise levels by 5 dB to 60 dBA. A reduction of 5 dBA can be achieved by implementing noise controls.

The contribution of rail noise does not significantly impact noise levels during the day-time due to the limited number of train passes over this 16-hr period. Train passing volume is anticipated to increase following the completion of rail upgrades by Metrolinx in 2025. However, the 2025 modifications will include changing the locomotive type from diesel to electric. Despite an increase in train passes anticipated in 2031, the locomotive will be a quieter, electrically driven vehicle reducing the noise impact of the rail corridor between 2021 and 2031.

### 11.2.3 Air Quality

One of the policies documented in the Multi-Modal Active Transportation Master Plan (MMATMP, 2014) is Transportation Demand Strategy and Smart Commute. Plans and

policies of the City of Barrie and the County of Simcoe support the creation of more sustainable transportation systems including Transportation Demand Management measures to modify travel behaviours, which is viewed as an important complement to improved infrastructure and services for transit, carpooling, cycling and walking.

One TDM initiative includes the creation of a Smart Commute program to be implemented as part of a network across the Greater Toronto Hamilton Area and part of the regional Smart Commute initiative funded by Transport Canada's Urban Transportation Showcase Program and local governments. Barrie Smart Commute program should be established as one of several transportation management associations in the GTHA to promote commuter options to business associations and employers. This implementation would be aided by Smart Commute to provide the tools, centralized coordination and promotion. One of the core objectives of Smart Commute is to reduce congestion and improve air quality by helping commuters consider more sustainable transportation modes including transit, carpooling, cycling and walking.

In addition, the recommendations in this Environmental Study Report, include the provision of bike lanes, multi-use trails and sidewalks to promote TDM and the provision of infrastructure to support active transportation. Getting people out of their cars and considering active modes to get around will help improve overall air quality in the City of Barrie.

### **11.3 Environmental Effects and Mitigation Measures**

It is recognized that the proposed improvements within the Study Area will result in some impact on the existing environment. Table 11-1 below provides an assessment of the potential environmental impacts associated with the project and the recommended mitigation measures required to reduce these effects.



**Table 11-1: Environmental Effects and Mitigation Measures**

Factor	Anticipated Impact	Proposed Mitigations
<b>Natural Environment</b>		
Vegetation/Trees	<ul style="list-style-type: none"> <li>Potential impact to trees along the Study Area corridors.</li> </ul>	<ul style="list-style-type: none"> <li>To address impacts to trees in the Study Area, a tree inventory and preservation plan is recommended to be completed by a Certified Arborist during Detailed Design.</li> <li>All vegetation loss, including woodlands/forests should be compensated at a 3:1 ratio. Removal of street trees should be replaced at a 3:1 ratio, while forested areas should be replaced at a 3:1 ratio based on the area lost.</li> <li>Contractor to be made aware of tree protection measures and no-go zones for material placement and vehicle use.</li> <li>Tree removal should not take place during core local breeding bird season from April 1<sup>st</sup> to August 31<sup>st</sup>, for Breeding Birds.</li> <li>Transportation, handling and storing of petroleum products and other chemicals should not take place near watercourses.</li> <li>Temporary lay-down areas and storage of materials should not be near watercourses.</li> <li>All trees as regulated by the Canadian Food Inspection Agency for pests such as the Emerald Ash Borer should be disposed of according to the City and CFIA recommended standards.</li> </ul>
Fisheries and Aquatic	<ul style="list-style-type: none"> <li>Potential impact to Brook Trout and sculpin.</li> </ul>	<ul style="list-style-type: none"> <li>No in-water works to occur between October 1<sup>st</sup> and July 15<sup>th</sup> of any given year. In-water works can only occur between July 16<sup>th</sup> to September 30<sup>th</sup> unless otherwise noted by MNRF and/or DFO. Discussions with DFO during detailed design.</li> <li>Installation of new culverts and/or replacement of culverts should follow guidelines as prescribed by the relevant agencies and constructed in a manner not to impede fish passage.</li> <li>It is recommended that all culverts where feasible be constructed using an open-bottom scenario such that proper substrate can be implemented to sustain and if not improve existing conditions.</li> <li>Measures for enhancement along creek banks and restoration of lost spawning habitat may be warranted, depending on discussions with DFO regarding Brook Trout and Mottled Sculpin spawning.</li> <li>If new habitat created, proper monitoring following construction will be required to denote whether species utilizing newly restored areas.</li> </ul>
Wildlife and SAR	<ul style="list-style-type: none"> <li>Potential impact to wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>Efforts should be made to protect wildlife during construction, using erosion fencing.</li> <li>Reference to MNRF Best Practices Technical Note on Reptile and Amphibian Exclusion Fencing (2013) and the MNRF SAR Handling Manual.</li> </ul>

Factor	Anticipated Impact	Proposed Mitigations
		<ul style="list-style-type: none"> <li>All fencing should be periodically monitored by an environmental monitor who is trained in proper handling of these species should they be encountered in the work area.</li> </ul>
Migratory Birds	<ul style="list-style-type: none"> <li>Potential impact to breeding birds.</li> <li>Potential for migratory bird to nest within work area.</li> </ul>	<ul style="list-style-type: none"> <li>Vegetation removal should not take place during the core local breeding bird season which is established from April 1<sup>st</sup> to August 31<sup>st</sup>, as protected by the <i>Migratory Bird Convention Act</i>.</li> <li>Measures to be taken to ensure protection of nest is established such that fledglings can successfully hatch and requirements under MBCA are met.</li> <li>Guidance on species observed should be sought from Canadian wildlife Service.</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>Increase in suspended solid loading.</li> </ul>	<ul style="list-style-type: none"> <li>Oil Grit Separator proposed at sewer outlets to achieve 80% total suspended solids removal for 85% of the total runoff volume.</li> <li>Enhanced grass swales recommended to provide additional quality control prior to discharging into local regulated watercourses.</li> </ul>
Water Quantity	<ul style="list-style-type: none"> <li>Increase in peak flow rate and volume.</li> </ul>	<ul style="list-style-type: none"> <li>Design of Low Impact Development measures within the road right-of-way for water quantity control, where possible.</li> </ul>
Sediment and Erosion Control	<ul style="list-style-type: none"> <li>Potential impact to watercourses as a result of soil disturbance from excavating and cut/fill activities.</li> </ul>	<ul style="list-style-type: none"> <li>No construction or grading outside of development envelope once confirmed during detailed design.</li> <li>Sediment and Erosion Control measures should be implemented to avoid impacts to woodlots, Provincially Significant Wetlands and additional unevaluated wetlands.</li> <li>Efforts to reduce areas of exposed soils and all types of erosion and sediment transport during staging and construction. Erosion and sediment controls to be installed prior to construction activities, should remain through duration and monitored to ensure sufficient controls in place. ESC measures should be reflect on all construction drawings.</li> </ul>
<b>Socio-Economic Environment</b>		
Noise	<ul style="list-style-type: none"> <li>Increase in existing noise levels from traffic.</li> </ul>	<ul style="list-style-type: none"> <li>City of Barrie to investigate reducing noise levels by 5 dB to 60 dBA at OLA #6 (located on Yonge Street, between Yonge Street and St. Paul's Crescent) through implementation of noise barrier/acoustic fence.</li> </ul>
	<ul style="list-style-type: none"> <li>Potential nuisance impacts to residence during construction.</li> </ul>	<ul style="list-style-type: none"> <li>Noise produced during construction phase is temporary and will be addressed as part of the timing restrictions.</li> <li>Contractor shall adhere to all applicable noise, dust control and emissions by-laws of the City of Barrie.</li> <li>Contractor to ensure that all construction equipment to be maintained and in operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components and lubrication of moving parts.</li> <li>Idling of equipment shall be restricted to the minimum necessary to perform the specified work.</li> </ul>

Factor	Anticipated Impact	Proposed Mitigations
Air Quality	<ul style="list-style-type: none"> <li>Increase in particulates during construction.</li> </ul>	<ul style="list-style-type: none"> <li>Water and/or commercial dust suppressants approved by the MOECC to be used during construction to reduce dust emissions.</li> <li>Contractor to sweep adjacent roads clean at the end of each week day if mud has been tracked onto roadway.</li> <li>Contractor to comply with all applicable by-laws for dust control and emissions.</li> </ul>
	<ul style="list-style-type: none"> <li>Potential impact to air quality with increased traffic and tailpipe emissions.</li> </ul>	<ul style="list-style-type: none"> <li>The recommendations from this Class EA (as documented in Section 11.2.4, there are plans to help improve the overall air quality in the City by implementing active transportation improvements (i.e., bike lanes and sidewalks) to reduce emissions.</li> </ul>
Residential/Businesses	<ul style="list-style-type: none"> <li>Impact on residents/ impacts on businesses.</li> </ul>	<ul style="list-style-type: none"> <li>Prior to construction, specific notices and contact information must be delivered to area residents and property owners informing them of construction details</li> <li>Access to individual driveways to be maintained during construction</li> </ul>
Property Acquisition	<ul style="list-style-type: none"> <li>Property acquisition anticipated.</li> <li>Discussions to be had with residents during detailed design to confirm requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary property requirements are available for review as part of the preliminary preferred design plans.</li> <li>The formal property acquisition process will be initiated during Detailed Design.</li> </ul>
Construction Safety	<ul style="list-style-type: none"> <li>Safety for corridor users.</li> </ul>	<ul style="list-style-type: none"> <li>During construction, open excavations will be fenced when no construction activity is taking place.</li> </ul>
Disruption to Motorists During Construction	<ul style="list-style-type: none"> <li>Inconvenience during construction.</li> </ul>	<ul style="list-style-type: none"> <li>Prior to commencement of construction activities, design phase of the project, regulatory agencies and adjacent property/business owners will be notified regarding scheduling of construction activities.</li> <li>Impacts will be temporary in nature. The City will attempt to mitigate as much as possible during detailed design and construction, through construction staging plans and traffic management plans.</li> </ul>
<b>Cultural Environment</b>		
Cultural Heritage Resources	<ul style="list-style-type: none"> <li>Encroachment and removal of vegetation.</li> <li>Impact to heritage resources during construction.</li> </ul>	<ul style="list-style-type: none"> <li>Where resources are expected to be impacted through alteration of their setting due to road widening, where feasible further adjustments will be considered to the profile, cross-section and grading limits during detailed design to reduce encroachment and avoid removal of mature trees, vegetation and/or fencelines.</li> <li>Post construction rehabilitation should reflect the pre-construction conditions of the resource and include plantings which are sympathetic to the historical context of the resource.</li> <li>Staging and construction activities should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources.</li> </ul>
Archaeology	<ul style="list-style-type: none"> <li>Potential to disturb archaeological resources.</li> </ul>	<ul style="list-style-type: none"> <li>Stage 2 Archaeological Assessment to be undertaken prior to construction within undisturbed areas listed in Stage 1 Report. Stage 3 work will be undertaken as required, per the commendations. Following receipt of Archaeological clearance from MTCS, construction can commence.</li> </ul>

Factor	Anticipated Impact	Proposed Mitigations
		<ul style="list-style-type: none"> <li>• In the event that human remains are found, the police or coroner must be contacted.</li> <li>• Should previously undocumented archaeological resources be discovered, they are subject to Section 48(1) of the <i>Ontario Heritage Act</i> and the person discovering the archaeological resources must cease alteration of the site and engage a licensed consultant archaeologist to carry out the archaeological field work.</li> </ul>



## **12. Commitments to Further Work**

### **12.1 Natural Environment**

#### **12.1.1 *Vegetation***

The following recommendations should be considered during detailed design:

- Areas associated with woodlands should be assigned a loss on an area basis rather than individual tree count;
- Those trees associated within the ROW and along residential and rural properties should be individually picked up where diameter-at-breast height is equal to or greater than 15 cm; and
- Tree and vegetation clearing should be limited as much as possible and follow the City of Barrie tree removal policies and by-law not limited to the Tree Preservation By-law 2014-1150 for those situated on private property with further recommendations in the City of Barrie's Tree Protection Manual (2010).

#### **12.1.2 *Geomorphology***

The following recommendations should be considered during detailed design and construction:

- All proposed channel dimensions should closely resemble existing geomorphic parameters laid out in Table 2 (Appendix C), specifically width, depth and slope;
- Pool/riffle sequences should be laid with pools generally on the outside bend of a meander and riffles through transitions;
- Stone sizing should take into account the existing substrate of each reach while protecting the road embankments and culverts;
- The channel at Crossing 3 and Crossing 8 will likely require realignment due to their proximity to the existing roadway. Conceptual designs can be produced once delineation of the road ROW is complete;
- Channel realignment should properly observe the final meander beltwidths;
- Low flow channels should be created through culverts using river stone to form the banks; and
- Bio-engineering is the preferred bank stabilization technique where infrastructure is not at risk.

### **12.2 Socio-Economic Environment**

#### **12.2.1 *Cultural Heritage***

Based on the impact assessment completed for the Study Area, the following recommendations have been developed:

- A Heritage Impact Assessment is recommended for CHLs 4-6 to further determine the cultural heritage value of the resources and to consider the impacts of the proposed work on the resources;
- A documentation report is recommended for CHLs 22, 24-27 to further document the subject resource and associated heritage attributes prior to project implementation; and
- Should future work require an expansion of the Study Area, a qualified heritage consultant should be contacted to confirm the impacts of the proposed work on potential heritage resources.

### **12.2.2 Archaeology**

Clearance will need to be secured from the Ministry of Tourism, Culture and Sport (MTCS) prior to construction. Due to the archaeological potential within the Study Area, a Stage 2 Archaeological Assessment will be completed prior to detailed design to assess the lands identified in the Stage 1 Archaeological Assessment Report.

As per MTCS's Standards and Guidelines for Consultant Archaeologists, a test pit survey must be conducted a maximum interval of either 5 m or 10 m (depending on the distance from features of archaeological potential) for all lands where ploughing is not viable.

Should the proposed work extend beyond the current Study Area, then further Stage 1 must be conducted to determine the archaeological potential of the surrounding lands.

## **12.3 Engineering Environment**

### **12.3.1 Stormwater Management and Drainage**

Water Quality control treatments including Low Impact development (LID) measures to be reviewed during detailed design.

Coordination with SIS Landowner's Group during Detailed Design to ensure proper treatment of all areas within the study area.

Visual Otthymo (VO) shall be used for purpose of sizing stormwater management facilities for quantity control.

### **12.3.2 Conceptual Sanitary Sewer Design**

The conceptual sanitary sewer design included an extension east to Yonge Street, beyond the original study limits of the project. As the nature of the adjacent development flowing to the sewer had not been fully fleshed, the conceptual design was based on City's WCMP and the associated WCMP PCSWWM model. Thus during detailed design the City should undertake a detailed slope analysis of the sewer and develop flows based on the final densities of the adjacent lands to ensure that sufficient velocity exists until the development lands build out. This should also include analysis based on anticipated growth targets provided by the Provincial Growth Plan.

Also during detailed design and as the adjacent development lands proceed the City should confirm the invert elevations and the proximity of the sewer to any new infrastructure.

Sanitary Sewer Design to be checked against City's updated design criteria in development during Detailed Design.

### **12.3.3 Conceptual Watermain Design**

During detailed design the need for joint restraint on the trunk water main should be evaluated and designed. The conceptual design did identify that the section within casings will require joint restraint.

Discussions to occur with City of Barrie Water Operations staff regarding general placement of the trunk watermain and to finalize requirements.

Cross-connection requirements to be confirmed with landowners group near Royal Jubilee Drive.

### **12.3.4 Utilities**

Further coordination with InnPower regarding relocation of substation during Detailed Design.

### **12.3.5 Geometric Design**

During detailed design and as adjacent development warrants additional design requirements will need to be finalized. These included follow up work on:

- St Paul's Substation and the cul-de-sac on St Paul's Crescent north leg. This could include the realignment of the access to the substation.
- Transit needs regarding intersection, mid-block stops – At the time of ESR preparation the transits needs had not been fully determined as a result the provision of mid-block stops and the need for bus slip lanes at intersections could not be fully ascertained.
- Maplevue Drive Grade Separation – Design of the temporary works required to construct the grade separation should be undertaken by the contractor and should include the design of tiebacks for shoring of the excavation. The City should consider obtaining easements for the installation of tie-backs of up to 20m along the north side of the excavation. The length of tie-backs will vary depending upon the height of the wall being retained and the location along Maplevue Drive. The width of the easement should be confirmed during detailed design.
- Lockhart Road interim design – As previously indicated the uncertainty surrounding the requirements for a grade separation at Lockhart Road and the Metrolinx Barrie Rail Corridor required the preparation of an interim at-grade crossing concept. The City should consider property acquisition in relation to the future grade separation and as additional details on timing of associated rail works become available review the provision of the grade separation.
- Big Bay Point Road interim design – The lane capacity anticipated by 2031 is such that the City may wish to consider the implementation of a 3 lane cross-section for the section between the former City of Barrie boundary and Collector 11. This should be confirmed during detailed design when decisions on adjacent land development and growth will be more fully determined. As part of this exercise the City may also be required to evaluate

the interconnection between adjacent road sections to ensure any changes provide for a smooth transition by the driving public.

- Semi-urban cross-sections – Several of the road segments have been identified with semi-urban cross-sections, notably curb and gutter on one side and ditching on the opposite. This was as a result of the ditched section being outside of the jurisdiction of the City of Barrie during the writing of the ESR. The City may wish to revisit and renegotiate this with the adjacent municipality during detailed design.
- Development roads – Several intersecting roadways have been shown at locations currently identified by the adjacent conformity plans. During detailed design these locations should be confirmed. The City should ensure that all adjacent development roads are designed to the applicable TAC and City of Barrie standards. In addition, there is a high likelihood of new intersecting roads being proposed by the adjacent developments which were not identified during the preparation of this ESR and as such could not be evaluated for inclusion of right or left turn lane requirements. Should new intersections be proposed by the adjacent developers the City should require that a traffic analysis be undertaken to identify the need for auxiliary turning lanes and any additional land this may require.
- Maplevue Drive East – Lovers Creek crossing – wing and headwalls to be designed to ensure no additional property is required.
- Culvert extension (3+840) will require some channel realignment, however will be minimized to greatest extent possible and will be undertaken as per environmental conditions imposed by LSRCA.
- Bike lanes may be implemented as an alternative to a multi-use path for roadways within the Study Area.
- Provision of left-turn lanes at collector road intersections to be reviewed during Detailed Design.
- Changes to number and location of intersections should be undertaken through development process.

## 12.4 Permits and Approvals

Based on a preliminary assessment, it is expected that the following permits and approvals will be warranted for this project but not limited to:

- Lake Simcoe Region Conservation Authority Permit under Ontario Regulation 179/06;
- Ministry of the Environment and Climate Change Permit-to-Take-Water/Registration;
- Tree Preservation By-law;
- DFO self-assessment; and
- Wildlife Scientific Collectors Permit.



Please note this list is not exhaustive, and additional permits and approvals may be required depending on the preferred design. Depending on permit and approval requirements additional work may be required during detailed design to ascertain specific permit/approval requirements.

## 12.5 Cost Sharing Opportunities

Given the significant capital investment associated with the preferred design it is recommended that the City of Barrie investigate opportunities for cost sharing with stakeholders throughout the study limits. Based on the nature of the project and the type of stakeholders the following opportunities should be investigated:

- Metrolinx - Cost sharing may be available for the capital cost associated with the construction of the Mapleview Drive Grade separation. Transport Canada guidelines for the apportionment of costs vary depending upon the primary reason for the construction of the grade separation. For Mapleview Drive it can be argued that the need for the grade separation can be equally attributed to both road and railway development having contributed largely to the need for the project, in which case the costs would be allocated as 50% road authority, in this case the City of Barrie, and 50% railway company, Metrolinx. In a worst case scenario, the costs would be attributed as 85% road authority and 15% rail authority. Cost sharing also exist for the cost of improvements which are required at the level crossing at Lockhart Road.
- Government of Canada - Transport Canada – Transport Canada runs a Rail Safety Improvement Program which allocates funds for safety improvements to existing rail lines, closures of grade crossings and initiatives to raise awareness about rail safety issues across Canada. It is recommended that the City investigate opportunities to obtain funding through this program for both the Mapleview Grade Separation and the improvements to the level crossing at Lockhart Road.
- Government of Canada – Infrastructure Canada – Currently the Government of Canada, through Infrastructure Canada, are providing funding for transportation projects which “ensure that people and products can move quickly and safely—whether from home to work, or from harvest to warehouse.” Opportunities may be available to obtain funding for both the grade separations as well as the construction of the road network.
- Province of Ontario – In addition to funding available through Metrolinx, opportunities continue to exist for cost sharing on a one-third/one-third/one-third basis between the federal, provincial and municipal governments.
- Town of Innisfil – Several of the roadways within the Study Area, specifically Big Bay Point and Lockhart Roads, have sections which are shared between the City of Barrie and the Town of Innisfil. While the Town were not a party to the EA, opportunities may exist to explore cost sharing as a boundary road between the two municipalities.
- Simcoe County – Opportunity exists for cost sharing with the County of Simcoe for improvements to the intersections of Mapleview and Lockhart with Huronia Road.

Please note this list is not exhaustive, both the federal and provincial governments often provide infrastructure funding through a number of programs which may come in to place in the future.

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# Appendices