Appendix A
Study Design
City of Barrie
Bell Farm Road Improvements
Study Design

November 30, 2016

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1.0 Study Introduction

1.1 Preface

The City of Barrie has initiated this Municipal Class Environmental Assessment (EA) to review Phases 1 and 2 and then to undertake the completion of Phases 3 and 4 of the Municipal Class EA Process for the widening of Bell Farm Road, with provisions for pedestrians and cyclists, from St. Vincent Street to a 4-lane cross section east of Alliance Boulevard, and maintaining the 4-lane cross section with improvements for pedestrians and cyclists from east of Alliance Boulevard to Duckworth Street.

The project will obtain environmental clearance and seek stakeholder consensus for the roadway improvements that will include definition of the municipal servicing to properties, roadway entrance locations, property requirements, stormwater management and potential sidewalk and bike lanes/paved shoulders or a multi-use pathway to support multiple modes of travel (pedestrian, bicycling, vehicular traffic and truck traffic).

The roadway plan will establish the servicing for the land use plan to accommodate the residential, industrial and commercial uses for the next 30-50 years. It will need to have flexibility to accommodate future modifications to the lot fabric and land uses.

This report is the initial public document for the Bell Farm Road EA Study. It presents a blueprint of the Work Plan and Study Process for the planning and design of this future transportation project.

1.2 Study Area

The project location is within the City of Barrie. The Study will define the entire right-of-way protection plan to accommodate:

- Proposed horizontal alignment;
- Vertical alignment;
- Widenings required for stormwater management facilities (which may be shared facilities with adjacent developments should consultation determine an interest from landowners);
- Intersection treatments;
- Cross section elements (sidewalks, multi-use path, boulevards, bicycle lanes or shared lanes);
- Utilities and municipal services;
- Lighting;
- Driveway entrance locations; and
- Any required widening to accommodate grading.

The Study Area, illustrated in Figure 1, consists of Bell Farm Road from St. Vincent Street to Duckworth Street, including both intersections.

1.3 Need and Justification

The Multi-Modal Active Transportation Master Plan (MMATMP) addressed Phases 1 and 2 of the five-phase Municipal Class EA Process for City-wide transportation improvements.

Bell Farm Road is an existing 2-lane major collector with a rural cross section servicing commercial/industrial...
2.0 Municipal Class Environmental Assessment

This Study will be completed as a standalone EA study meeting the requirements of the Municipal Class EA. The final document will be an Environmental Study Report (ESR).

This project will complete all requirements of a Schedule C project under the Municipal Class EA by establishing the need and justification for the project, considering all reasonable alternatives with acceptable effects on the natural, social and cultural environments, and proactively involving the public in defining a recommended plan for improvements. Should the project trigger federal approvals, the documentation will present recommended mitigation measures to satisfy federal requirements in principle.

2.1 Guiding Principles

The study approach includes the following Ministry of the Environment and Climate Change’s (MOECC) five guiding principles for EA studies, namely:

- Consider all reasonable alternatives;
- Provide a comprehensive assessment of the environment;
- Utilize a systematic and traceable evaluation of net effects;
- Undertake a comprehensive public consultation program; and,
- Provide clear and concise documentation of the decision-making process and public consultation program.

2.2 Environmental Assessment Act Requirements

The Environmental Assessment will follow a Class EA process meeting the requirements of the Municipal Class EA (amended 2011 and 2015).

Based on the range of anticipated effects and capital cost of the project, the study is being initiated as a Municipal Schedule C project. This Schedule C project will include two Public Information Centres (PICs) and will conclude with the preparation of an ESR. Following this approach the public will be provided a 30-day review period at the Study conclusion. As the initial step in the Class EA process, this Study Design Report is being made available to the public as the discretionary Step 1.2 in the Municipal Class EA process illustrated in Figure 2. The public and agencies will have this initial opportunity to comment on the proposed approach.

2.3 EA Phases

The Municipal Class EA Process is illustrated in Figure 2.

The following is the specific breakdown of tasks by phase for a Municipal Schedule C project:

**Phase 1: Identify the Problem**

Completed by the MMATMP

- Identification and description of the problem or opportunity.

**Phase 2: Discretionary public consultation (Draft Study**
Design available on the City’s website).

**Phase 2: Alternative Solutions**
*Completed by the MMATMP*

- **Step 1:** Identification of alternative solutions to the problem.
- **Step 2:** Identify the study area and a general inventory of the natural, social and cultural environments.
- **Step 3:** Identification of the net positive and negative effects of each alternative solution.
- **Step 4:** Review and validation of Alternative Solutions considered by TMP and preliminary recommendation of a preferred solution.
- **Step 5:** Identification of reasonable design alternatives for the preferred solution.
- **Step 6:** Public consultation at PIC No.1.
- **Step 7:** Confirmation; finalization of Study Design for work program; and refinements and/or addition of design alternatives to be carried forward for Phase 3.
- **Step 8:** Selection of the preferred solution, following public and agency review.

**Phase 3: Alternative Design Concepts for the Preferred Solution**

- **Step 1:** Identification of alternative designs.
- **Step 2:** Preparation of a detailed inventory of the social and economic environments.
- **Step 3:** Identification of the potential impacts of the alternative designs.
- **Step 4:** Evaluation of the alternative designs.
- **Step 5:** Public consultation at PIC No.2.

**Phase 4: Environmental Study Report (ESR)**

- **Step 1:** Completion of the ESR.
- **Step 2:** File the ESR and Notice of Completion.
- **Step 3:** 30-day public review period

**Phase 5: Implementation**

- **Step 1:** Complete Contract
- **Step 2:** Identify problem or opportunity
- **Step 3:** Complete Design
- **Step 4:** Identify environmental study/report
- **Step 5:** Determine application
- **Step 6:** Select preferred solution
- **Step 7:** Pre-Construction

Future phase after this Study. The simplified generalized EA process is illustrated in Figure 3.

Figure 2: Municipal Class EA Process
3.0 Study Process

3.1 Public Consultation Process

The consultation process will use several techniques to proactively involve the public including Public Information Centres (PIC’s), and meetings with external agencies. Meetings will be organized with a Technical Advisory Committee (TAC), and will include as a minimum, Lake Simcoe Region Conservation Authority (LSRCA), and Emergency Services. These meetings will be in addition to the progress meetings with the Project Team.

The use of separate meetings with project team and interest groups will ensure a high level of communication with the community on issues and alternatives.

Two rounds of Public Information Centre meetings will be held to present the project, the assessment of opportunities, the preliminary transportation improvement alternatives and the prioritization of improvements. The PIC’s will be an integral component of the studies - seeking input and comments from the local road users/stakeholders.

With respect to public involvement, the work program proposes the following key elements:

- Study commencement notice and PIC notices in local papers.
- Maintaining and updating study mailing lists.
- Facilitating a Value Planning workshop with agency, City and stakeholders early in the Study to solicit opinions and receiving early input to prepare the Draft Study Design.
- Submission and review of a Draft and Final Study Design Report (Scoping Document) that will be available on the City’s web site for public review.
- PIC No. 2 (1st PIC for this project stage) will present the project goals, problem and opportunity statement, Draft Study Design (Work Plan), environmental inventories, traffic analysis, assessment of Planning Solutions and seek public/agency input. A session will be scheduled to present information to agencies and elected officials in advance of the public.
- PIC No. 3 (2nd PIC for this project stage) will present the assessment of design alternatives and the Technically Preferred Alternative (TPA) for the Study Area. Council members will be invited to an advance session of the PIC and the consultant will be available to present to Council in advance of the public meeting.
- Public presentation to Council to seek endorsement of the study recommendations (these endorsements will be included as an Appendix in a final ESR).

PIC No. 1 occurred as part of the MMATMP. This project will have two PICs, PIC No. 2 and PIC No. 3.
It is essential that there be contact and interaction with the following major agencies and groups including: First Nations, Public, DFO (Federal Fisheries Act), LSCRA, Ministry of Natural Resources and Forestry (MNRF), Ministry of the Environment and Climate Change (MOECC), Ministry of Tourism, Culture and Sport (MTCS), and Utility Companies.

### 3.2 Work Program

The major elements of the technical work program to be completed include the following:

**Task 1: Project Start-Up**

Upon initiation of the projects, a meeting will be held to: review study scope, budget and schedule; establish membership, meeting dates and role of the Project Team, Staff Technical Committee, and Stakeholder’s Group; review the Notice of Study Commencement; and prepare all required agreements. The Project Team and Staff Technical Committee will provide guidance into the technical elements of the study including the study issues, data collection, and weighting of factors and the evaluation of alternatives.

**Task 2: Information Gathering**

The collection and organization of the data necessary for the analysis, evaluation and design activities will include:

- Assembly and review of study materials;
- Collect reports and modelling data/output from the City’s MMATMP;
- Review the Official Plan, relevant Official Plan Amendments and Secondary Plans;
- Gather existing natural/social environmental inventories and stormwater reports; and
- Review of existing and projected traffic volumes as identified in any area traffic studies and the Multi-Modal Active Transportation Master Plan.

**Task 3: Study Design and Value Planning Workshop**

This Study Design document will help establish the foundation for all of the remaining environmental planning and public consultation processes. The Study Design allows the early identification of the major issues and concerns, and in addition, recognizes areas of consensus or agreement and defines the Problem Statement. The preliminary identification and assessment of Planning Solutions/Alternatives to the Undertaking in the Study Area will be presented in this report for public/agency review and comment.

An early Value Planning workshop will be organized for the TAC to attend. This early workshop will allow open discussion with stakeholders as an event before the study presents any conclusions.

**Task 4: Transportation Analysis**

The transportation analysis will build upon the previous work that has been completed. The operational implications of existing and projected traffic demands and the improvement alternatives will be examined. In this regard, the transportation analysis will involve the following key tasks:

- An initial review of the previous traffic modelling activities;
- Documentation of existing profile of road users including all modes of travel (vehicular, bicycles, pedestrians and emergency services);
- Analysis of forecast traffic demands and future projections, and identification of level of service for roadway links and intersections (building and documenting on previous forecasts) for land use development;
- Examination of area collision histories to identify areas of concern and possible improvement opportunities;
- Identification of existing /future operational problems and timelines for need for additional capacity of the transportation network;
- Providing input into the performance of each alternative (traffic operation and safety); and
- Confirmation of the need and justification for roadway improvements and timing.

The Traffic Analysis will provide documentation of the Synchro modelling within the study area and measure the operational performance of intersections and roadway links. The traffic report will also provide recommendations on the timing of the improvements. This analysis will be used to identify the preliminary design level of geometric needs of the various alternatives (i.e. storage lengths, auxiliary lanes, signal/traffic controls, etc.) and in addition, will be used to evaluate the impacts/benefits of the various competing alternatives.

**Active Transportation:** The roadway design should reflect physical geometric design elements that match the community design objectives. Safety of bicycle lanes, buffered bicycle lane, raised cycle tracks or multi-use pathways and pedestrian crossings will be key elements. The key task will be the development and approval of design criteria.

**Task 5: Inventory of Natural, Social and Cultural Environment**

**Social Environment:**

Areas of investigation include existing and proposed land uses, land use
policies and regulations, aesthetics, recreation facilities, and links with pedestrian and cycling facilities. This will document the community plan of the existing and future land uses and form the baseline from which alternatives will be measured.

**Noise Analysis**

The acoustical assessment for this project will determine existing daytime sound level contours and future sound levels associated with the improvements for areas with existing residential (noise sensitive) land uses. STAMSON noise software will be used for the noise assessment. Noise mitigation will be assessed in accordance with applicable standards and bylaws and the MTO Environmental Reference Manual. Any proposed noise mitigation will be consistent with the existing land uses and will define the future sound levels that might need to be mitigated by land developers for future residential and noise sensitive land uses in the study area. The need for mitigation will be based on the preliminary forecasted sound change created by the proposed improvements.

**Natural Habitat Assessment**

This non-fisheries natural environment assessment will investigate and categorize the natural and near-natural habitats of the study area, identify native biodiversity and identify their supporting ecological functions. These investigations, aided through advance consultation with the Conservation Authority and/or Ontario Ministry of Natural Resources and Forestry, will particularly address the potential for agency-designated significant features and functions as well as any provincially or regionally rare or ecologically significant features to be present. Particular attention will be paid to the potential occurrence of designated Species at Risk (SAR).

**Cultural Heritage**

A desktop assessment of available historical sources, mapping and City of Barrie information to identify potential for significant cultural heritage resources within or adjacent to the study area will be completed. The local heritage staff will be contacted to determine if any listed or designated properties are located within or adjacent to the study area. A technical memorandum outlining the preliminary screening will be completed, recommending whether additional study may be necessary to confirm the presence of cultural heritage resources; assess the potential impact of any of the selected alternatives; and identify mitigation measures that may be required to reduce adverse impacts to any identified cultural heritage resources.

**Archaeology**

The Stage 1 archaeological assessment to be undertaken for this project will be conducted in accordance with the Ministry of Tourism, Culture and Sport (MTCS) Standards and Guidelines for Consultant Archaeologists (2010).

The objectives of a Stage 1 archaeological background study are: to develop an inventory of archaeological resources in the proposed area; to determine the presence of any archaeological sites in the area; and, to recommend appropriate strategies for future planning consideration. This will be accomplished by conducting detailed documentary research of the land use, archaeological history, and present condition of the property. This information will be gathered by reviewing the National Archaeological Site Registration Database. The data gathered will advise of the location, type, and significance of registered archaeological sites for a typical radius of one kilometre around the subject property. Reviewing the registered archaeological site database will identify significant heritage resources on or adjacent to the study area, and will summarize the form and extent of previous cultural heritage investigations undertaken within the general project vicinity.

**Landscape Architecture**

The aesthetics of the corridor will be evaluated and recommendations for complementing/enhancing the aesthetics of the roadway will be incorporated into the preliminary streetscape design. Urban/rural corridor ‘greening’ techniques will be recommended in appropriate areas in consideration of City standards. These techniques could include plantings for canopy cover, buffer plantings, riparian zone restoration and general aesthetic upgrades to the roadway. The use of salt tolerant, drought tolerant and native species wherever appropriate will be recommended.

**Tree Inventory Plan and Arborist Report**

The inventory component of this project is anticipated to take approximately one day to complete, with the delivery of a preservation plan and an arborist report. The report component of the program will identify trees that pose a specific risk, as well as any trees that may require removal or specific preservation criteria dependent upon the type and limits of construction, construction staging areas, and access points to successfully complete the work.

**Illumination**

The existing roadway illumination will be reviewed. Available documentation will be studied and the design criteria for the roadway design, the requirements for illumination will be determined and identified. Lighting calculations with photometric printouts for various alternatives will be carried out.
Topographic & Legal Survey

A detailed topographic & legal survey will be completed within the project limits and extended as necessary where topography might deal with grading/elevation differences. The survey will establish the location of property lines in the project limits.

Drainage and Hydrology

The drainage and storm water management design criteria will be confirmed with the City. Hydrologic calculations will be performed to determine the flows for the 2 to 100 year return period rainfall events, including the regulatory event, and to establish the capacities of the existing required system. As the various alternatives are developed, the corresponding drainage and storm water design will be developed and detailed in a storm water management plan, sufficient to permit identification of constraints and prepare preliminary cost estimates. The following is a breakdown of the drainage and hydrology work plan:

1. Background information review, field investigations, and documentation of existing conditions;

2. Determining the design criteria for drainage and storm water management (SWM), and conceptual storm water management; and

3. Completion of hydrology studies, review SWM and low impact development alternatives, preliminary design, and final design.

Watermain and Sanitary Sewer

Watermain improvements and upgrades in the study area will also be identified. Capacity analysis of the existing sanitary sewer will be performed. This will include location and analysis of existing infrastructure, and detailed design of the recommended improvements, new alignments, services, tie-ins etc., as required.

Task 7: Development, Analysis and Evaluation of Alternatives

As previously noted, the consideration of all reasonable alternatives is a guiding principle for EA studies. The context sensitive design roadway alignment, cross section, intersection alternatives will be generated through discussions with the City, Project Team, Stakeholders Group, agencies and the general public. The list of design alternatives will be confirmed with the public, as required as part of the EA process, including the "Do Nothing" option. These alternatives will consider the community and planning visions of the study area.

This study will include a systematic, traceable analysis and evaluation of the needs in the study area, the process used to identify alternatives and the methodology used to analyze and evaluate alternative planning solutions. Additionally, this assignment will include a comprehensive public consultation programme which will assist in the development of a recommended plan.

The identification of evaluation criteria will include potential factors such as roadway level of service, traffic safety, property impacts, noise, natural environment and cost. The evaluation process Multi Attribute Trade-off System (MATS) will assign a "weight" to each criteria and an iterative process will be used for the evaluation of individual competing alternatives. The iterative process will involve one, or possible two levels of evaluation and sensitivity testing.

The evaluation process is transparent and can be readily defended where significant trade-offs are involved. The Project Team and Staff Technical Committee will participate in weighting exercises to provide direct input into the decision-making process. The evaluation and analysis of design alternatives will identify all improvement options and associated cost estimates including lifecycle costs, development charges, alternative construction/ material options, proposed timeline and innovative solutions.

Based on the results of the MATS evaluation results, a technically preferred alternative (TPA) will be identified. A technical memorandum outlining the results of the MATS process/Analysis and Evaluation will be completed and will include: the assessment of alternatives to the undertaking; generation and assessment of preliminary design alternatives; evaluation criteria (i.e. environmental inventories and technical investigations); selection of the technically preferred alternative; and alternative refinements to the technically preferred alternative (if applicable).

Task 8: PIC No. 2* (1st project PIC)

Public Information Centre (PIC) No. 2 will present the Problem Statement, Draft Study Design, and the preliminary analysis of Planning Alternatives. It will present preliminary recommendations for a basket of solutions.

PIC No. 2 will summarize the traffic and needs analysis, the environmental inventories, an initial list of preliminary design alternatives and potential coarse screening of those planning alternatives. The public will be given the opportunity to provide input on the priorities of evaluation criteria "Factor Groups".

Task 9: PIC No. 3* (2nd project PIC)

PIC No. 3 will present the detailed MATS evaluation of alternatives and recommendations for a Preferred Plan. This will quantify measurable differences between the options (performance and environmental effects). This evaluation will present a sensitivity analysis of the distribution of weights by evaluators for
the evaluation criteria, which will demonstrate the trade-offs involved in the Study.

Each PIC will include coloured graphics and text boards to describe the process and opportunities for the public to provide comment.

* PIC No. 1 occurred as part of the MMATMP. This project will have two PICs, PIC No. 2 and PIC No. 3.

**Task 10: Preparation of Environmental Study Report**

The preparation of the draft and final report will follow the format and content for an ESR accepted by MOECC. The ESR will document the study methodology, findings, public involvement and recommendations. A draft version will be submitted to the City and external review agencies and made available for PIC No. 2. After PIC No. 2, the document will be updated and finalized. A presentation will be made to City Council.

The project schedule includes a provisional presentation of the ESR at the General Information Committee meeting.

**Task 11: Public Notification of the PIC/ESR**

Individual letters (or emails) will be sent to persons/organizations on the contact lists maintained throughout the course of the study advising of the PIC dates and availability of the ESR. The ESR is anticipated to be available for PIC No. 3. The ESR will be made available for review on the project website, City Hall (Clerks Office and 6th Floor Engineering), the Downtown and Painswick Libraries.

### 4.0 Study Schedule

A draft schedule for this Study is shown in **Table 1**: Draft Study Schedule.

<table>
<thead>
<tr>
<th>TASKS</th>
<th>DATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Start-up Meeting</td>
<td>August 2016</td>
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<tr>
<td>Study Design</td>
<td>September 2016</td>
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<tr>
<td>Alternative Design Solutions</td>
<td>September 2016</td>
</tr>
<tr>
<td>Assessment of Planning Alternatives</td>
<td>September 2016</td>
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<tr>
<td>Value Planning Workshop</td>
<td>September 7, 2016</td>
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<tr>
<td>PIC No. 2</td>
<td>Fall 2016</td>
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<tr>
<td>Transportation Analysis</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Municipal Infrastructure Memorandum</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Archaeological Assessment</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Built Heritage and Cultural Heritage Assessment</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Natural Heritage Impact Assessment</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Arborist Report/Tree Survey</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Topographic Survey</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Legal Survey</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Traffic Operations Report</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Noise Study</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Draft ESR</td>
<td>November 2016</td>
</tr>
<tr>
<td>Development of Preliminary Design Alternatives</td>
<td>Winter 2017</td>
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<tr>
<td>Assessment of Preliminary Design Alternatives</td>
<td>Winter 2017</td>
</tr>
<tr>
<td>PIC No. 3</td>
<td>Winter 2017</td>
</tr>
<tr>
<td>Complete Draft Final ESR / Initiate 30% Detailed Design</td>
<td>Winter 2017</td>
</tr>
<tr>
<td>Final ESR/Notice of Completion</td>
<td>Spring 2017</td>
</tr>
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</table>
5.0 Assessment of Planning Solutions

This section is a summary of the recommendations from the MMATMP. For a full assessment, please refer to the original report.

Alternative Planning Solutions represent alternative ways or methods of addressing the problem to be solved by the project. These reflect different strategies and include the "Do Nothing" approach (maintaining the status quo). Following the assessment of Alternative Planning Solutions, those alternatives judged to address the problem statement will be carried forward and will form the Recommended Planning Solution. The recommended planning solution will address the problem statement required to plan for the safety of the travelling public, while providing the best overall balance between transportation engineering objectives, life cycle costs, and other environmental, cultural, socio-economic, and land use planning objectives.

The City’s MMATMP has previously identified the need for the roadway improvements.

5.1 Alternative Planning Solutions for Bell Farm Road

In determining the preferred planning alternative for the City, Alternative Planning Solutions were analyzed in the MMATMP. These included:

1) Do Nothing;
2) Transportation Demand Management;
3) Limited Land Use planning; and,
4) Provide Transportation / Municipal Infrastructure.

The “Do Nothing” Alternative – as mandated by the Class EA, must be considered. It represents a baseline from which other approaches can be compared.

Transportation Demand Management (TDM) – This strategy would reduce vehicular demand and would encourage more active modes of transportation (cycling and walking).

Limited Land Use Planning – this strategy would be an approach that would limit any new residential development and therefore eliminate the need for roadway improvements.

Provide Transportation / Municipal Infrastructure – This strategy would be to provide roadway and intersection improvements to accommodate future demand and vehicular turning movements.

Coarse Screening of Planning Solutions

Based on traffic demands, the "Do Nothing" alternative and Limited Land Use Planning are not recommended to be carried forward.

TDM is not carried forward as a standalone solution, but rather will be incorporated with the Provide Transportation/Municipal Infrastructure alternative as a Recommended Solution. This recommendation is consistent with the findings of the MMATMP and will be presented to the public at PIC No. 2. Should no objection to this recommendation be received by the public at PIC No. 2, then it will be accepted and the study will continue forward to assess preliminary design alternatives.
6.0 Preferred Design Criteria

The design criteria for Bell Farm Road are illustrated in Table 2.

<table>
<thead>
<tr>
<th>Table 2: Design Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Class</td>
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<tr>
<td>Posted Speed</td>
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<tr>
<td>Design Speed</td>
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<tr>
<td>Minimum Horizontal Curve Radius</td>
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<tr>
<td>Maximum Superelevation</td>
</tr>
<tr>
<td>Minimum Vertical Crest Curve: Crest:</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Stopping Sight Distance</td>
</tr>
<tr>
<td>Lane Width</td>
</tr>
<tr>
<td>Bike Lane</td>
</tr>
<tr>
<td>Shared Bicycle Lane</td>
</tr>
<tr>
<td>Sidewalks</td>
</tr>
<tr>
<td>Right-of-way</td>
</tr>
<tr>
<td>Side Street Day-Lighting Distance:</td>
</tr>
<tr>
<td>Triangles:</td>
</tr>
<tr>
<td>Watermain Cover to Obvert</td>
</tr>
<tr>
<td>Storm Cover to Obvert</td>
</tr>
<tr>
<td>Sanitary Cover to Obvert</td>
</tr>
<tr>
<td>Truck Route</td>
</tr>
<tr>
<td>Boulevard</td>
</tr>
<tr>
<td>Continuous Two Way Left Turn Lane</td>
</tr>
</tbody>
</table>
Figure 4: Road Cross Section Alternatives Defining Number of General Purpose Lanes (Consistent with Recommendations from MMATMP)

Legend
- Preliminary Recommendation Not to Carry Forward
✓ Preliminary Recommendation to Carry Forward

Figure 5: Bell Farm Road West Section Cross Section Alternatives
Road Alignment Alternatives

Road alignment alternatives include the following:
- Widen to the north;
- Widen on the centre; and,
- Widen to the south.

Based on the level of adjacent development, a preliminary recommendation is to carry forward equal widening on each side (widen on the centre). This preliminary recommendation will be presented at PIC No. 2 (first PIC for this project) for public comment.

Stormwater Management Best Management Practices

- Major / Minor System Design
- Oversized Pipes
- On-Site and Off-site Control Devices and Facilities
- Mechanical Treatment Devices

Low Impact Development Practices

- Soakaways, Infiltration Trenches and Chambers
- Bioretention
- Vegetated Filter Strips
- Permeable Pavement
- Enhanced Grass Swales
- Perforated Pipe Systems

Mitigation of Visual Intrusion Alternatives

The mitigation of visual intrusion alternatives will include but are not limited to the following:
- Protect existing coniferous trees (adjacent to residential land uses);
- New noise barrier/visual screen;
- Planting of new trees on private property for visual screening; and,
- Planting of new trees in ROW for visual screening.

Sidewalk Alternatives

The sidewalk alternatives will include but are not limited to the following:
- Existing (<1.2 m);
- 1.5 m sidewalk;
- 1.8 m sidewalk; and,
- 2.0 m sidewalk.

The existing sidewalk width is not recommended to be carried forward as it is below current sidewalk accessibility standards, see Figure 7.
8.0 Preliminary Design Considerations

The existing conditions in the study area present a variety of issues and constraints for the improvements to Bell Farm Road. Issues in the study area include:

Transportation and Structures:
- The alternatives must accommodate requirements for access to emergency services and existing commercial/industrial businesses during and post construction.
- Traffic capacity (accommodating turning movements).

Utilities and Municipal Services:
- Condition and capacity of the existing sanitary sewers in the study area
- Evaluation of future capacity requirements for water, storm and sanitary sewers

Focus (pedestrian friendly streetscapes and connectivity for cyclists are recognized as key components)
- Traffic impacts of design alternatives
- The investigation and evaluation of minor and major gateways in the project area and the feasibility.
• Location of existing utility conflicts within the study area.

Social Environment:
• Disturbances to residents and businesses during construction including noise, air quality, safety and traffic control.
• Protection and mitigation of negative effects on existing commercial buildings during construction.
• Considerations for vulnerable road users (pedestrians, cyclists etc.).
• Potential property impacts to residential and commercial properties and potential encroachment on privately owned land.
• Potential for archeological and heritage sites.
• Landscaping/Streetscaping which will include an assessment of existing features and planning of new landscaping and potential street furniture to increase aesthetics and historical significance.

Need for relocation or design revision of existing aerial power lines.

Natural Environment:
• Investigation and protection of surrounding plant and wildlife in project area.
• Stormwater best management practices for widened roadways in consultation with the City.
• Investigation of existing commercial properties and the impact and control of any hazardous or deleterious materials used in their operations (including the effect of new construction).

Engineering:
• Future right-of-way protection to accommodate utilities and services, stormwater management, sidewalks, curbs and cycling facilities.
• Geometric Design Standards and potential horizontal and vertical alignment adjustments.
• Evaluation and alternatives of using innovative design throughout the project area, including but not limited to LID techniques and innovative materials.

Economics:
• Capital costs including property acquisition.
• Life cycle costs including operations and maintenance costs.
### 9.0 List of References

Reference 1: Multi-Modal Active Transportation Master Plan (City of Barrie), 2013

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### Appendix A: Glossary of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AADT</td>
<td>Annual Average Daily Traffic – the average 24-hour, two-way traffic per day for the period from January 1st to December 31st.</td>
</tr>
<tr>
<td>Alignment</td>
<td>The vertical and horizontal position of a road.</td>
</tr>
<tr>
<td>Alternative</td>
<td>Well-defined and distinct course of action that fulfills a given set of requirements. The EA Act distinguishes between alternatives to the undertaking and alternative methods of carrying out the undertaking.</td>
</tr>
<tr>
<td>Alternative Planning Solutions</td>
<td>Alternative ways of solving problems or meeting demand (Alternatives to the Undertaking).</td>
</tr>
<tr>
<td>Alternative Design Concepts</td>
<td>Alternative ways of solving a documented transportation deficiency or taking advantage of an opportunity. (Alternative methods of carrying out the undertaking).</td>
</tr>
<tr>
<td>Alternative Project</td>
<td>Alternative Planning Solution, see above.</td>
</tr>
<tr>
<td>ANSI</td>
<td>Area of Natural or Scientific Interest</td>
</tr>
<tr>
<td>Berm</td>
<td>Earth landform used to screen areas.</td>
</tr>
<tr>
<td>BMP</td>
<td>Best management practice.</td>
</tr>
<tr>
<td>Bump-Up</td>
<td>The act of requesting that an environmental assessment initiated as a class EA be required to follow the individual EA process. The change is a result of a decision by the proponent or by the Minister of Environment to require that an individual environmental assessment be conducted.</td>
</tr>
<tr>
<td>Bypass</td>
<td>A form of realignment in which the route is intended to go around a particular feature or collection of features.</td>
</tr>
<tr>
<td>Canadian Environmental Assessment Act (CEAA)</td>
<td>The CEAA applies to projects for which the federal government holds decision-making authority. It is legislation that identifies the responsibilities and procedures for the environmental assessment.</td>
</tr>
<tr>
<td>Class Environmental Assessment Document</td>
<td>An individual environmental report documenting a planning process which is formally submitted under the EA Act. Once the Class EA document is approved, projects covered by the class can be implemented without having to seek further approvals under the EA Act provided the Class EA process is followed.</td>
</tr>
</tbody>
</table>
Class Environmental Assessment Process: A planning process established for a group of projects in order to ensure compliance with the Environmental Assessment (EA) Act. The EA Act, in Section 13 makes provision for the establishment of Class Environmental Assessments.

Compensation: The replacement of natural habitat lost through implementation of a project, where implementation techniques and other measures could not alleviate the effects.

Consortium: A group of businesses or organizations allied to take on a project.

Corridor: A band of variable width between two locations. In transportation studies a corridor is a defined area where a new or improved transportation facility might be located.

criterion: Explicit feature or consideration used for comparison of alternatives.

Cumulative Effects Assessment: Cumulative Effects Assessment assesses the interaction and combination of the residual environmental effects of the project during its construction and operational phases on measures to prevent or lessen the predicted impacts with the same environmental effects from other past, present, and reasonably foreseeable future projects and activities.

Decibel (dB): A logarithmic unit of measure used for expressing level of sound.

dBA: 'A' weighted sound level; the human ear cannot hear the very high and the very low sound frequencies as well as the mid-frequencies of sound, and hence the predicted sound levels, measured in dBA, are a reasonable accurate approximation of sound levels heard by the human ear.

Detail Design: The final stage in the design process in which the engineering and environmental components of preliminary design are refined and details concerning, for example, property, drainage, utility relocations and quantity estimate requirements are prepared, and contract documents and drawings are produced.

DFO: Department of Fisheries and Oceans.

EA: Environmental Assessment


Environment: Air, land or water, Plant and animal life, including human life, The social, economic and cultural conditions that influence the life of humans or a community, Any building structure, machine or other device or thing made by humans, Any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or Any part or combination of the foregoing and the interrelationships between any two or more of them, in or of Ontario.

Environmental Effect: A change in the existing conditions of the environment which may have either beneficial (positive) or detrimental (negative) effects.

Environmentally Sensitive Areas (ESA’s): Those areas identified by any agency or level of government which contain natural features, ecological functions or cultural, historical or visual amenities which are susceptible to disturbance from human activities and which warrant protection.

Equivalent Sound Level (Leq): The level of a continuous sound having the same energy as a fluctuating sound in a given time period. In this report Leq refers to 24-hour, 16 or 18-hour averages.

ESR: Environmental Study Report. The final documentation for Schedule C project, defining the project, consultation process, preferred solution and mitigation measures.

Evaluation: The outcome of a process that appraises the advantages and disadvantages of alternatives.

Evaluation Process: The process involving the identification of criteria, rating of predicted impacts, assignment of weights to criteria, and aggregation of weights, rates and criteria to produce an ordering of alternatives.

External Agencies: Include Federal departments and agencies, Provincial ministries and agencies, conservation authorities, municipalities, Crown corporations or other agencies other than MTO.

General Arrangement: Structural plan of the bridge and proposed works including elevations and cross-sectional views of the bridge.

Factor: A category of sub-factors.

HADD: Harmful Alternation, Disturbance or Destruction of fish habitat.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Environmental Assessment</td>
<td>An environmental Assessment requiring the submission of a document for approval by the Minister, pursuant to the EA Act and which is neither exempt from the EA Act nor covered by a Class EA approval.</td>
</tr>
<tr>
<td>LSRCA</td>
<td>Lake Simcoe Region Conservation Authority</td>
</tr>
<tr>
<td>Mitigating Measure</td>
<td>A measure that is incorporated into a project to reduce, eliminate or ameliorate detrimental environmental effects.</td>
</tr>
<tr>
<td>Mitigation</td>
<td>Taking actions that either remove or alleviate to some degree the negative impacts associated with the implementation of alternatives.</td>
</tr>
<tr>
<td>MMATMP</td>
<td>Multi-Modal Active Transportation Master Plan</td>
</tr>
<tr>
<td>MNRF</td>
<td>Ministry of Natural Resources and Forestry.</td>
</tr>
<tr>
<td>MOECC</td>
<td>Ministry of the Environment and Climate Change.</td>
</tr>
<tr>
<td>MTCS</td>
<td>Ministry of Culture, Tourism and Sport.</td>
</tr>
<tr>
<td>MTO</td>
<td>Ministry of Transportation Ontario.</td>
</tr>
<tr>
<td>Noise Attenuation</td>
<td>A mitigation measure used to lessen the intensity of the noise level (dBA) where the noise level is increased in a noise sensitive area greater than 5 dBA 10 years after completion.</td>
</tr>
<tr>
<td>NSA</td>
<td>Noise Sensitive Area is a noise sensitive land use, which has an outdoor living area associated with the residential unit.</td>
</tr>
<tr>
<td>NVCA</td>
<td>Nottawasaga Valley Conservation Authority</td>
</tr>
<tr>
<td>OLA</td>
<td>Outdoor Living Area is the part of an outdoor amenity area provided for the quiet enjoyment of the outdoor environment.</td>
</tr>
<tr>
<td>PIC</td>
<td>Public Information Centre (see POH).</td>
</tr>
<tr>
<td>Planning Alternatives</td>
<td>Planning alternatives are “alternative methods” under the EA Act. Identification of significant transportation engineering opportunities while protecting significant environmental features as much as possible.</td>
</tr>
<tr>
<td>Planning Solutions</td>
<td>That part of the planning and design process where alternatives to the undertaking and alternative routes are identified and assessed. Also described as “Alternative Project” under the federal EA Act.</td>
</tr>
<tr>
<td>POH</td>
<td>Public Open House (see PIC).</td>
</tr>
<tr>
<td>Prime Agricultural Areas</td>
<td>Prime agricultural areas as defined in municipal official plans and other government policy sources.</td>
</tr>
<tr>
<td>Project</td>
<td>A specific undertaking planned and implemented in accordance with the Class EA including all those activities necessary to solve a specific problem.</td>
</tr>
<tr>
<td>Project File</td>
<td>The final product of a Schedule B project. This is a completion of all data/reports produced for the project.</td>
</tr>
<tr>
<td>Proponent</td>
<td>A person or agency that carries or proposes to carry out an undertaking, or is the owner or person having charge, management, or control of an undertaking.</td>
</tr>
<tr>
<td>Public</td>
<td>Includes the general public, interest groups, associates, community groups, and individuals, including property owners.</td>
</tr>
<tr>
<td>Realignment</td>
<td>Replacement or upgrading of an existing roadway on a new or revised alignment.</td>
</tr>
<tr>
<td>Recommended Plan</td>
<td>That part of the planning and design process, during which various alternative solutions are examined and evaluated including consideration of environmental effects and mitigation; the recommended design solution is then developed in sufficient detail to ensure that the horizontal and vertical controls are physically compatible with the proposed site, that the requirements of lands and rights-of-way are satisfactorily identified, and that the basic design criteria or features to be contained in the design, have been fully recognized and documented in sufficient graphic detail to ensure their feasibility.</td>
</tr>
<tr>
<td>Route Alternatives</td>
<td>Location alternatives within a corridor.</td>
</tr>
<tr>
<td>SADT</td>
<td>Summer Average Daily Traffic – the average 24-hour, two-way traffic for the period from July 1st to August 31st including weekends.</td>
</tr>
<tr>
<td>Screening</td>
<td>Process of eliminating alternatives from further consideration, which do not meet minimum conditions or categorical requirements.</td>
</tr>
<tr>
<td>Sub-factor</td>
<td>A single criterion used for the evaluation. Each sub-factor is grouped under one of the factors.</td>
</tr>
<tr>
<td>Technical Advisory Committee</td>
<td>The Technical Advisory Committee will include the City and Consultant. It will act as the decision-making body for the study recommendations.</td>
</tr>
<tr>
<td>TESR</td>
<td>Transportation Environmental Study Report</td>
</tr>
<tr>
<td>TMP</td>
<td>Transportation Master Plan</td>
</tr>
<tr>
<td>Traceability</td>
<td>Characteristics of an evaluation process which enables its development and implementation to be followed with ease.</td>
</tr>
</tbody>
</table>
Undertaking

In keeping with the definition of the Environmental Assessment Act, a project or activity subject to an Environmental Assessment.
Appendix B
Record of Consultation
Table of Contents

1.0 Introduction

2.0 Public and Agency Consultation
   2.1 Individual Property Owner Contacts
   2.2 Newspaper Notice
   2.3 Agency Contacts
   2.4 First Nations

3.0 PIC Comments
   3.1 Summary of Comments

4.0 Conclusions

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   Figure 1: Study Area

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   Table 1: Summary of Written Comments

Appendices
   Appendix A - Newspaper Notice
   Appendix B - PIC Display Boards
   Appendix C - PIC Comment Sheets
1.0 INTRODUCTION

The City of Barrie initiated a Class Environmental Assessment (EA) in July of 2016 for the widening of Bell Farm Road. Bell Farm Road is a 2-lane major collector with a rural cross section servicing commercial/industrial properties. The east end of Bell Farm Road includes a 280 m section that is primarily urbanized with 4 lanes and serves a mix of commercial and multi-unit residential properties. The pavement structure of Bell Farm Road is approaching the end of its service life and requires reconstruction.

The project is subject to the Municipal Class Environmental Assessment (EA) process, under the Province of Ontario’s Environmental Assessment Act. The study will establish the need and justification for the project, complete environmental inventories to establish a baseline to compare alternatives, consider all reasonable alternatives and proactively involve the public in defining a recommended plan for improvements.

Based on the range of anticipated effects and capital cost of the project, the study is being initiated as a Municipal Schedule C project. At the completion of the project an Environmental Study Report (ESR) will be prepared for a 30-day public review.

The study area is shown in Figure 1.

2.0 PUBLIC AND AGENCY CONSULTATION

One of the key aspects of the project is to provide the public, interested parties, affected agencies and municipalities with the opportunity for input. In order to ensure this objective is met, a public and agency notification program was undertaken. The program includes a number of communication mechanisms, discussed in the following sections.

2.1 Individual Property Owner Contacts

A Public Information Centre (PIC) for this project was previously held during the Multi-modal Active Transportation Master Plan (MMATMP). During Phases 3 and 4 of the Municipal Class EA (this project) a second PIC was held on:

Wednesday, November 23, 2016 at:
City Hall Rotunda, 1st Floor
70 Collier Street
Barrie, ON
4:00 - 7:00 pm (Agencies and Public)

The Public Information Centre included presenting the following:

- Municipal Class EA Process
- Need and Justification
- Study Area Issues
- Technical Investigations
- Environmental Inventories
- Preliminary Design Alternatives
- Next Steps

City and consultant representatives were available to respond to any inquiries. All members of the public and interest groups were invited to the PIC to view the presentation materials and to discuss the project with the City and consultant representatives.

Twelve (12) people registered at the PIC. Each person was encouraged to provide a written response to any issues or concerns.

2.2 Newspaper Notice

Notice of the PIC was placed in the Barrie Examiner on November 10, 2016 and November 12, 2016. The newspaper notice is found in Appendix A.

2.3 Agency Contacts

The following agencies and groups were invited to attend the PIC:

- A Channel Barrie
- Albarrie Canada Limited
- Bell Canada
- Canadian Home Builders Association-Simcoe County
- Ducks Unlimited
- Enbridge
- Fisheries and Oceans Canada
- Greater Barrie Chamber of Commerce
- Hydro One Network
- Innisfil Hydro Distribution Systems Ltd.,
- Ministry of Tourism, Culture and Sport
- Ministry of Economic Development, Employment & Infrastructure
- Ministry of the Environment and Climate Change
- Ministry of Energy and Infrastructure
- Ministry of Municipal Affairs and Housing

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Bell Farm Road EA Study
Class Environmental Assessment – City of Barrie
Summary Report - Public Information Centre No. 2
December 2016

- Ministry of Transportation
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Natural Resources and Forestry
- Lake Simcoe Region Conservation Authority
- Nottawasaga Valley Conservation Authority
- Ontario Clean Water Agency
- Ontario Provincial Police
- Ontario Realty Corporation
- PowerStream
- Rogers Cable Inc.
- Service Ontario
- Simcoe County Admin. Centre
- Simcoe County District School Board
- Simcoe County Heavy Construction Association
- Simcoe Muskoka Catholic District School Board
- Simcoe Muskoka District Health Unit
- Springwater Township
- Tourism Barrie
- Town of Innisfil

Notification of the PIC was communicated to all affected residents, local municipalities, external agencies and interested groups.

2.4 First Nations

Individual letters were sent to the First Nations within the vicinity of the Study Area, inviting them to attend the meeting. Letters were sent to the following First Nations:
- Ministry of Transportation
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Natural Resources and Forestry
- Lake Simcoe Region Conservation Authority
- Nottawasaga Valley Conservation Authority
- Ontario Clean Water Agency
- Ontario Provincial Police
- Ontario Realty Corporation
- PowerStream
- Rogers Cable Inc.
- Service Ontario
- Simcoe County Admin. Centre
- Simcoe County District School Board
- Simcoe County Heavy Construction Association
- Simcoe Muskoka Catholic District School Board
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- Algonquins of Ontario Consultation Office
- Barrie Friendship Centre
- Alderville First Nation
- 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
- Mississauga’s of Scugog Island First Nation
- Moose Deer Point First Nations
- Wahta Mohawk First Nation
- William Treaties First Nation

3.0 PIC Comments

Display panels/boards were set up around the perimeter of the room, to be viewed at leisure. A copy of the PIC presentation boards is provided in Appendix B.

Three (3) comment sheets were received at the PIC. Nine (9) comment sheets were received during the subsequent 2-week comment period. Copies of the comments, excluding personal information, are provided in Appendix C. The comments and discussions are summarized in the following sections.

3.1 Summary of Comments

The comments received and discussions held at the Public Information Centre are summarized below in Table 1. The comments have been summarized by general subject matter.

Comments raised by the public include:
- Support for continuing sidewalks on both sides of the street
- Support for a pedestrian crosswalk even with 2 sidewalks
- Consider additional trees where possible
- Consider median landscaping to break up the street and control speeds on the approach to the back-to-back curves
- Consider visibility of bus stop
- Consider a toe wall to allow widening of adjacent parking
- Reduce property acquisition
- Strong support for the improvements and repair to asphalt surface
- Property owner at 125 Bell Farm Road is willing to negotiate land
- Concern for extent and limits of sidewalks

Table 1: Summary of Written Comments

<table>
<thead>
<tr>
<th>Comment</th>
<th>Number of Respondents</th>
<th>Comment Sheet Reference No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A new oval roundabout alternative</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Support for crosswalks at Alliance Boulevard</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Consider a toe wall to allow widening of adjacent parking</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Property owner at 125 Bell Farm Road is willing to negotiate land</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Concern for disruption to local businesses during construction</td>
<td>2</td>
<td>4, 8</td>
</tr>
<tr>
<td>Consideration for existing drainage issues</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Concern for insufficient parking spaces</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Consideration for preservation of existing hedges and trees</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Not aware of any issues with respect to Traditional, Aboriginal and Treaty rights</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Concern for survey accuracy where sidewalk may be shown on private property on east portion</td>
<td>3</td>
<td>9, 10, 11</td>
</tr>
<tr>
<td>Sidewalks unnecessary on south side of west portion</td>
<td>3</td>
<td>9, 10, 11</td>
</tr>
<tr>
<td>Support for sidewalks</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Consider a crosswalk at the top of the hill in between bus stops</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>
4.0 CONCLUSIONS

The conclusions from the meeting are:

- Positive feedback for improvements
- Concern for impacts to local businesses
- Concern for reduction in parking
- Concern for extent and limits of sidewalks

Appendix A
Newspaper Notice
Appendix B

PIC Display Boards

Welcome

Welcome to the second Public Information Centre (PIC) meeting for the Ross/Collier/Bayfield Streets and Bell Farm Road Class EA studies. This follows the initial public consultation completed during the Multi-Modal Active Transportation Master Plan (MMATMP), which included the first PIC.

Please sign in on the attendance sheet and obtain a comment sheet at the registration desk.

Should you have any questions regarding the presentation materials, background reports or any other aspect of the study, please speak to the City or Consultant study team members in attendance.

We encourage your input/feedback on the material being presented on the display boards. Please deposit completed comment sheets in the comment box or mail / fax / e-mail to the address at the bottom of the form by December 7, 2016.

There is an opportunity at any time during the EA process for interested persons to provide written input.

Any comments received will be collected under the Environmental Assessment Act and Freedom of Information and Privacy Act and, with the exception of personal information, will become part of the public record.
Study Objectives and Background:

Objective of this PIC:
- Engage public, stakeholders and agencies early in the study process to seek input on preliminary alternative design concepts.
- Through early public engagement, facilitate the development of the alternative design solutions.
- Seek input to identify potential community priorities and/or concerns pertaining to transportation improvements identified as part of these studies.

Overall Study Objectives:
- Develop alternative design solutions for the preferred solutions identified in the Multi-Modal Active Transportation Master Plan (completed Phases 1 & 2 of the Class EA process)
- Identify the location, extent and sensitivity of affected environments
- Assess the design alternatives given the potential environmental impacts
- Seek public input and comments
- Identify a preferred design solution
- Establish measures to mitigate adverse impacts as required
- Satisfy the requirements for Phases 3 & 4 of the Municipal Class EA Process

Ongoing Studies/Activities
- Tree Inventory / Survey
- Cultural Heritage Assessment
- Natural Heritage Assessment
- Stage 1 Archaeological Assessment
- Traffic Analysis
- Geotechnical Investigation
- Topographic, Legal and Utility Surveys
- Drainage and Stormwater Management

Both projects are being undertaken as Schedule C Municipal Class EAs in accordance with the Municipal Class Environmental Assessment process. A copy of this document is available at the Resource table. The data and reports produced for the study will be documented in Environmental Study Reports (ESR) for each project.
As part of the City’s planned population growth from 145,000 to 210,000 and 101,000 jobs by 2031, the City’s Multi-Modal Active Transportation Master Plan (MMATMP) was developed to serve as the City’s roadmap in developing a well-balanced transportation network to serve its future needs and development through 2031.

The MMATMP was developed to provide a transportation system that:

- is safe, efficient and accessible with choices in mobility
- fosters the use and development of a sustainable transportation network
- provides a public transit system that can offer a real alternative to the private automobile
- provides a network of on-road and off-road pedestrian and cycling facilities that allow the use of active transportation modes as an alternative to the automobile

As 40% of the noted growth is designated to occur within existing developed areas, road widenings are required to implement active transportation and provide adequate capacity. Specific recommendations for each project will be detailed in subsequent panels.

### Active Transportation Elements

**Active Transportation (AT):**

AT is any form of human-powered transportation. Walking, cycling, wheeling, in-line skating and skateboarding are all forms of active transportation. AT can also involve combining modes such as walking/cycling with public transit.

**AT infrastructure being considered (in addition to sidewalks):**

<table>
<thead>
<tr>
<th>AT Infrastructure</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Lanes and Buffered Bicycle Lanes</td>
<td>A bicycle lane is a portion of a roadway which has been designated by pavement markings and signage for the exclusive use of cyclists (OTM, Book 18).</td>
</tr>
<tr>
<td>Shared Lanes / Sharrows</td>
<td>Shared Lanes: Markings are placed on the travel lane and generally indicate where cyclists should travel (OTM, Book 18). Sharrows: “Sharrow” is the term used for shared roadway lane markings or shared lane arrows. A sharrow consists of two white chevron markings and a bicycle stencil. Sharrows are intended to guide cyclists as to where they should ride within a travel lane shared by both motorists and cyclists. They are an optional treatment and are context specific (OTM, Book 18).</td>
</tr>
</tbody>
</table>
Project Purpose:
This project will determine the preferred design solution based on the MMATMP recommendations that can be integrated as part of future renewal works in this corridor.

As part of the City’s commitment to the health of Lake Simcoe and its watercourses this project will examine options to implement (‘retrofit’) stormwater management (SWM) in this corridor. Implementing SWM will help improve the environment by treating stormwater to remove pollutants and by controlling flows that can cause watercourse degradation through erosion. Implementing SWM is recommended in the City’s Comprehensive Stormwater Management Master Plan.

Problem Statement:
Bell Farm Road is approaching the end of its service life and requires reconstruction. The existing section of the road with a rural cross-section does not have sidewalks or storm water management. To accommodate growth, the MMATMP recommends this road be widened to increase traffic capacity and provide active transportation facilities.

Opportunity Statement:
To address recommendations of the MMATMP and complete necessary renewal activities, there is an opportunity to replace and upgrade municipal infrastructure in a cost effective and environmentally sustainable manner.

Municipal Infrastructure Needs:
To ensure underground infrastructure lifecycle requirements align with a reconstructed road, the following improvements are proposed.

<table>
<thead>
<tr>
<th>Street Section</th>
<th>Road Structure Condition</th>
<th>Water</th>
<th>Sanitary</th>
<th>Storm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell Farm Road – West Section</td>
<td>Poor</td>
<td>Replace 200mm DI (installed 1972)</td>
<td>250mm AC, remaining service life: 75 years*</td>
<td>New SWM system to be installed</td>
</tr>
<tr>
<td>Bell Farm Road – East Section</td>
<td>Fair</td>
<td>Replace 200mm DI (installed 1972)</td>
<td>250mm AC, remaining service life: 75 years*</td>
<td>Partial SWM exists; New SWM to be installed where required.</td>
</tr>
</tbody>
</table>

* Capacity to be confirmed; improvements will be identified where required. Minor in-situ rehabilitation may be recommended to extend service life.

Stormwater Management (SWM):
New SWM systems will be designed to provide quantity and quality control as well as assess opportunities to implement low impact development practices.
Bell Farm Road (West Section) Alternative Concepts:

Alternatives are being studied that would facilitate the implementation of the MMATMP recommendations.

<table>
<thead>
<tr>
<th>Cross-Section</th>
<th>ROW</th>
<th>No. of Lanes</th>
<th>Sidewalks</th>
<th>Bicycle Facilities</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing Conditions</td>
<td>26m</td>
<td>2</td>
<td>None</td>
<td>On Road</td>
<td>Rural cross-section.</td>
</tr>
<tr>
<td>Alternative 1 – MMATMP Recommendation</td>
<td>26m</td>
<td>2 + TWLTL</td>
<td>Both Sides</td>
<td>Bike Lanes</td>
<td>Cross-section recommended in the MMATMP.</td>
</tr>
<tr>
<td>Alternative 2 – Buffered Bike Lane with Realignment</td>
<td>27m</td>
<td>2 + TWLTL</td>
<td>Both Sides</td>
<td>Buffered Bike Lanes</td>
<td>Provides buffered bike lanes to provide continuity with east section. Existing S-bend realigned to improve geometrics.</td>
</tr>
<tr>
<td>Alternative 3 – Mitigative Option</td>
<td>26m</td>
<td>2 + TWLTL, 2 (between Alliance Blvd)</td>
<td>Both Sides (north side only between Alliance Blvd)</td>
<td>Bike Lane</td>
<td>Minimizes impact to trees abutting residential area.</td>
</tr>
</tbody>
</table>

Bell Farm Road Class EA – Preliminary Alternatives Concepts

Bell Farm Road Class EA – MMATMP Recommendations

2031 Vehicle Lane Requirements

2031 Active Transportation (AT) Network

MMATMP Recommendation Comparison Table

<table>
<thead>
<tr>
<th>Cross-Section</th>
<th>ROW</th>
<th>No. of Lanes</th>
<th>Sidewalks</th>
<th>Bicycle Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing Conditions</td>
<td>26m</td>
<td>2</td>
<td>None</td>
<td>On Road</td>
</tr>
<tr>
<td>MMATMP Recommendation</td>
<td>26m</td>
<td>2 + Two-way Left Turn Lane</td>
<td>Both Sides</td>
<td>Bike Lanes</td>
</tr>
<tr>
<td>East Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing Conditions</td>
<td>26m</td>
<td>4</td>
<td>Both Sides (not continuous)</td>
<td>Bike Lanes</td>
</tr>
<tr>
<td>MMATMP Recommendation</td>
<td>26m</td>
<td>4</td>
<td>Both Sides</td>
<td>Buffered Bike Lanes</td>
</tr>
</tbody>
</table>
Bell Farm Road (East Section) Alternative Concepts:
Alternatives are being studied that would facilitate the implementation of the MMATMP recommendations.

<table>
<thead>
<tr>
<th>Cross-Section</th>
<th>ROW</th>
<th>No. of Lanes</th>
<th>Sidewalks</th>
<th>Bicycle Facilities</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Conditions</td>
<td>26m</td>
<td>4</td>
<td>Both Sides (not continuous)</td>
<td>On Road Sidewalks are not continuous on both sides for this section of Bell Farm Road.</td>
<td></td>
</tr>
<tr>
<td>Alternative 1 – MMATMP Recommendation</td>
<td>29m</td>
<td>4</td>
<td>Both Sides</td>
<td>Buffered Bike Lanes</td>
<td>Cross-section recommended in the MMATMP.</td>
</tr>
<tr>
<td>Alternative 2 – Road Diet</td>
<td>26m</td>
<td>2 + TWLTL</td>
<td>Both Sides</td>
<td>Buffered Bike Lanes</td>
<td>Replace outside lanes with buffered bicycle lanes. Traffic analysis to confirm feasibility and justification for left-turn lanes at Duckworth Street.</td>
</tr>
</tbody>
</table>

![Bell Farm Road Class EA – Preliminary Alternatives Concepts](image-url)
Next Steps:
• The project team will review public, stakeholder and agency comments from this PIC
• Complete all supporting studies
• Prepare draft Environmental Study Report (ESR)
• Shortlist alternative design solutions
• Fully evaluate alternative design solutions
• Identify a technically preferred alternative solution
• Hold a PIC in 2017 to present the technically preferred alternative solution to seek public input and comment
• Prepare the draft Final ESR
• Present recommendations to City Council for approval
• File Notice of Study Completion and complete 30-day public review period

How can you remain involved in this Study?
• On the comment sheet, please indicate if you would like to be kept informed of the project process including the next PIC.

Help shape decisions made in this Study:
• You can provide your comments by completing a comment sheet and dropping it in the comment box, or you are welcome to take it home and return it at a later date. Please submit your comments by December 7, 2016.
• If you would like more information or if you have any questions, concerns or comments, please contact:

  Mr. Brett Gratrix, P.Eng.
  City of Barrie, Engineering Department
  70 Collier Street, 6th Floor, Barrie, ON L4M 4T5
  Tel: (705) 739-4220 Ext. 5117, Fax: (705) 739-4247
  Email: brett.gratrix@barrie.ca

Thank You For Participating

Comments and personal information regarding this project are collected under the authority of the Environmental Assessment Act to assist in decision making and to determine further public consultation needs relating to the project. Comments and opinions which do not constitute personal information, as defined by the Freedom of Information and Protection of Privacy Act, will be shared among the Ministry of the Environment and others as appropriate, and may be included in the study documentation which will be made available for public review. Personal information will remain confidential unless prior consent to disclose is obtained.
Appendix C
PIC Comment Sheets

December 2016
The City of Barrie

Bell Farm Road
Municipal Class Environmental Assessment Phases 3 & 4

Public Information Centre
Wednesday, November 23, 2016
4:00 p.m. to 7:00 p.m.
City Hall Rotunda, 1st Floor

Comment Sheet

Personal information on this form is collected under the authority of the Environmental Assessment Act, Chap. E18, Section 7, and will be used in the development of a Municipal Class Environmental Assessment. Questions about this collection should be directed to the Director of Engineering, P.O. Box 400, 70 Collier Street, Barrie, Ontario, L4M 4T5, (705) 726-4242.

Please print all responses

Name of Respondent:

Representing (Agency, Municipality, Property Owner, Tenant, etc.):

Address (Including Postal Code & Telephone Number):

Street Address: [redacted] Unit/Apt: [redacted]
Postal Code: L4M 6C2 Telephone Number: [redacted]
Email: [redacted]

A Study Design Report is available on the City’s web site at www.barrie.ca/assessments under the project heading “Bell Farm Road & Ross/Collier/Bayfield Streets Transportation Improvements”. This report details the road cross-section alternative concepts.

Comments:

- Cross walk at Blaine
- Sidewalk + bike lanes both sides
- Terry Drakes
- Would like to negotiate the terrain @ the camera
- 1.5m Bell Farm
- Assess the use of a freewall which may accommodate expansion of the parking lot at 725 Bell Farm
November 28, 2016

Mr. Brett Gratix, P.Eng.
City of Barrie
Engineering Department
70 Collier Street, P.O. Box 400
Barrie, ON
L4M 4T5

Dear Brett,

Further to our conversation at the Public Information Centre last Wednesday, we would like to submit our Comment Sheet on behalf of the 59 Bell Farm Road tenants including: [redacted] and [redacted] in our comments, we would like to address the impact traffic flow issues will have, drainage problems that need to be remediated, as well as the already problematic parking situation that we experience on an on-going basis. We would also like to put forth our recommendation for option 3—the option we feel would be most beneficial to Bell Farm Road.

First and foremost, we would like the City of Barrie to take into serious consideration that the businesses in our building alone support 15 families. Bell Farm Road alone has over 28 small businesses on it—businesses which will be severely impacted by any disruption of traffic flow on this street. In order to minimize the disruption to our day-to-day businesses we have come to the consensus that every effort should be made to only close the road on weekdays between the hours of 6:00pm to 8:00am or Saturday and Sunday. This will allow for the regular transport truck deliveries as well as allow us the best opportunity to service our customers in the timely fashion they are accustomed to.

Drainage on Bell Farm Road has been an on-going problem, specifically for our building, the storm water runs off Bell Farm Road into our parking lot creating a river or settling and turning to ice in the winter. It is our request that this be addressed during the planning and execution of the upcoming construction. Our plaza sits below grade at the current time and we need to ensure that this problem is not made worse as a result of the construction.

With respect to parking on Bell Farm Road, we would encourage the City of Barrie’s Planning Department to make every effort to conduct an on-site evaluation of the current situation which will only be made worse by the proposed construction. Currently, every day between 11:00am and 2:00pm 10-20 cars are parked along the side of Alliance Boulevard, in our parking lot and in front of our plaza. They are mostly patrons of “The Original Mom’s Restaurant” as they do not have sufficient parking for their posted capacity. With all three of the proposed options for Bell Farm Road, our boulevard will be

Thank you for your comments.
taken away and we can only assume this will impact our plaza parking adversely. We have recently, at
our own expense, purchased signage for our parking lot to deter this behavior.

Based on the proposed drawings that we viewed last week, the only option that we feel confident in
agreeing to is Option 3. This option is the only one that does not impact our parking lot and lit,
permanent marquee sign. Also, we would like to see the preservation of the cedar hedge and trees that
currently line our sign of Bell Farm Road. If these trees are healthy, we would like to see them
preserved. Further to the comments made that the blue prints “were not exact”, we would like to
ensure that we do not lose any of our parking lot under any of the options as the current blue prints on
display showed.

We wish to be kept informed of the project progress. This includes, notice of the second PIC, and
subsequent staff recommendations for the Preferred Alternative Solution that will be presented to
General Committee. We welcome the opportunity for further dialogue or to provide clarification of any
of the above should you need it.

Sincerely,

Dear Mr. Gratrix:

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Public
Information Centre for your projects. MTCS’s interest in these EA projects relates to its mandate of
conserving Ontario’s cultural heritage, which includes:

- Archaeological resources, including land-based and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project’s potential impact on cultural
heritage resources.

While some cultural heritage resources may have already been formally identified, others may be
identified through screening and evaluation. Aboriginal communities may have knowledge that can
contribute to the identification of cultural heritage resources, and we suggest that any engagement with
Aboriginal communities includes a discussion about known or potential cultural heritage resources that
are of value to these communities. Municipal Heritage Committees, historical societies and other local
heritage organizations may also have knowledge that contributes to the identification of cultural heritage
resources.

We have reviewed the Study Design Reports for these projects and offer the following comments.

Archaeological Resources

The MTCS Criteria for Evaluating Archaeological Potential is normally used to determine if an
archaeological assessment is needed. MTCS archaeological sites data are available at
archaeology@ontario.ca. In this case, the Study Design Reports indicate that Stage 1 of the
archaeological assessment process will be carried out. If the Stage 1 report recommends further
archaeological fieldwork within the footprint of an alternative being carried forward, the fieldwork should
be completed and its results incorporated into the evaluation of the alternative(s). Your consultant
archaeologist licenced under the OHA is responsible for submitting the report directly to MTCS for review.
Built Heritage and Cultural Heritage Landscapes

The MTCS Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes is normally used to determine whether your EA project may impact cultural heritage resources. The Clerk for the City of Barrie can provide information on property registered or designated under the Ontario Heritage Act. Municipal Heritage Planners can also provide information that will assist you in completing the checklist. The Study Design Reports for these projects indicate that some work is being done to identify potential resources of this sort.

If potential or known heritage resources exist, MTCS recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, should be completed to assess potential project impacts. Our Ministry’s Info Sheet #5: Heritage Impact Assessments and Conservation Plans outlines the scope of HIAs. Please send the HIA to MTCS for review, and make it available to local organizations or individuals who have expressed interest in heritage.

Environmental Assessment Reporting

All technical heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MTCS whether any technical heritage studies will be completed for your EA project, and provide them to MTCS before issuing a Notice of Completion. If your screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MTCS on this project: please continue to do so through the EA process, and contact me for any questions or clarification.

Sincerely,

Dan Minkin
Heritage Planner
Dan.Minkin@Ontario.ca

---

Brett Gratrix

From: Jeff Andersen <jandersen@nvca.on.ca>
Sent: Thursday, November 10, 2016 11:08 AM
To: Brett Gratrix
Subject: Ross/Collier/Bayfiled and Bell Farm Road Class EA

Good Day Mr. Gratrix;

NVCA is in receipt of notification of the above-mentioned EAs. All of these projects are under the jurisdiction of the Lake Simcoe Region Conservation Authority. As such NVCA will not be involved in, nor do we require, any further notifications pertaining to these projects.

Thank you for the opportunity to comment.

All the Best with your projects.

Jeff J. Andersen
Regulations Technician
Nottawasaga Valley Conservation Authority
8195 8th Line, Utopia, ON L0M 1T0
705-424-1479 ext. 238
705-424-2115
jandersen@nvca.on.ca

This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender and destroy all copies of the original message.
29 November, 2016

Brett Graftix
Infrastructure Planning Engineer
70 Collier Street
Barrie, Ontario L4M 4T5

Dear Brett Graftix,

RE: Bell Farm Road Municipal Class Environmental Assessment. File: T05-BE

I would like to acknowledge receipt of your correspondence, which was received on 11/10/2016 regarding the above noted project.

As you may be aware, the area in which your project is proposed is situated within the Traditional Territory of Curve Lake First Nation. Our First Nation’s Territory is incorporated within the Williams Treaties Territory and is the subject of a claim under Canada’s Specific Claims Policy. We strongly suggest that you provide the specific legal agreement that will be used to consult to also extend to the other First Nations of the Williams Treaties.

Although we have not conducted exhaustive research nor have we the resources to do so, Curve Lake First Nation Council is not currently aware of any issues that would cause concern with respect to our Traditional, Aboriginal and Treaty rights.

Please note that we have particular concern for the remains of our ancestors. Should excavation unearth bones, remains or other such evidence of a native burial site or any Archaeological findings, we must be notified without delay. In the case of a burial site, Council reminds you of your obligations under the Cemeteries Act to notify the nearest First Nation Government or other community of Aboriginal people which is willing to act as a representative and whose members have a close cultural affinity to the interred person. As I am sure you are aware, the regulations further state that the representative is needed before the remains and associated artifacts can be removed. Should such a find occur, we request that you contact our First Nation immediately.

Curve Lake First Nation also has available, trained Archaeological Liaisons who are able to actively participate in the archaeological assessment process as a member of a field crew, the cost of which will be borne by the proponent.

If any new, undisclosed or unforeseen issues should arise, that has potential for anticipated negative environmental impacts or anticipated impacts on our Treaty and Aboriginal rights we require that we be notified regarding these as well.

Thank you for recognizing the importance of consultation and respecting your duty to consult obligations as determined by the Supreme Court of Canada.

Should you have further questions or if you wish to hire a liaison for a project, please feel free to contact our Lands and Resources Consultation Liaisons

Yours sincerely,

Curve Lake First Nation
The City of Barrie
Bell Farm Road
Municipal Class Environmental Assessment Phases 3 & 4

Public Information Centre
Wednesday, November 23, 2016
4:00 p.m. to 7:00 p.m.
City Hall Rotunda, 2nd Floor.

COMMENT SHEET

Personal information on this form is collected under the authority of the Environmental Assessment Act, Chap. E18, Section 7, and will be used in the development of a Municipal Class Environmental Assessment. Questions about this collection should be directed to the Director of Engineering, P.O. Box 400, 70 Collier Street, Barrie, Ontario, L4M 4T9. (705) 739-4242.

Please print all responses

NAME OF RESPONDENT: [Redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

[Redacted]

ADDRESS (Including Postal Code & Telephone Number):

Street Address: [Redacted] Unit/Apt: [Redacted]

Postal Code: L4M 5G1 Telephone Number: [Redacted]

Email: [Redacted]

A Study Design Report is available on the City’s website at www.barrie.ca/projects under the project heading “Bell Farm Road & Ross/Collier/Bayfield Streets Transportation Improvements”. This report details the road cross-section alternative concepts.

Comments: Concerned about access to business and whether this work will be done in stages or all at once. Also, what is the approximate start date of the actual construction?

Do you wish to continue to be informed of the project progress? This will include notice of the second PIC and subsequent staff recommendations for the Preferred Alternative Solution that will be presented to General Committee. Notice will be provided via email if provided on page 1 under Respondent address information.

[ ] Yes [ ] No

Signature: [Redacted]

Date: [Redacted]

Please submit this comment sheet by December 7, 2016 to:

Mr. Brett Grafix, P. Eng.
City of Barrie
Engineering Department
70 Collier Street, P.O. Box 400
Barrie, ON
L4M 4T9

Tel: (705) 739-4220, Ext. 5117
Fax: (705) 739-4247
E-mail: Brett.Grafix@barrie.ca

Thank you for your comments.
ENGINEERING DEPARTMENT
Comment Sheet
Bell Farm Road Municipal Class EA Phases 3 & 4

Personal Information on this form is collected under the authority of the Environmental Assessment Act, Chap. E18, Section 7, and will be used in the development of a Municipal Class Environmental Assessment. Questions about this collection should be directed to the Director of Engineering, P.O. Box 400, 70 Coller Street, Barrie, Ontario, L4M 4T5, (705) 726-4242.

NAME OF RESPONDENT:

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

PROPERTY OWNER

ADDRESS (Including Postal Code & Telephone Number):

Street Address: ___________________________________________
Postal Code: L4M 5B1
Telephone Number: _______________________________________
Unit/Apt: ____________________________

Email: __________________________________________________

A Study Design Report is available on the City’s web site at www.barrontoauthorizations under the project heading “Bell Farm Road & Road/Collier/Bayfield Streets Transportation Improvements”. This report details the road cross-section alternative concepts.

Comments:

EAST - ALTERNATIVE 2
26M
SURVEY NEED TO BE CHECKED & SIDEWALK

WEST - ALTERNATIVE 3
26M
MITIGATION OPTION
NO SIDEWALK NECESSARY ON SOUTH SIDE.

Do you wish to continue to be informed of the project progress? This will include notice of the second PIC and subsequent staff recommendations for the Preferred Alternative Solution that will be presented to General Committee. Notice will be provided via email if provided on page 1 under Respondent address information.

[ ] Yes  [ ] No

Signature ____________________________ Date: Nov 25, 2016

Please return this comment sheet by December 7, 2016 to:

Mr. Brett Groat, P. Eng.
City of Barrie
Engineering Department
70 Coller Street, P.O. Box 400
Barrie, ON
L4M 4T5

Tel: (705) 739-4220, Ext. 5117
Fax: (705) 739-4247
E-mail: Brett.Groat@barrie.ca

Thank you for your comments.
ENGINEERING DEPARTMENT
Comment Sheet
Bell Farm Road Municipal Class EA Phases 3 & 4

Do you wish to continue to be informed of the project progress? This will include notice of the second PIC and subsequent staff recommendations for the Preferred Alternative Solution that will be presented to General Committee. Notice will be provided via email if provided on page 1 under Respondent address information.

☐ Yes ☐ No

Signature: [Redacted]  Date: Nov 25, 2014

Please submit this comment sheet by December 7, 2016 to:

Mr. Brett Gratrix, P.Eng.
City of Barrie
Engineering Department
70 Collier Street, P.O. Box 400
Barrie, ON L4M 4T5

Tel: (705) 739-4220, Ext. 5117
Fax: (705) 739-4247
E-mail: Brett.Gratrix@barrie.ca

Thank you for your comments.
The City of Barrie

BELL FARM ROAD
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PHASES 3 & 4

Public Information Centre
Wednesday, November 23, 2016
4:00 p.m. to 7:00 p.m.
City Hall Rotunda, 1st Floor

COMMENT SHEET

Personal information on this form is collected under the authority of the Environmental Assessment Act, Chap. E18, Section 7, and will be used in the development of a Municipal Class Environmental Assessment. Questions about this collection should be directed to the Director of Engineering, P.O. Box 400, 70 Collier Street, Barrie, Ontario, L4M 4T5, (705) 739-4242.

Please print all responses

NAME OF RESPONDENT: [Redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.): PROPERTY Owner

ADDRESS (Including Postal Code & Telephone Number):
Street Address: [Redacted] Unit/Apt: 
Postal Code: L4M 5G1 Telephone Number: 
Email: [Redacted]

Do you wish to continue to be informed of the project progress? This will include notice of the second PIC and subsequent staff recommendations for the Preferred Alternative Solution that will be presented to General Committee. Notice will be provided via email if provided on page 1 under Respondent address information.

☐ Yes ☐ No

Signature: [Redacted]
Date: Nov 25, 2016

Please submit this comment sheet by December 7, 2016 to:

Mr. Brett Gratton, P. Eng.
City of Barrie
Engineering Department
70 Collier Street, P.O. Box 400
Barrie, ON
L4M 4T5

Tel: (705) 739-4229, Ext. 5117
Fax: (705) 739-4247
E-mail: Brett.Gratton@barrie.ca

Thank you for your comments.
BELL FARM ROAD
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PHASES 3 & 4

Public Information Centre
Wednesday, November 23, 2016
4:00 p.m. to 7:00 p.m.
City Hall Rotunda, 1st Floor

COMMENT SHEET

Personal information on this form is collected under the authority of the Environmental Assessment Act, Chap. E18, Section 7, and will be used in the development of a Municipal Class Environmental Assessment. Questions about this collection should be directed to the Director of Engineering, P.O. Box 400, 70 Coller Street, Barrie, Ontario, L4M 4T8, (705) 726-4242.

Please print all responses

NAME OF RESPONDENT:

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):
Property Owner

ADDRESS (Including Postal Code & Telephone Number):
Street Address: [Redacted] Unit/Apt: [Redacted]
Postal Code: L4M 6J8 Telephone Number: [Redacted]

Email: [Redacted]

A Study Design Report is available on the City's website at www.barrie.ca/gastudies under the project heading "Bell Farm Road & Ross/Collier/Bayfield Streets Transportation Improvements". This report details the road cross-section alternative concepts.

Comments:
We are very pleased to see that action is being taken to address serious safety issues on Bell Farm Rd. We have a special needs daughter who walks along this road to her equestrian. The lack of sidewalks is a serious matter that we have raised to our aldermen many times.
Cars drive very fast on this road and due to the hill there is a "blind spot" to see pedestrians.
Appendix C
Traffic Operations Assessment Report
This technical memorandum discusses the traffic operations on Bell Farm Road.

1. Introduction

The City of Barrie (City) has initiated an Environmental Assessment (EA) and Detail Design (DD) for transportation improvements on Bell Farm Road between Duckworth Street and St. Vincent Street as presented in Figure 1.

2. Traffic Analysis Parameters

A summary of the existing traffic volume data provided by the City of Barrie is provided in Table 1. The turning movement counts were recorded over an 8-hour period. The analysis was based on the most recent (2016) counts that were available.

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell Farm Road / St. Vincent Street</td>
<td>Wednesday, June 19, 2013</td>
</tr>
<tr>
<td>Bell Farm Road / Alliance Boulevard (west)</td>
<td>Wednesday, October 7, 2015</td>
</tr>
<tr>
<td>Bell Farm Road / Alliance Boulevard (east)</td>
<td>Wednesday, April 21, 2016</td>
</tr>
<tr>
<td>Bell Farm Road / Duckworth Street / Ring Road</td>
<td>Thursday, September 22, 2016</td>
</tr>
<tr>
<td>Bell Farm Road / Alliance Boulevard (east)</td>
<td>Wednesday, June 19, 2013</td>
</tr>
<tr>
<td>Bell Farm Road / Alliance Boulevard (west)</td>
<td>Thursday, September 22, 2016</td>
</tr>
</tbody>
</table>

The traffic analysis was performed using the software tool Synchro 9 based on the Highway Capacity Manual (HCM) calculation methodology. The afternoon peak hour was examined as a worst case scenario. Traffic during that period is generally busier than during the morning peak hour. Traffic signal timings in Synchro were optimized for the purpose of the analysis.

The intersection performance results are presented as follows:

- **Volume-to-Capacity (V/C) ratio**: represents the level of utilization of a turning movement. Typically, a V/C value below 0.85 indicates efficient operations whereas a value above 1 indicates congestion problems. Occasional congestion may occur when this value is between 0.85 and 1.00.

- **Average Delay per Vehicle and Level of Service (LOS)**: represents the driver’s level of satisfaction. The LOS is directly based on the average delay per vehicle, ranging from LOS A with an average delay equal to or less than 10 seconds to LOS F with average delay greater than 55 seconds (for an unsignalized approach). Typically, a LOS D is deemed satisfactory. A LOS E or F may require corrective measures depending on the context.

- **95th Percentile Queue Length**: represents the queue length that is exceeded only 5% of the time, as estimated by Synchro. The 95th Percentile Queue is typically used to determine storage requirements.
3. Existing Conditions

The existing lane configuration and traffic control at each intersection within the study area is presented in Figure 2. Most of Bell Farm Road is a 2-lane rural cross-section with open ditches. The roadway widens to 4 lanes within approximately 250 metres of Duckworth Street.

![Figure 2: Existing Lane Configuration and Traffic Control](image)

Sidewalks exist on the north side only from Duckworth Street to the east intersection with Alliance Boulevard. Along the remainder of the corridor, pedestrians are required to use the shoulder area of the road as shown in Figure 3. Bell Farm Road is also used by cyclists as an access route to Georgian College.

At the east intersection of Bell Farm Road and Alliance Boulevard, pedestrians can often be observed crossing Bell Farm Road. These pedestrians result in part from the location of a transit stop and the proximity of Mom’s Restaurant on the south side of the road and a concentration of area employment predominantly on the north side.

![Figure 3 – Bell Farm Road Pedestrian Traffic](image)

4. Existing Traffic Operations

The adjusted traffic volumes used for the analysis of the existing conditions are presented in Appendix A. The results of the traffic analysis are presented in Table 2 for signalized intersections and Table 3 for unsignalized intersections. Detailed analysis reports are provided in Appendix B.

### Table 2 – Traffic Analysis Results – Existing, PM Peak Hour, Signalized

<table>
<thead>
<tr>
<th>Intersections</th>
<th>Movement</th>
<th>V/C</th>
<th>Average Delay (s)</th>
<th>LOS</th>
<th>95th Queue (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Bell Farm Road / St. Vincent Street</td>
<td>EBL</td>
<td>0.23</td>
<td>37</td>
<td>D</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>EBT/R</td>
<td>0.16</td>
<td>15</td>
<td>B</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>WBL</td>
<td>0.82</td>
<td>60</td>
<td>E</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>WBT/R</td>
<td>0.88</td>
<td>33</td>
<td>C</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>NBL</td>
<td>0.03</td>
<td>11</td>
<td>B</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>NBT</td>
<td>0.79</td>
<td>25</td>
<td>C</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>NBR</td>
<td>0.12</td>
<td>3</td>
<td>A</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SBL</td>
<td>0.58</td>
<td>13</td>
<td>B</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>SBT/R</td>
<td>0.58</td>
<td>11</td>
<td>B</td>
<td>11</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td>24</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3 – Traffic Analysis Results – Existing, PM Peak Hour, Unsignalized

<table>
<thead>
<tr>
<th>Intersections</th>
<th>Movement</th>
<th>V/C</th>
<th>Average Delay (s)</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Bell Farm Road / Alliance Boulevard (west)</td>
<td>SBL/R</td>
<td>0.31</td>
<td>15</td>
<td>B</td>
</tr>
<tr>
<td>3 Bell Farm Road / Alliance Boulevard (east)</td>
<td>SBL/R</td>
<td>0.31</td>
<td>17</td>
<td>C</td>
</tr>
</tbody>
</table>
The results for the signalized and unsignalized intersections indicate that all intersections currently operate within capacity during the afternoon peak hour. It is noted that the westbound through/right turn movement at the intersection at St. Vincent Street operates near capacity (V/C = 0.88).

5. 2031 Traffic Operations

A growth rate of 1% was applied to the adjusted turning movement volumes to obtain the traffic projections for the 2031 horizon. For analysis purposes, it was assumed that one lane per direction would be added to St. Vincent Street to reflect the recommended roadway changes from the 2014 Multi-Modal Active Transportation Master Plan (MMATMP). The addition of a two-way left-turn lane to the existing 2-lane cross section segment of Bell Farm Road was also assumed as safety measure.

The 2031 traffic volume projections used for the analysis of the future conditions are presented in Appendix A. The results of the traffic analysis are presented in Table 4 for signalized intersections and Table 5 for unsignalized intersections. Detailed analysis reports are provided in Appendix B.

### Table 4 – Traffic Analysis Results – 2031 Projection, PM Peak Hour, Signalized Intersections

<table>
<thead>
<tr>
<th>Intersections</th>
<th>Movement</th>
<th>V/C</th>
<th>Average Delay (s)</th>
<th>LOS</th>
<th>95th Queue (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell Farm Road / St. Vincent Street</td>
<td>EBL</td>
<td>0.25</td>
<td>28</td>
<td>C</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>EBT/R</td>
<td>0.13</td>
<td>10</td>
<td>A</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>WBL</td>
<td>0.70</td>
<td>36</td>
<td>D</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>WBT/R</td>
<td>0.81</td>
<td>19</td>
<td>B</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>NBL</td>
<td>0.05</td>
<td>21</td>
<td>C</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>NBT</td>
<td>0.79</td>
<td>29</td>
<td>C</td>
<td>117</td>
</tr>
<tr>
<td></td>
<td>SBL</td>
<td>0.66</td>
<td>22</td>
<td>C</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>SBT/R</td>
<td>0.41</td>
<td>12</td>
<td>B</td>
<td>56</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>22</td>
<td>C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 5 – Traffic Analysis Results – Existing, PM Peak Hour, Unsignalized Intersections

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Movement</th>
<th>V/C</th>
<th>Average Delay (s)</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell Farm Road / Alliance Boulevard (west)</td>
<td>SBL/R</td>
<td>0.41</td>
<td>18</td>
<td>C</td>
</tr>
<tr>
<td>Bell Farm Road / Alliance Boulevard (east)</td>
<td>SBL/R</td>
<td>0.42</td>
<td>22</td>
<td>C</td>
</tr>
</tbody>
</table>

The results for the signalized and unsignalized intersections indicate that all intersections would still operate within capacity during the afternoon peak hour.

With the planned widening of St. Vincent Street, and with appropriate traffic signal timing adjustment, the intersection with Bell Farm Road will be operating more efficiently and with delays similar to existing conditions despite the increase of traffic. The westbound right-turn movement is identified as a critical movement because of the significant traffic volume (477 veh/h) during the afternoon peak hour but does not require mitigation measures within the 2031 planning horizon.
6. Active Transportation Needs

As can be seen in Figure 3 above, sidewalks are not provided on the full length of Bell Farm Road, forcing pedestrians to use the shoulders. The provision of sidewalks along the full length of Bell Farm Road is recommended to accommodate the pedestrian demand and to improve pedestrian safety. The provision of a bicycle lane on each side of the roadway is also recommended to accommodate cyclists.

As discussed above, the east intersection with Alliance Boulevard has been identified as a busy pedestrian crossing. With the planned reconstruction of Bell Farm Road, a Level 2 Type B crossover configuration similar to the one shown on Figure 4 is recommended based on the selection matrix of the Ontario Traffic Manual (OTM) Book 15.

7. Recommendations

The traffic analysis of Bell Farm Road indicates that the intersections are currently operating within capacity and at a good level of service. They will continue to operate within capacity and at a similar level of service within the planning horizon of 2031 with the planned widening of St. Vincent Street.

The provision of a 2-way left-turn lane in the existing 2-lane segment of Bell Farm Road is recommended as a safety improvement and to better maintain traffic flow.

The provision of sidewalks and bicycle lanes along the full length of Bell Farm Road is recommended to accommodate the pedestrian and cycling demands and to improve active transportation safety.

A level 2 Type B pedestrian crossover is recommended at the eastern intersection with Alliance Boulevard to accommodate the higher pedestrian demand at this location and to improve pedestrian safety.

Figure 4: Pedestrian Crossover Level 2 Type B (Source: OTM Book 15)
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Municipal Infrastructure Review Report
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<td>21</td>
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</table>
1.0 INTRODUCTION

BT Engineering Ltd. (BTE) has been retained by the City of Barrie to undertake a review of municipal infrastructure requirements associated with the reconstruction and widening of Bell Farm Road, in accordance with the Municipal Class Environmental Assessment process. This report examines sanitary, storm sewer, stormwater management and water distribution requirements. Background information and previous studies are referenced at the end of this report.

Bell Farm Road serves a business park comprising commercial, industrial and institutional land uses. The project study area and location are illustrated in Figure 1.
2.0 SANITARY SEWER SYSTEM

2.1 Existing Sanitary System

The Bell Farm Road sanitary sewer system is comprised of 250 mm diameter asbestos cement (AC) pipe. Pipe gradients generally range between 1.0 % and 2.5 %. Sanitary sewers were constructed starting in 1973 with the upper (east) section of the sewer system built in 1988. As such pipe ages are from 29 to 44 years. In the terms of reference for this assignment the City of Barrie indicated that replacement of the sanitary sewers along Bell Farm Road, as an option, shall be considered.

The average sewer depth of cover is between 2.7 and 3.6 metres. The sanitary sewershed is shown in Figure 2.

2.2 Pipe Condition CCTV Inspection

A closed circuit video (CCTV) inspection of the sanitary system was undertaken by the City in 2014. The work was performed by Sewer Technologies Inc. (STI). A rating system (structure, maintenance and overall condition) is used by the inspection company to categorize each pipe segment (maintenance hole to maintenance hole). No information in their report was provided to describe the rating categories. We have therefore assumed it is a rating category under the Pipeline Assessment Certification Program (PACP). The PACP grading system is described in Table 1.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Condition Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Excellent condition – no defects</td>
</tr>
<tr>
<td>1</td>
<td>Excellent condition – minor defects</td>
</tr>
<tr>
<td>2</td>
<td>Good condition – has begun to deteriorate</td>
</tr>
<tr>
<td>3</td>
<td>Fair condition – moderate deterioration</td>
</tr>
<tr>
<td>4</td>
<td>Poor condition</td>
</tr>
<tr>
<td>5</td>
<td>Immediate attention needed</td>
</tr>
</tbody>
</table>

Nine (9) pipe sections along Bell Farm Road were rated by STI. Three sections had a zero rating, five sections were rated between 1 and 3, and one section was rated at 4.

BTE has reviewed the CCTV tapes and found that while there are some pipes with cracks, the cracks are considered minor. Only a limited number of sections have a pipe with a transverse or circumferential crack. Most of the pipes appear to be in generally good condition.

2.3 Pipe Age and Material Considerations

The sanitary sewer is an AC Series 2400 pipe. Generally AC pipe may be expected to have a service life of 75 years, or longer, provided a hydrogen sulphide (H$_2$S) environment and / or adverse soil conditions are not present. Considering that there are a number of MH pipe drops along Bell Farm Road, re-aeration occurs, which serves to minimize potential H$_2$S generation. Also the CCTV tapes did not reveal any concrete deterioration problems.

It is possible that the existing AC pipe can provide another 50 years of service or longer.

2.4 Pipe Hydraulics

A sewer hydraulic review has been performed. The evaluation findings are that the existing sanitary sewer meets the City of Barrie design guidelines and has adequate pipe flow capacity. Sanitary sewer information and the review spreadsheet are presented in Appendix A.

2.5 Sanitary Sewer Findings and Recommendations

BTE’s findings with respect to the sanitary sewer along Bell Farm Road are provided below.
Findings:

1. The AC pipe material has an existing service age from 29 to 44 years. The sewer's ultimate service life could extend beyond 75 years.

2. The pipes generally appear to be in good condition.

3. The pipe has sufficient hydraulic capacity to serve the Business Park.

Based on these findings, the following recommendations are provided.

Recommendations:

1. It is recommended that during detailed design the sanitary sewer be re-inspected. A direct comparison should be made to the 2014 CCTV tape at each location where a crack was observed. If there has been a change in pipe structure condition(s), then, during the road project construction works, the City should consider undertaking selective pipe structure repair(s) as may be deemed warranted.

2. Overall the existing sanitary sewer is considered to be adequate. Based on available information, sewer replacement is not considered warranted at this time.
existing stormwater works, as well as an examination of stormwater retrofit opportunities. The MOECC has the ability to place stringent requirements on approvals for new stormwater works and to revise existing approvals if necessary.

3.3 Sophia Creek Master Drainage Plan

There have been a number of studies on Sophia Creek, including the most recent Drainage Area Environmental Assessment (EA) Plan update (2016). Pertinent findings from the EA update study, relevant to this project undertaking, are summarized below:

- The 6 hour SCS design storm produces the highest peak flows and the 1:100 year 6 hour SCS design storm is the regulatory storm event;
- Low Impact Development (LID) Stormwater Management (SWM) measures were identified as a suitable retrofit opportunity option for the Bell Farm Road reconstruction, subject to existing groundwater and soil conditions;
- The minor system should be designed for the 5-year return period event;
- Results of the EA study analysis indicate that LID measures could reduce the major storm peak flows by 2% to 6% throughout the study area. As such, while beneficial from a water quality and water balance perspective, the benefit from a quantity control perspective and the major drainage system storm infrastructure in the watershed (Sophia Creek) is limited. Although the LID measures do not significantly reduce major system flows, they do attenuate peak flows from the more frequent storm events, reducing frequent nuisance flooding; and
- The St. Vincent storm trunk sewer (minor system), downstream of Bell Farm Road, is identified as being deficient in terms of its 5-year peak flow pipe capacity.

BT Engineering has incorporated the above EA findings into our design criteria for this road reconstruction project.

3.4 SWM Design Targets, Objectives and Design Criteria

The SWM design criteria, as compiled from a number of reports plus City and LSRCA guidelines, are presented in Table 2.

Table 2 – SWM Design Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Criteria Target Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storm sewer (Minor system)</td>
<td>5-year return period design. Conform to City technical design guidelines.</td>
</tr>
<tr>
<td>Major system</td>
<td>Roads: water depth not to exceed 300 mm under the Regulatory event (100 year SCS event). No net increase in downstream flood damage, and/or works should incorporate mitigation measures.</td>
</tr>
<tr>
<td>Peak flows</td>
<td>Not to exceed existing conditions. Match or reduce downstream peak flows.</td>
</tr>
<tr>
<td>Water quality</td>
<td>As per the LSRCA and City Technical Guidelines and to meet MOECC approval guidelines.</td>
</tr>
</tbody>
</table>

Under the water quality criteria, stormwater volume control requirements apply; specifically, linear development volume control. Linear development is to retain and treat the larger of the runoff from the 12.5 mm event from the total reconstructed impervious surface; or the runoff from a 25 mm event based on a net increase in impervious surface.

Final determination and selection of a preferred best management practice solution (BMP) will require further investigations, such as geotechnical work to identify in-situ soil properties and groundwater conditions.

3.5 LSRCA Policy and Regulations

LSRCA regulations and policies apply to this project. Some of the key issues are outlined below. A copy of this report will be provided to LSRCA with follow-up submissions to be made during detailed design.

Road reconstruction projects are subject to stormwater volume control requirements under the LSRCA Technical Guidelines; specifically, linear development volume control. Linear development is to retain and treat the larger of the following:

- The runoff from the 12.5 mm event from the total reconstructed impervious surface; or
- The runoff from a 25 mm event from the net increase in impervious surface.

The objective of the road reconstruction project is to comply with the linear development volume control criteria. If compliance is not achievable due to soil/groundwater conditions or site constraints, the LSRCA's flexible treatment alternative for sites with restrictions criteria shall be applied. The flexible treatment alternatives are described as follows:

- Alternative 1 – Retain the runoff from the 12.5 mm event from the total reconstructed impervious surface;
- Alternative 2 – Achieve runoff volume reduction to the maximum extent possible (minimum 5 mm from all impervious surfaces); or
- Alternative 3 – Off-site control of the runoff from a 25 mm event from the net increase in impervious surface.

The Sophia Creek watershed falls under the general authority of the Lake Simcoe Protection Plan (LSPP). The City is committed to meet the requirements of the LSPP including determining the effectiveness of the existing drainage infrastructure at reducing the negative impacts of stormwater on the environment and identifying additional stormwater management retrofit opportunities or improvements that could improve stormwater treatment. Any retrofit opportunities would be implemented on a site specific basis with the improvements carried through to downstream areas.

3.6 Water Quality Protection Options

Stormwater from roadways is known to create non-point source water pollution that is detrimental to the water quality of receiving water bodies. Vehicular-related pollution, such as oil and grease, heavy metals, nutrients and sediments, is directly related to traffic volume. In addition, roads tend to serve as a conduit for pollutants from rural and urban areas draining to them, such as runoff to the right-of-way
from agricultural or landscaped areas which transports sediment, pesticides and fertilizers; and for the particulates generated with de-icing sand applications, and as pavement breaks down with use.

Low Impact Development (LID) is an innovative method of stormwater management that attempts to replicate in the post-development environment the pre-development hydrologic regime. This is accomplished by reducing the runoff volume, peak discharge, and associated pollutant loads near the source of runoff, using techniques that intercept and hold runoff. LID aims at using vegetation and infiltration to reduce the runoff volumes and increase the time of travel of runoff. A further objective of the LID stormwater management philosophy is to provide a train of treatment measures, such that the road storm runoff must flow through multiple measures before discharging to the receiving watercourse.

LID measures have been examined for this project to determine the feasibility of implementing one or several LID techniques. One of the advantages of LID is that it treats runoff at, or as closely as possible to, its source. LID storm water management techniques that are consistent with transportation type construction projects are listed below and a brief description is provided in the subsequent sections.

- Bio-Retention
- Bio-Slopes
- Catch Basin Controls
- Gutter Filter
- Infiltration Trenches/Strips
- Permeable Pavement
- Surface Sand Filter
- Grassed Swales
- Vegetation/Landscaping
- Perforated pipe system

Pollution prevention and street sweeping are measures for reduction of the pollutant loading reaching the stormwater runoff. They are overall management measures for pollution abatement.

In cases where the flows are high, then “end-of-pipe” measures - such as detention ponds, super pipes (for water quantity peak control), oil/grit separators or other measures can be considered if it is not fully possible to implement a combination of the LID stormwater management measures. The following sections describe LID and end-of-pipe measures that were considered for this project.

### 3.6.1 Bio-Retention

Bio-retention cells consist of vegetated depressions used to filter runoff rapidly using bio-retention soil media. The soil media include mulch and soil. Runoff is stored in the bio-retention cell until it infiltrates into native soils. Bio-retention cells help to reduce peak discharges by temporary storage, and to improve storm runoff water quality by filtration. Figure 4 illustrates the concept.

In this project there is limited space available within the road right-of-way for bio-retention measures.

### 3.6.2 Bio-Slopes

Bio-slopes are built within the roadway embankment to provide rapid filtration of the runoff as it leaves the roadway shoulder. The storm runoff is intercepted by a gravel trench, and is filtered through a mix of pea gravel, perlite, dolomite and gypsum. The runoff is not detained and there is no effect on water quantity. However, the filter provides water quality improvement. Figure 5 illustrates the concept.

In this project, bio-slopes cannot be used because the road will have an urban section with limited available space.
3.6.3 Catch Basin Controls

Catch basin controls are devices to prevent floatables from entering the storm sewer. The catch basin controls can be baffles, screen covers, geotextile fabrics, and other similar objects placed in the catch basins. Their main effectiveness is in reducing the possibility of floatables from entering the pipe network and receiving watercourse. These types of catch basins are maintained in the same manner and frequency as normal catch basins. An illustration follows in Figure 6.

![Figure 6 – Catch Basin Controls](image)

Catch basin controls will be considered in this project.

3.6.4 Gutter Filter

Gutter filters consist of a concrete gutter with a grate cover. The concrete gutter is filled with sand or sand and gravel. Storm runoff is filtered as it flows through the granular media. Figure 7 illustrates the concept.

In this project, it is felt that clogging of the gutter filters may be problematic; as such they will not be considered further.

![Figure 7 – Gutter Filter](image)

3.6.5 Infiltration Trenches and Strips

Infiltration trenches and strips consist of an excavated trench lined with geotextile and backfilled with stone, as illustrated in Figure 8. The purpose of the system is to promote infiltration of stormwater into the subsurface soils. In this project, infiltration trenches and strips may be considered as part of a water quality treatment train, subject to soil and space constraints.

![Figure 8 – Infiltration Trench](image)
3.6.6 Grassed Swales

The use of grass swales as the primary stormwater management practice is appropriate for all levels of protection, where the following conditions are met:

- The grass is kept at least 80 mm high;
- The maximum flow in the grassed swale for the design storm is less than 150 l/s; and,
- The maximum flow velocity is less than 0.5 m/s.

Under these conditions, it can be expected that the grassed swale may provide close to 90% removal of total suspended solids.

Grassed swales can be used for all levels of protection, where wetlands, wet ponds or sand filters cannot reasonably be utilized because of physical, engineering, property, environmental, or cost considerations; or for levels 3 and 4 protection, where the municipality would have to acquire additional property in order to reasonably accommodate infiltration, wetlands, wet ponds or dry ponds.

Water quality treatment with grassed swales is based on the flow velocity in the swale being less than or equal to 0.5 m/s, a maximum flow rate of 150 l/s, and a maximum depth of flow of approximately 0.25 m. In addition, vegetation should be allowed to grow higher than 75 mm to enhance the filtration of suspended solids. Figure 9 illustrates the concept.

Figure 9 – Grassed Swale

3.6.7 Enhanced Grassed Swales

Wide flat bottoms can be used to improve the water quality performance of grassed swales, thus permitting treatment of a greater overall area. The wide bottom helps to reduce the flow depth and velocity, consequently assisting in the settlement of suspended particles. In cases where the flow velocities cannot be reduced to the desired values, permanent rock flow checks along the swale can be used to promote settling. Flow checks reduce the effective slope of the swale where the slope is too steep to allow the maximum design velocity (0.5 m/s) to be achieved. The ponding behind the flow checks also provides treatment for a larger flow depth or flow rate than would be possible with a standard grassed swale. The values of flow rate, flow velocity, and depth used for grassed swales apply to enhanced grass swales.

There is little opportunity to apply grassed swales and enhanced grassed swales in the road right-of-way with an urban section. Their application is considered suitable for swales on private property, if owners are agreeable to such a retrofit.

3.6.8 Filter Strips

Filter strips are vegetated areas designed to accept runoff in the form of sheet flow. The vegetation filters out sediment and pollutants and promotes infiltration. Filter strips are suitable for small drainage areas (less than 2 ha). The filter strip can have a slope of up to 10% and the flow length can range from 10 to 20 m depending on the slope. The vegetated side slopes of a road function as a filter strip for sheet flow from the road.

On this road project there are limited opportunities to use filter strips within the road right-of-way, due to limited space for stormwater quality control.

3.6.9 Pervious Pavement

Pervious pavement is what it sounds like. Instead of a pavement impermeable barrier, pervious pavement allows a pathway for water to infiltrate. The City has indicated that this option for the roadway is not acceptable. The City is concerned with potential clogging, asphalt performance and increased maintenance and operating costs. As such, this option will not be considered in this project.

3.6.10 SWM Ponds

A SWM pond detains runoff during a storm event for approximately 24 to 48 hours. Water quality treatment is provided by sedimentation settling while the runoff is detained in the pond.

A minimum drainage area of 5 ha is generally required in order to provide an outlet orifice of sufficient size to minimize clogging. The length to width ratio should be in the order of 3:1 to 5:1 and the inlet and outlet should be at opposite ends of the facility.

Extended detention dry ponds that operate in a continuous mode are not as effective as extended detention wet ponds in removing storm water pollutants. Generally, dry ponds should only be used when wet ponds or wetlands cannot be implemented due to constraints such as temperature and land availability. Dry ponds are included in the MOE (2003) Design manual only for aquatic habitat protection levels 3 and 4.

In this road project there is no space available for SWM ponds, and as such they will not be considered in this project.
3.6.11 Oil/Grit Separators

Oil/grit separators (OGS) consist of underground detention chambers designed to trap and retain oil and sediment. The devices use sedimentation for suspended solids and phase separation to trap oil. Currently several manufacturers offer a variety of designs, which provide a relatively wide range of runoff treatment.

It is generally accepted that OGS are effective for drainage areas smaller than 2 ha, since OGS provide very little flow attenuation. They are designed to provide treatment for relatively frequent runoff events, and by-pass larger flows. Their effectiveness stems from treating runoff events that occur with regularity, but they cannot treat design storm level flows.

Notwithstanding the 2 ha traditional drainage limit, newly developed OGS by some manufacturers permit treatment of stormwater quality for much larger drainage areas. OGSs will be considered in this project as part of any treatment train approach for water quality measures.

3.6.12 Perforated Pipe System

Perforated pipe systems can be thought of as long infiltration trenches or linear soakaways that are designed for both conveyance and infiltration of stormwater runoff. They are underground stormwater conveyance systems designed to attenuate runoff volume and thereby, reduce contaminant loads to receiving waters. They are composed of perforated pipes installed in gently sloping granular stone beds that are lined with geotextile fabric that allow infiltration of runoff into the gravel bed and underlying native soil while it is being conveyed from source areas or other BMPs to an end-of-pipe facility or receiving waterbody.

Perforated pipe systems, as illustrated in Figure 10, can be used in place of or to compliment conventional storm sewer pipes, where topography, water table depth, and runoff quality conditions are suitable. They are suitable for treating runoff from roofs, walkways, parking lots and low to medium traffic roads, with adequate pretreatment. A design variation can include perforated catchbasins, where the catchbasin sump is perforated to allow runoff to infiltrate into the underlying native soil. Perforated pipe systems can also be referred to as eXfiltration systems, and percolation drainage systems.

Figure 10 – Perforated Pipe System

A perforated pipe system will be considered for this project. A geotechnical investigation is required to validate its site suitability.

3.7 Water Quality Treatment Selection

In reviewing the range of stormwater quality treatment options, it can be concluded that the following options, as part of a treatment train process, could be applied to Bell Farm Road. Their application is subject to geotechnical investigation findings.

- Catch basin controls;
- Oil/grit separators;
- Infiltration systems; and/or
- Perforated pipe systems.

Preliminary sizing of a perforated pipe system is provided in Appendix B. The final selection and sizing of options will be reviewed and confirmed during detailed design.

3.8 Storm Sewer Design

Preliminary sizing of storm sewers for Bell Farm Road was performed using the Rational Method, in accordance with the City of Barrie guidelines. The preliminary pipe sizes were incorporated into the EPASWM model (5-year event). Storm sewer design information is included in Appendix B.
3.9 Hydro-Technical Analyses

Hydrological analyses using EPASWMM (Version 5.2) have been performed for design storms (5-year and 100-year). The design storm considered is the SCS 6-hour event. Simulations were performed for existing and proposed road reconstruction conditions, with and without SWM LID measures. Peak flow results are presented in Table 3.

<table>
<thead>
<tr>
<th>Description</th>
<th>Return Event</th>
<th>Period</th>
<th>Existing condition peak flow (m³/s)</th>
<th>Proposed road peak flow (m³/s), with LID</th>
<th>Proposed road peak flow (m³/s), without LID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell Farm Road upstream of St. Vincent St.</td>
<td>5 year</td>
<td>Minor system</td>
<td>2.41</td>
<td>2.85</td>
<td>2.57 (9.8 % reduction compared to proposed)</td>
</tr>
<tr>
<td>Bell Farm Road upstream of St. Vincent St.</td>
<td>100 year</td>
<td>Minor and major systems</td>
<td>6.48 *</td>
<td>6.60 *</td>
<td>6.58 (0.3 % reduction compared to proposed)</td>
</tr>
<tr>
<td>* Represents potential peak flow for both the major and minor systems combined, under free-flow conditions, at the lower section of Bell Farm Road to St. Vincent Street (along model conduit section: C6).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The principle LID measure considered is a perforated pipe system (PPS). The PPS would be located between the Alliance Boulevard intersections for a distance of 300 metres. The significance of 300 metres is that it can meet water quality control objectives (refer to Section 3.4). Details for the perforated pipe system are further outlined in Appendix B.

Under this road reconstruction project, peak flows for the 5-year and 100-year return period events are anticipated to increase by 18%, and 2 %, respectively. Incorporating a perforated pipe system into the project for a 300 metre section can partially mitigate peak flows for the 5-year return period event. For the 100-year return period event, the 300 metre perforated pipe system has a limited peak flow attenuation effect.

An additional analysis was performed for a perforated pipe system along the entire length of Bell Farm Road. Under this scenario it was found that the 5-year and 100-year return periods closely matched existing condition peak flows.

Additional analyses will be undertaken during detailed design to refine the major / minor system. Further measures such as catchbasin controls and oil grit separators will be incorporated into the treatment train.

Sub-catchment areas 201 and 301 (reference Figure B1) are within the Willow Creek watershed, in the NVCA region. The existing road cross-section in these sub-catchment areas comprises 4 traffic lanes with concrete sidewalks on both sides of the road. It is anticipated that the road cross-section in these areas will remain essentially unchanged in terms of impervious percentage. Therefore no change in the peak runoff is expected. This will be confirmed during detailed design.

Hydrological information and model results are presented in Appendix B.

3.10 Erosion and Sediment Control

Erosion and sediment control during the construction stage will be governed by OPSS 805 – Construction Specification for Temporary Erosion and Sediment Control Measures, and will comprise the following minimum measures:

- The disturbed site will be enclosed with silt fence before construction starts.
- Only areas strictly required to proceed with construction will be stripped. These areas will be stabilized as soon as practical.
- Any disturbed area will be stabilized as soon as practical, especially swales and ditches.
- Areas stripped of vegetation will be surrounded by silt fence.
- A vegetated buffer will be maintained between disturbed areas and neighbouring properties where practical.
- Site access will be covered with clear stone and/or rip rap to reduce tracking of mud by truck tires.

3.11 Approvals

Design drawings for Bell Farm Road will be prepared as this project proceeds to detailed design. In the design phase specific design elements will be reviewed and confirmed. Future submissions and consent approvals will be required from the City of Barrie, LSRCA and MOECC, prior to proceeding to construction.

3.12 SWM Findings and Conclusions

Key findings and conclusions from the stormwater management analyses for Bell Farm Road are summarized below.

1. Road re-development will require stormwater management controls to address both stormwater quantity and quality, in accordance with City and Conservation policies, regulations and guidelines.
2. The following LID options, as part of a treatment train process, could be applied in Bell Farm Road: catch basin controls, oil/grit separators, infiltration systems, and/or perforated pipe systems. Their suitability is subject to geotechnical investigation findings.
3. Widening of Bell Farm Road will increase peaks flows by 18% for the 5-year return period and 2% for the 100-year return period event.
4. Incorporating a perforated pipe system into the entire length of the road widening project can control peak flow changes.
4.0 WATER DISTRIBUTION SYSTEM

This report section documents existing and proposed design recommendations for the water distribution system. Watermain information and analyses results using the EPANet model are provided in Appendix C. Findings presented herein are subject to confirmation at the detailed design stage.

4.1 Existing Watermain System

The City of Barrie’s water distribution system has a well interconnected network of transmission pipes mainly connecting the supply facilities to storage tanks in the network. The water supply is a multi-zonal network. Drinking water is supplied to Bell Farm Road as part of pressure zone 2N. The top water level in pressure zone 2N is reported to be 324.4 metres (Reference: Barrie System-Wide Transient Analysis, Génivar, 2013).

Existing pipe sizes and material in the Bell Farm Road Business Park are 200 mm diameter ductile iron pipe. Most of the pipes were installed in the period between 1972 and 1975. The current in-service age is up to 45 years. Pipe replacement along Bell Farm Road with a 300 mm diameter PVC pipe is proposed by the City of Barrie.

4.2 Water Network Model

The EPANet model is used to evaluate the local area network. A skeletonized model was set up for the Bell Farm Road study area, specifically under a steady state condition. Existing (200 mm) and proposed (300 mm) diameter pipes for Bell Farm Road were modelled. The model setup is illustrated in Figure 11.

Figure 11 – Model Schematic

Modelling assumptions and calculations are outlined in Appendix C. Maximum day water demands and fire flow criteria considered are based on information shown in Table 4.

Table 4 – Water Demand Flow Criteria

<table>
<thead>
<tr>
<th>Land Use Zoning or Other Parameter</th>
<th>Demand Flow Rate or Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone EM2 - Industrial Park</td>
<td>Average day: 50 m³/day/ha</td>
</tr>
<tr>
<td>Zone EM3 - Business Park</td>
<td>Average day: 35 m³/day/ha</td>
</tr>
</tbody>
</table>

4.3 Hydraulic Model Simulation

Water pressure results for the fire flow plus maximum day demand scenario are presented in Table 5. Fire flow for the existing 200 mm diameter Bell Farm Road pipe and a proposed pipe diameter increase to 300 mm diameter, are presented. Fire flows in Table 5 are exclusive of the maximum day demand and represent flows available in the pipe system at the various system nodes, based on either first reaching a residual pressure of 140 kPa, or at a 3.0 metre/second water velocity in any local pipe conduit.

Table 5 – Fire Flow Simulation Results

<table>
<thead>
<tr>
<th>Model Node ID</th>
<th>Location</th>
<th>Existing Condition (200 mm pipe size)</th>
<th>Proposed Condition (300 mm pipe size)</th>
<th>Available Fire Flow (L/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Bell Farm Road at west leg of Alliance</td>
<td>95 lps maximum pipe velocity of 3.0 m/s reached.</td>
<td>290 lps, maximum pipe velocity of 3.0 m/s reached.</td>
<td>700 lps @ 140 kPa maximum pipe velocity of 8.91 m/s theoretical</td>
</tr>
<tr>
<td>270 lps @ 140 kPa maximum pipe velocity of 7.39 m/s theoretical</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 lps</td>
<td>Bell Farm Road - midway</td>
<td>228 lps maximum pipe velocity of 3.0 m/s reached.</td>
<td>354 lps @ 140 kPa maximum pipe velocity of 4.46 m/s theoretical</td>
<td></td>
</tr>
<tr>
<td>169 lps @ 140 kPa maximum pipe velocity of 4.62 m/s theoretical</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>136 lps @ 140 kPa maximum pipe velocity of 2.66 m/s</td>
<td>260 lps @ 140 kPa maximum pipe velocity of 2.94 m/s</td>
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<td></td>
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</tbody>
</table>

Hazen Williams C value of 100 is used for the existing condition. C of 120 used for proposed 300 mm diameter pipe size scenario.

Note: Where theoretic velocities are shown, these values are in a turbulent or transition zone (Modie diagram), which are beyond the limitations of Hazen Williams equation; as such the results are considered invalid and are shown in the table for information purposes only.

Watermain pressure results in Table 5 indicate that a 300 mm diameter watermain can meet MOECC and City guidelines for fire flows plus maximum day demand at a residual pressure of 140 kPa.
The Fire Underwriters Survey (FUS) guide considers that a fire flow, for Commercial / Industrial land use, of between 10,000 to 12,000 litres/minute (167 to 200 lps), generally may be appropriate. This depends on the site specific building area, exposure and type of construction.

Based on the model results it is concluded that a 300 mm diameter pipe for Bell Farm Road can provide sufficient fire flows for an Industrial / Commercial Business Park.

4.4 Hydraulic Transient Analysis

A hydraulic transient analysis of the City water distribution system was performed by Genivar in 2013. Under various power failure scenarios, it was determined that the majority of pressure surges in Zone 2N vary between 80 and 100 psi (555 kPa – 690 kPa). Some areas (particularly adjacent to Zone 1) will experience pressures between 100 and 120 psi (690 kPa – 830 kPa). A range from -10 metres to 101 metres (-15 psi to 144 psi) may be expected.

A proposed PVC-DR18 pipe has a long-term rating (LTR) of 163 m (1630 kPa / 235 psi) and a short-term rating (STR) of 211 m (2110 kPa / 300 psi). This pipe material is considered to be sufficient for the anticipated range of transient pressure surges expected.

4.5 Watermain Frost Depth

The depth of frost penetration has been calculated based on formulas for predicting frost depth penetration under MOECC Guidelines for the Design of Water Distribution Systems. The frost depth for Bell Farm Road is calculated to be between 1.65 and 1.95 metres for a watermain pipe located in a trench with a silty sand cover soil type: SM and silty clay soil type SC. This includes a safety factor of 0.15 metres (Reference Appendix F – MOE Guidelines for the Design of Water Distribution Systems).

The City of Barrie standard for a watermain pipe minimum depth of cover is 1.7 metres. Frost depth of cover calculations are provided in Appendix C.

4.6 Future Design Submission(s)

Design drawings for Bell Farm Road will be prepared as this project proceeds to detailed design. In the design submission, specific design elements will be reviewed and confirmed. A Form 1 (Record of Watermains Authorization as a Future Alteration) submission, under a Drinking Water Works Permit, will be required for approval by the City of Barrie.

5.0 REFERENCES

- Planning and Design Manual of the Etobicoke Exfiltration System for Stormwater Management, Tran and Li, Ryerson University.
- Policies and Design Guidelines, various, City of Barrie.
- Sewer Inspection Reports, various, Sewer Technologies Inc., 2014.
Appendix A
Sanitary Sewer Review
Figure A2 - Zoning Map

Symbol Description

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>EM2</td>
<td>Industrial Park</td>
</tr>
<tr>
<td>EM3</td>
<td>Business Park</td>
</tr>
<tr>
<td>C4</td>
<td>General Commercial</td>
</tr>
<tr>
<td>R2</td>
<td>Residential Single Detached</td>
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</tbody>
</table>
Appendix B
Sanitary Sewer Review
B1 Sub-Catchment Data Information (EPASWMM input)

<table>
<thead>
<tr>
<th>ID</th>
<th>Area (Ha)</th>
<th>Segment Length (m)</th>
<th>Width Skew Factor (2-Sk)</th>
<th>SWM Width (m)</th>
<th>Slope %</th>
<th>XIMP Pre %</th>
<th>XIMP Post %</th>
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</thead>
<tbody>
<tr>
<td>101</td>
<td>3.13</td>
<td>250</td>
<td>1.75</td>
<td>438</td>
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<td>63</td>
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<td>1.9</td>
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<td>3.17</td>
<td>64</td>
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<td>3.67</td>
<td>250</td>
<td>1.2</td>
<td>300</td>
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<td>108</td>
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<td>City model</td>
<td>City model</td>
<td>City model</td>
<td>2.24</td>
<td>66</td>
<td>86</td>
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</table>

XIMP represents directly connected impervious percentage.

The Rational method ‘C’ value is calculated based on total impervious percentage (TIMP). A 5% increase in impervious area for the property portion of the sub-catchment (not road area) is considered to apply for TIMP.

Areas 201 and 301 are shown in the Rational Method spreadsheet.

B2 Rainfall

Rainfall curve information is based on City of Barrie RID curve, modified for climate change.

<table>
<thead>
<tr>
<th>Return Period</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year</td>
<td>853.608</td>
<td>4.699</td>
<td>0.766</td>
</tr>
<tr>
<td>100-year</td>
<td>1426.408</td>
<td>5.273</td>
<td>0.759</td>
</tr>
</tbody>
</table>

Equation: \( \text{Rainfall intensity (mm/hr)} = A + (\text{time} \times B)^C \)

B3 Perforated Pipe System (PPS) – Preliminary Sizing

Guideline: LID size is based on a 5:1 to 10:1 ratio of impervious area to facility treatment area. Using a 10:1 ratio for the Bell Farm Road direct contributing area (9.51 Ha) with a water quality target of 30 m$^3$/ha, yields a minimum water quality volume (WQV) requirement of 285 m$^3$.

Minimum reservoir stone depth (Dr) = Soil Infiltration rate (I) x Ts / Vs
= 600 mm to 1200 mm (value range, say 1000 mm)
I of 10 mm/hr ...assumed
Ts...draw down time of 24 hours to 48 hours
### STORM SEWER - RATIONAL METHOD DESIGN SHEET

**Project:** City of Barrie  
**Date:**  

<table>
<thead>
<tr>
<th>INDIVIDUAL RUNOFF</th>
<th>DESIGN STREET TO AREA</th>
<th>C</th>
<th>INTENSITY</th>
<th>FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Tc</td>
<td>(mm/hr)</td>
<td>(l/s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>71.10</td>
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</table>

### EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

**NOTE:** The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

----------

**Analysis Options**

**Flow Units:** CMS  
**Process Models:** Rainfall/Runoff: YES  
RDII: NO  
Snowmelt: NO  
Groundwater: NO  
Flow Routing: YES  
Ponding Allowed: NO  
Water Quality: NO  
Infiltration Method: HORTON  
Flow Routing Method: DYNWAVE

**Starting Date:** 01/20/2017 00:00:00  
**Ending Date:** 01/20/2017 06:00:00  
**Antecedent Dry Days:** 0.0  
**Report Time Step:** 00:15:00  
**Wet Time Step:** 00:05:00  
**Dry Time Step:** 01:00:00  
**Routing Time Step:** 30.00 sec  
**Variable Time Step:** YES
### Runoff Quantity Continuity

- **Total Precipitation**: 1.196 hectare-m, 58.905 mm
- **Evaporation Loss**: 0.000 hectare-m, 0.000 mm
- **Infiltration Loss**: 0.455 hectare-m, 22.398 mm
- **Surface Runoff**: 0.717 hectare-m, 35.300 mm
- **Final Storage**: 0.030 hectare-m, 1.492 mm

### Flow Routing Continuity

<table>
<thead>
<tr>
<th>Subcatchment</th>
<th>Dry Weather Inflow</th>
<th>Wet Weather Inflow</th>
<th>RDII Inflow</th>
<th>External Inflow</th>
<th>External Outflow</th>
<th>Flooding Loss</th>
<th>Evaporation Loss</th>
<th>Exfiltration Loss</th>
<th>Initial Stored Volume</th>
<th>Final Stored Volume</th>
<th>Continuity Error (%)</th>
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<td>0.000</td>
<td>0.000</td>
<td>0.005</td>
<td>0.000</td>
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</tbody>
</table>

### Time-Step Critical Elements

- **Link C7 (85.53%)**
- **Link C8 (8.84%)**

### Highest Flow Instability Indexes

- **Link C7 (4)**
- **Link C8 (2)**

### Routing Time Step Summary

- **Minimum Time Step**: 0.50 sec
- **Average Time Step**: 4.71 sec

---

**Node Depth Summary**

---

**Reported**

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<tr>
<th>Max Depth Node</th>
<th>Type</th>
<th>Meters</th>
<th>Meters</th>
<th>Meters</th>
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### Conduit Surcharge Summary

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Analysis begun on: Wed Feb 22 10:01:59 2017
Analysis ended on: Wed Feb 22 10:01:59 2017
Total elapsed time: 00:00:00
Appendix C
Water Distribution System

C1 Watermain Depth of Cover (Frost)

Soils

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<td>SM</td>
<td>( X_1 = 0.18 + 0.044 \left( C \right)^{0.5} )</td>
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<td>Light Blue</td>
<td>Schomberg</td>
<td>SC</td>
<td>( X_3 = 0.30 + 0.050 \left( C \right)^{0.5} )</td>
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Design Freezing Index \( C \) for Barrie = 900
Pipe cover includes a safety factor of 0.15m.

City design guidelines stipulate that watermains shall be installed with a minimum cover of 1.7 metres over the mains in urbanized areas.

C2 Water Demand

<table>
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<th>Average Day / Maximum Day Flow Calculations</th>
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<td>Land Use Area (Ha) / Flow Rate</td>
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<tr>
<td>------------------------------------------</td>
</tr>
<tr>
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<tr>
<td>28 m/day</td>
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Maximum day factor: 2.5
Maximum day peak total flow: 30.08 L/s or 5.01 L/s for each of the model 6 site nodes.
C3 EPANET Results

Model Overview

Input File: Bell.net

Bell Farm Road                  Water Distribution System

Link - Node Table:

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Node Results:

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Link Results:

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Node Results:

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Appendix E
Arborist Report
Preconstruction Arborist Report

Prepared For:

BT Engineering
100 Craig Henry Drive
Ottawa, ON
K2G 5W3

Site Address:

Bell Farm Road, Ross Street, Collier Street, Bayfield Street,
Barrie, Ontario

November 25, 2016

Prepared By:

John Stewart
Principal Consulting Arborist
ISA ON-0455AM
urbantreemanagementgroup@gmail.com

Summary
This report is in regards to the Bell Farm Road improvements as well as Ross, Collier and Bayfield Streets, for the City of Barrie.

This project will require construction within the Minimum Tree Protection Zone (MTPZ) of multiple trees. All trees with proposed construction within the MTPZ must have hoarding installed to the distance (measured from the base of the tree) as detailed in the construction documents with the consulting arborist's comments.

One hundred and fifteen trees were inventoried and recommendations made for the affected trees. Due to the scope of work and lane widening, several trees will need to be removed. The remaining trees will need to be protected and preservation comments are provided within this report.

Assignment
The Urban Tree Management Group was authorized by BT Engineering to assess and inventory all the trees within the project site for proposed road improvements and to create a written report on the effects to the inventoried trees as a result of the proposed project, if any.

Limitations of the Assignment
It to be understood that The Urban Tree Management Group was contracted to conduct an identification, health and structure assessment of the inventoried trees as they relate to City by-laws. It is the obligation of the property/project owner to ensure the recommendations provided within this report are carried out, as deemed appropriate by City or governing staff.

It must be also be understood that anyone reading this report should be somewhat familiar with trees and all their potential reactive physiological responses to the proposed project; otherwise further discussion with the consulting arborist will be needed to understand the impact to said trees.
Discussion

Tree preservation is a pro-active measure that starts at the planning stage and continues throughout the project until completion. It is important to understand that tree root protection affects overall tree health and survivability and is the main key in effective tree preservation success.

Work within the Minimum Tree Protection Zone (MTPZ) of any tree would be considered serious root injury and would leave the tree with a high potential of structural failure or serious decline. Boxes surrounding existing trees are based on the above mentioned drip-lines recorded in the field and represent a 'best case scenario' for tree protection needs. The on-site project arborist will have final approval of tree protection requirements.

The use of supersonic air tool (SSAT) or hydro vac may be required for trees with construction within the MTPZ while the construction project is underway in order to ensure these trees are reasonably preserved. Tree Preservation Specifications are there to protect trees while providing the necessary information and actual footprints to ensure all work around trees can continue efficiently.

Increasing tree protection zone distances should be done at the design stage. Field marking the exact locations of new proposed structures and underground utilities by the planning personnel has proven to be the most effective way to ensure accurate distances from trees. Generally speaking, it is better to add some fill than to excavate roots.

Further discussions may be needed to ensure methods are useful, cost effective and will provide for the trees that are being protected.

Tree Protection Zone (TPZ)

This is the area(s) to be protected defined by the City of Barrie and by The Urban Tree Management Group and will change from tree to tree due to structural boundaries. Where some fill or excavate must be temporarily located near a TPZ, a plywood barrier must be used to ensure no material enters the TPZ. Rigid Hoarding is needed when construction machines are very close (within 1-2 metres) of the trunk to prevent accidental bumps from machines. These seemingly harmless bumps stay with the tree forever and can cause significant chronic stress to the tree.

There must not be any storage of any materials within the TPZ of any protected tree.

Tree Protection Signs

It is recommended that the City of Barrie create Tree Protection Signs similar to the one found in Appendix 6. A sign should be displayed on some of the TPZ’s. These signs could be made in bulk at a discounted rate and installed on the hoarding in various locations. Signage informs the public and reminds the contractors of the significance of the TPZ’s and the efforts put forward by the City of Barrie in tree preservation.

Root Pruning Protocol

Root pruning is not a common skill set and should be performed by a qualified arborist familiar with root excavation and root pruning. Trees roots are underground and are otherwise not detectible without physical exploration: using a Supersonic Air Tool (SSAT) such as an Air Spade® or day lighting vehicle (Hydro-Vac). Root pruning trenches must be at least the depth of the deepest root (usually 30-60cm) and about 15cm wide. Roots are assessed by the arborist with regard to the effects construction may have on the tree, and then either pruned with a sharp tool, or possibly recommended for removal, or a design change may be needed on-site to accommodate.

The use of a rotary saw is not acceptable to prune the roots of trees.

Root Pruning within the MTPZ (distance measured from the base of the tree calculated by multiplying the dbh by 6) of any tree requires root exploration via supersonic air tool or day lighting vehicle to first remove the soil and expose the roots. A Certified Arborist (CA) will be required onsite during the initial excavation.
to make appropriate recommendations to the contractor for appropriate tree preservation as required. When trees are damaged or injured significantly, the CA must notify the project arborist immediately to report the circumstances. Generally roots under 2 cm in diameter can be pruned using a sharpened tool such as hand pruners or a sharpened spade under the supervision of the Certified Arborist. Roots between 2 and 8 cm in diameter can be pruned by the Certified Arborist using a sharp tool, such as a handsaw, hand pruner or loppers and under the supervision of the Construction Inspector and/or the advisement of the Project Arborist. All roots over 8 cm in diameter must be assessed by the Project Arborist prior to pruning unless the arborist on-site can confidently assess the effect of the removal of the root as not detrimental to the tree. This must be documented by the Certified Arborist and reported to the project arborist immediately.

1. Root Pruning within the Critical Root Zone (the distance measured from the base of the tree calculated by multiplying the dbh by 12) and outside of the MTPZ, typically requires the use of a sharpened garden spade, cutting a line to a depth of about 30 cm by the on-site Certified Arborist and the advisement of the Project Arborist if needed. However, the same pruning protocol for the size of roots encountered (in the MTPZ) applies to the roots found within this area.

The trenches (when using SSAT) are typically backfilled with the same excavated soil or new topsoil or compost, and hoarding should be installed along this trench to protect the remaining roots.

Hoarding
Hoarding (Tree Protection Fencing (TPF)) is used on construction sites to ensure that damage to the tree and its root zone is prevented. This distance is typically located by the MTPZ. However, it must be understood that sometimes this distance is not achievable due to infrastructure being too close. It must be further understood that the hoarding distance sometimes must accommodate a larger tree protection zone (than the typical MTPZ distance) due to a limited root growing area/volume (this area is typically defined by the Project Arborist.)

Observations and Recommendations
Refer to the Tree Inventory Table found in the supporting materials for further details and observations.

All of the trees recommended for retention should be protected and are noted in the inventory table. It is recommended that any transplanting be performed by either a spade truck in order for maximum success or hand dug by a Certified Arborist familiar with such a process. In either transplanting option, a Certified Arborist should be on site to monitor and direct the process to ensure proper arboriculture standards are followed. Remaining trees should have root pruning performed at the extent of the MTPZ (minimum tree protection zone) by the use of an Air Spade® and proper root pruning protocols. Potential site elevation and soil compaction may have too high of an impact on these trees for them to remain without remedial attention.
Conclusion

All trees with proposed construction within the CRZ will have hoarding installed to define a specific TPZ. They will be the least impacted from construction if the hoarding and recommended root pruning is completed prior to construction.

If preservation methods outlined in this report are adhered to, the remaining trees will incur minimal injuries. If the remaining trees have equally respected CRZ’s where machines are not used and foot traffic is kept to a minimum, even though there will not be any hoarding, these trees’ roots will incur no additional stress from the proposed construction.

If there is any need to remove the hoarding for any reason, approval from the City of Barrie must be granted prior, otherwise there may be a risk of losing a security deposit placed by the contractor, or the contractor may be subjected to remedial work or fines deemed appropriate by the City of Barrie staff.

If proper care is provided by the contractors and all involved in regards to the trees, and the recommendations of this report are followed, the remaining trees on the property should incur minimal injuries and should have an appropriate survival rate. Any alteration to the Tree Preservation Plan or this report’s recommendation must be approved prior to work commencing.

During the field inventory component and site visits for this project no endangered or species at risk were located or noticed.

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Appendix 1 – Tree Inventory Table
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Appendix 2 – Photos

Bell Farm Road Tree #1

Bell Farm Road Tree #2 through 6

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Bell Farm Road Utility Lines near Trees #9 through 15

Bell Farm Road Tree #16 Ditch near MTPZ

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Concrete Ditch and Fire Hydrant near MTPZ of Bell Farm Road Tree #19

Bell Farm Road Tree #21 through 79

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Bell Farm Road Tree #81 Ditch in MTPZ

Bell Farm Road Tree #81 Fire Blight

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Ross Street Tree #92 and #94 Sidewalk in MTPZ

Ross Street Tree #95 through #98 Sidewalk near MTPZ
Collier Street Tree #99 Sidewalk in MTPZ

Collier Street Tree #99 Previous Construction in MTPZ

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Collier Street Tree #100 through 103 Sidewalk in MTPZ

Ross Street Tree #111 through 115 Sidewalk near MTPZ
### Appendix 3– Glossary of Common Arboricultural Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Organic Matter</td>
<td>Material derived from the growth (and death) of living organisms. The organic components of the soil.</td>
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<tr>
<td>CRZ</td>
<td>Acronym for Critical Root Zone, also known as the Critical Root Zone (see definition above), within which there is a high likelihood of encountering roots that are necessary for the survival for the tree.</td>
</tr>
<tr>
<td>Project Arborist</td>
<td>The consulting arborist retained to provide all tree preservation recommendations to the project manager or contractors on a given construction project.</td>
</tr>
<tr>
<td>Qualified Arborist</td>
<td>An arborist who has documented related training (i.e. ISA, MTCU, or equivalent) and on-the-job experience (minimum of 5 years)</td>
</tr>
<tr>
<td>Radial trenching</td>
<td>Technique for aerating the soil or alleviating compaction around a tree by removing and replacing soil (which may be amended) in trenches (typically 300mm deep and 150mm wide) made in a spoke like pattern (radially from the trunk) in the root zone to improve conditions for root growth.</td>
</tr>
<tr>
<td>Reaction Wood</td>
<td>Wood formed in leaning or crooked stems or on lower or upper sides of branches as a means of counteracting the effects of gravity.</td>
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**Removal Cut**
- A cut that removes a branch at its point of origin. Collar cut.

**Reduction Cut**
- A pruning cut that reduces the length of a branch or stem back to a lateral branch large enough to assume apical dominance.

**Resistograph®**
- A brand name of a device consisting of a specialized micro-drill bit that drills into trees and graphs density differences that are used to detect decay.

**Soft-Scaped**
- Landscaping practices that do not involved solid or deeply-dug foundations. Patios consisting of slab rocks laid on-top of the soil with minimal excavation and base (less than 1cm) and causing minimal damage to existing tree roots.

**Static Support System**
- Cabling system that utilizes rigid materials such as rods and steel cables to limit movement and provide constant support of limbs.

**Structural cells**
- Modular system consisting of units of soil and integrated support structures that serve both as a foundation for paved surfaces and a hospitable environment for tree root growth.

**Structural pruning**
- Pruning to establish a strong arrangement or system of scaffold branches.

**Structural Soil™**
- Pavement substrate that can be compacted to meet engineering specifications yet remains penetrable be tree roots in the urban environment. Composed of angular crushed stone, clay loam, and hydrogel mixed in a weight ratio of 100:20:0.03. Developed at the Urban Horticulture Institute, Cornell University, Ithaca, NY.

**Supersonic Air Excavation Techniques (SSAT)**
- A methodology using a device that directs a jet of highly compressed air to excavate soil. Used within the root zone of trees to avoid or minimizing damage to the roots, or near underground structures such as pipes and wires to avoid or minimize damage to them.

**Tree Protection Zone – (TPZ)**
- Defined area within which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees, especially during construction. TPZ is sometimes based on a minimum multiple of dbh (e.g. 6:1, 6cm of ground distance from the trunk for 1cm of dbh).

---

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Walls

Trees have 4 walls in a process known as compartmentalization.
- Wall 1 prevents decay moving up and down in a tree
- Wall 2 prevents decay moving inward in a tree
- Wall 3 prevents decay moving laterally in a tree
- Wall 4 is the new growth formed on the outside of the tree, callus growth.

Woundwood

Lignified, differentiated tissues produced on woody plants as a response to wounding.

Appendix 4 - References

2. Dujesiefken, Dr. Dirk, 2012. Director of the Institute for Tree Care in Germany, The CODIT Principle, research presented on cambial regrowth on trees after injury at the Annual ISA Conference in Kingston Ontario
4. ISA, 2010. Glossary of Arboricultural Terms
Appendix 5 - Arborist Qualifications

JOHN STEWART
| urbantreemanagementgroup@gmail.com | (905) 979 8244

WORK EXPERIENCE

PRINCIPAL CONSULTING ARBORIST, THE URBAN TREE MANAGEMENT GROUP
2016 - PRESENT
Conduct site monitoring and reporting for public and private sector construction projects for delivery to municipal foresters to ensure adherence to Tree Protection bylaws and specifications. Reports include mitigating recommendations as needed if subject trees are negatively impacted.
Perform vegetation impact assessments and pre-construction reports for civil infrastructure projects for various municipalities.
Complete tree risk assessments in both public and private settings through the utilization of TRAQ/QTRA/TRACE protocols and procedures.
Provide expert witness testimony in a variety of municipal and private tree risk related situations.
Conduct various tree health assessments and provide mitigating options and procedures. Create and carry out Plant Health Care (PHC) programs.
Perform professional expert arboriculture practices necessary to provide complete and ethical tree care.

SENIOR CONSULTING ARBORIST, DAVEY RESOURCE GROUP
2014 - 2016
Perform vegetation impact assessments and pre-construction reports for civil infrastructure projects for various municipalities throughout the Golden Horseshoe and Greater Toronto Areas.
Conduct site monitoring and reporting for public and private sector construction projects for delivery to municipal foresters to ensure adherence to Tree Protection bylaws and specifications. Reports include mitigating recommendations as needed if subject trees were negatively impacted.
Supervision and management of consulting arborists.
Completion of tree risk assessments utilizing GIS software in both public and private settings through the utilization of TRAQ protocols.
Completion of several visual tree inventory projects within a municipal context.

MANAGER OF FORESTRY AND HORTICULTURE, CITY OF WATERLOO
2010 – 2014
Responsible for the daily activities and programs of the Forestry and Horticulture Departments.
Create and maintain budgets, report writing, briefing notes, strategies and council presentations.
Developed Emerald Ash Borer Management Plan and oversaw execution of plan.
Responsible for tree maintenance on Region of Waterloo right of ways.
Filled in as Acting Director of Environment and Parks on a regular basis.
Liaised with local media as necessary.
Oversaw winter snow removal operations for Parks Department.
Liaised with community groups such as TD Green Streets, Trees Canada and 10000 Trees.
Negotiated easement and secondary land use agreements with organizations such as Hydro One and Grand River Conservation Authority.

FORESTRY OPERATIONS COORDINATOR, GRAND RIVER CONSERVATION AUTHORITY
2008 – 2010
Responsible for the daily activities of the forestry operations.
Risk assessment and hazard mitigation within the conservation areas and lands.
Responsible for the care of nursery stock including bare root refrigerated stock and potted material.
Liaised with tree planting initiative groups such as Trees for Guelph, Trees for Mapleton and Green Legacy.
Responsible for noxious weed management with all conservation properties.
Responsible for chainsaw safety training for all GRCA employees.
URBAN FORESTRY FOREMAN, CITY OF BRAMPTON
2006 – 2008
Responsible for the daily activities and scheduling of the city’s forestry department.
Met with residents, councilors and consultants to discuss, diagnosis and prescribe courses of action on Brampton’s urban forest.
Had a key role in several events and initiatives such as the Communities in Bloom competition in which the City of Brampton was named the National Champion 2006 and World Champion 2008. During the 2008 event our forestry department received the highest ranking amongst Canada’s other municipality forestry departments.
Acted as Brampton’s delegate in a cooperative with Trees Canada and Toronto Conservation. This cooperative designed and created a community education forest from a regional buffer zone in order to help educate local schools and community groups on their urban forest.
Led a team from Brampton’s forestry department to help out the Callander Bay community, which was devastated by a summer storm in 2006. Oversaw winter snow removal operations within Parks Department.

EDUCATION AND TRAINING
INTERNATIONAL SOCIETY OF ARBORICULTURE
CERTIFIED ARBORIST: ON 0455AM
CERTIFIED MUNICIPAL SPECIALIST
CERTIFIED TREE RISK ASSESSMENT QUALIFIED
HUMBER COLLEGE
HORTICULTURE APPRENTICESHIP PROGRAM
ARBORICULTURE APPRENTICESHIP PROGRAM
ELSA
SAFETY AND AWARENESS FOR LINE CLEARING CERTIFICATE
SAFETY IN LINE CLEARING CERTIFICATE
8 TON CRANE CERTIFICATE
ARBORICULTURE CANADA
CHAINSAW SAFETY AND TECHNICAL TREE FELLING CERTIFICATE
HAZARD AND DANGER TREE CUTTING AND FELLING CERTIFICATE
TREE DYNAMICS AND INTEGRATED RISK ASSESSMENT CERTIFICATE
ONTARIO ARBOIRST PROVINCIAL DESIGNATION 444A-373728
PNW-International Society of Arboriculture – Certified Tree Risk Assessor Qualification (TRACE)
 Quantified Tree Risk Assessment System – Quantified Tree Risk Assessor (QTRA No.4426)
Butternut Health Assessor – BHA # 569 designated by the Ministry of Natural Resources and Forestry (MNRF),
Ontario Exterminator License – Landscape Exterminator 047496
OPSIA – PROFESSIONAL CHAINSAW OPERATOR AND TRAINER
EMERGENCY FIRST AID, CPR/AED A
MENTAL FIRST AID CANADA – BASIC MENTAL FIRST AID CERTIFICATE
ONTARIO DZ DRIVER’S LICENSE
OCCUPATIONAL HEALTH AND SAFETY, SUPERVISOR HEALTH AND SAFETY AWARENESS
TEACHING AND TRAINING EXPERIENCE
HUMBER COLLEGE OF APPLIED TECHNOLOGIES, Teacher Arboriculture Apprenticeship Program
Taught the classes of Plant Health Care and Arboriculture Theory for three years
Technician for the Advanced Climbing class for two years
COLLEGE OF THE NORTH ATLANTIC, Instructor, Skills Development Program
Contract Instructor for the college delivering modern climbing and felling techniques for this skills development program
UNIVERSITY OF TORONTO, Instructor, Employee Safety Training
Delivered chainsaw safety and operation, chipper and stumper operation and felling procedures programs to the maintenance staff for the university.

PROFESSIONAL VOLUNTEER ACTIVITIES
ISAO Board Member with duties including Trade Magazine and MAUF Liaison
Technical Editor of Ontario Arborist magazine for ISAO
ISAO Climbing Competition Committee Member
ISA Exam Proctor for ISA Certifications
MTCU Industry Committee Member - Arboriculture
Part of a risk management for woodlots committee for MAUF (Municipal Arborist and Urban Foresters Association).

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Appendix F
Land Use Planning Report
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Bell Farm Road EA
Land Use Planning Report
November 2016

1.0 Introduction

BT Engineering (BTE) was retained by the City of Barrie to prepare a Land Use Planning Report as part of the Bell Farm Road Environmental Assessment Study. The land use review examined the current and future land uses in the Study Area, which includes commercial, industrial and residential areas.

The project location is illustrated in Figure 1.

Figure 1: Project Location
2.0 Study Area

The area under study is located north of downtown Barrie. The Study Area is delineated by Highway 400 in the north, St. Vincent Street on the west side, Cynthia Court, Roslyn Road and Rose Street in the south, and Duckworth Street in the east. This encompasses all of Bell Farm Road and the businesses on the road.

The land uses in the study area are commercial, industrial and residential. Section 3.2 includes a detailed overview of the current land uses in the Study Area. The Study Area can be seen in Figure 2.

3.0 Land Uses in Study Area

3.1 City of Barrie Official Plan

The Official Plan (OP) of the City of Barrie provides guidance for consideration of land use changes, the provision of public works, actions of local boards, municipal initiatives, and the actions of private enterprise. Section 5.4 of the City of Barrie Official Plan outlines the transportation goals of the City, including: “To promote [...] all forms of active transportation, safe integration and connectivity between these various modes of transportation will be encouraged.”

There are 10 schedules for the land uses, as per the OP, as follow:

- Schedule A – Land Use
- Schedule B – Planning Areas
- Schedule C – Special Policy Areas
- Schedule D – Road Plan
- Schedule E – Road Widening Plan
- Schedule F – Watercourses
- Schedule G – Drinking Water System Vulnerable Areas
- Schedule H – Natural Heritage Resources
- Schedule I – Intensification Areas
- Schedule J – Lake Simcoe Watershed

The lands within and surrounding the Study Area are designated as General Commercial, General Industrial and Residential areas by the City of Barrie’s Official Plan (OP) Schedule A, as shown in Figure 3. A closer view of the Study Area is shown in Figure 4.

Based on the Schedule A land use plan:

- Bell Farm Road is designated General Commercial to the east and General Industrial to the west; and,
- The land along Cynthia Court, which backs onto Bell Farm Road, is designated Residential.

There are no major bodies of water crossing or near Bell Farm Road.

Refer to the Official Plan for permitted uses and policies pertaining to general industrial, general commercial and residential lands.

---

1 City of Barrie Official Plan (2010)

2 City of Barrie Official Plan
Based on the Schedule D road plan, Bell Farm Road is classified as a Major Collector road, and it runs parallel to Highway 400.

Based on the Schedule E road widening plan, Bell Farm Road has a 26 m right-of-way.

3.2 Bell Farm Road Land Uses
Bell Farm Road is mostly surrounded by commercial and industrial properties. Buildings and properties along Bell Farm Road are presented in Section 3.2.1 and Section 3.2.2 starting from the east end of Bell Farm Road, at the intersection with Duckworth Street, proceeding west to the St. Vincent Street intersection.

3.2.1 North Side of Bell Farm Road
The buildings and properties shown in Photo 1 to Photo 10 illustrate businesses on the north side of Bell Farm Road.
Photo 1: 140 Bell Farm Road, Georgian College Student Residence, approximately 125m west of Duckworth Street

Photo 2: 130 Bell Farm Road, commercial strip mall and parking lot, approximately 200m west of Duckworth Street

Photo 3: 110 Bell Farm Road, Storage Mart, approximately 325m west of Duckworth Street

Photo 4: 100 Bell Farm Road, physiotherapy clinic, approximately 360m west of Duckworth Street
Photo 5: 80 Bell Farm Road, Pavliks IT business, approximately 440m west of Duckworth Street

Photo 6: 60 Bell Farm Road, Barrie Police building and businesses, approximately 590m west of Duckworth Street

Photo 7: 40 Bell Farm Road, commercial businesses, approximately 710m west of Duckworth Street

Photo 8: 20 Bell Farm Road, Asia Wok restaurant, approximately 190m east of St. Vincent Street
3.2.2 South Side of Bell Farm Road
Shown in Photo 11 to Photo 19 are businesses along the south side of Bell Farm Road, and a small section of backyard fences of a residential development on Cynthia Court.

Photo 11: 125 Bell Farm Road, office building, approximately 125m west of Duckworth Street

Photo 12: 115 Bell Farm Road, commercial businesses, approximately 230m west of Duckworth Street

Photo 9: 20 Bell Farm Road, commercial businesses (continuation of mall with Asia Wok), approximately 190m east of St. Vincent Street

Photo 10: 4 Bell Farm Road, commercial businesses, on the northeast corner of the intersection of Bell Farm Road and St. Vincent Street
Photo 13: 93 Bell Farm Road, Barrie Minor Hockey Association building (seen on left), approximately 360m west of Duckworth Street

Photo 14: 79 Bell Farm Road, Barrie Police building, approximately 470m west of Duckworth Street

Photo 15: 65 Bell Farm Road, The Original Mom’s Restaurant, approximately 540m west of Duckworth Street

Photo 16: 59 Bell Farm Road, commercial businesses, approximately 590m west of Duckworth Street
Photo 17: Backyard fences of houses on Cynthia Court (the street south of Bell Farm), approximately 600m west of Duckworth Street

Photo 18: 15 Bell Farm Road, Barrie Fire Station, approximately 120m east of St. Vincent Street

Photo 19: 5 Bell Farm Road, commercial businesses, southeast corner of the intersection of Bell Farm Road and St. Vincent Street
Appendix G
Traffic Noise Impact Report
Executive Summary

BT Engineering Inc. (BTE) was retained by the City of Barrie to conduct a noise assessment for the Bell Farm Road Improvements Environmental Assessment (EA) Study. No increase in traffic volumes, other than natural growth, is expected on Bell Farm Road and the noise study was conducted for a 10 year future planning horizon. The study area contains a mix of commercial, industrial and residential dwellings and therefore a noise assessment is required to determine the effects of future traffic on noise levels on Bell Farm Road.

The analysis was conducted using acoustical modelling software, STAMSON Version 5.1. Specifically, the analysis included: determination of the characteristics of the Noise Sensitive Area (NSA); noise modelling; and an assessment of the need for mitigation measures required to meet the appropriate noise criteria for developments adjacent to existing transportation corridors.

Sound level contours were determined for Bell Farm Road and Highway 400. Highway 400 is the predominate source of roadway noise. The forecast increase in sound level is less than 5 dBA and therefore noise mitigation is not warranted for residential units on the south side of Bell Farm Road.

1.0 Introduction

BT Engineering Inc. (BTE) was retained by the City of Barrie to conduct a noise assessment for the Bell Farm Road Environmental Assessment.

The following report summarizes the technical analysis of sound level changes for the 10-year horizon. The report has been prepared following the methodology of the MTO Noise Manual, MOECC/MTO Noise protocol and MTO Directive A-1.

The project will include improvements for active transportation as well as vehicular usage. Within the 10-year planning horizon, Bell Farm Road will be widened to a three-lane cross section with a four-lane cross section approaching the intersection of Bell Farm Road and Duckworth Street. For the purpose of this review, both Bell Farm Road and Highway 400 are aligned east/west.

There are no rail lines located within close proximity to the Study Area; therefore no railway noise source has been included in the analysis. See Figure 1.1 for the Study Area of the proposed project noise impacts.

A representative modelling was completed for 36 Cynthia Court (receiver site) to determine the effects of traffic at that residential property.

![Figure 1.1: Study Area](image-url)
2.0 Existing Data
The limits of the Study Area, as shown in Figure 1.1, were defined by assessing impacts associated with a natural increase in traffic for a 10-year horizon.

The noise source considered was vehicular traffic noise on Bell Farm Road and Highway 400. No other noise sources, such as rail and aircraft, were considered for the Study Area. The assessment was performed in accordance with the MTO Environmental Guide for Noise and MOECC/MTO Noise protocol.

The traffic data used, such as posted speed limits, and traffic volumes and characteristics, are summarized in Table 2.1. The traffic volumes used in the analysis were derived from forecasts completed in the EA study. A 10-year horizon was selected for analysis to assess future conditions following provincial practices for noise analysis. The forecast traffic demand predicts no growth in vehicular traffic associated with the improvements.

<table>
<thead>
<tr>
<th>Street Name</th>
<th>Posted Speed Limit (km/h)</th>
<th>AADT Current (2016)</th>
<th>Future (2026) Without Project</th>
<th>Future (2026) With Project</th>
<th>Medium Trucks</th>
<th>Heavy Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell Farm Road</td>
<td>50</td>
<td>7,000</td>
<td>7,700</td>
<td>7,700</td>
<td>1.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Highway 400</td>
<td>100</td>
<td>85,000</td>
<td>93,900</td>
<td>93,900</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

3.0 Methodology
The STAMSON 5.1 noise software program, which is approved for use on projects requiring noise assessments, was utilized to determine sound levels. The sound levels were calculated using STAMSON with the input of data such as traffic and topographical characteristics (i.e. presence of dense trees).

The general overall procedure followed in the noise analysis included:
1. Identification and location of receiver sites within the NSA.
2. Prediction of equivalent sound levels.
3. Assessment of the need for mitigation measures required to meet the appropriate noise criteria.

Acoustic modelling projected future 2026, 24 hour equivalent sound levels (Leq's) within the study area at the receiver site having a noise sensitive land use (residential property). Sound levels were generated in the Study Area for the future year 2026 conditions.

Traffic Input Data
Bell Farm Road
Approximately 7,700 vehicles/day are projected to use Bell Farm Road in the 10-year planning horizon (with or without the project).

Highway 400
Approximately 93,900 vehicles/day are projected to use Highway 400 by 2026.

3.1 Additional Input Variables
In addition to traffic volumes, the following STAMSON input variables were used or considered for the calculation of future sound levels:

- Topography (hills, flatlands) – the site is generally flat
- The intermediate ground surface (hard surface reflects sound, soft surface absorbs sound)
- Distance, in metres, from source to receiver, using the centreline of the road as the source
- The angle at which the receiver (building) intercepts the source (road), measured relative to the perpendicular line between the source and the receiver
- Receiver height, in metres
- Posted speed limit (Bell Farm Road is 50 km/h, Highway 400 is 100 km/h)
- Depth of woods (0-30 m, 30-60 m, 60 m or more)
- Roadway grade (slope)
- The percentage of commercial vehicles on Bell Farm Road was used from traffic counts performed in 2016
- The percentage of commercial vehicles on Highway 400 was estimated from traffic counts provided by MTO: 5 % medium/10 % heavy trucks
4.0 Conclusion

The sound level contours for the existing noise levels and future noise levels are illustrated in Figure 4.1 and, Figure 4.2 respectively. Sound levels on Bell Farm Road are dominated by sound levels from Highway 400. The sound level at the receiver site is forecast to increase by 1 dBA with or without the project. The sound level at the receiver site is shown in Table 4.1. The STAMSON outputs for the receiver site are included in Appendix A.

![Figure 4.1: Existing Sound Level Contours on Bell Farm Road](image1)

![Figure 4.2: Future Sound Level Contours on Bell Farm Road](image2)

<table>
<thead>
<tr>
<th>Current Conditions</th>
<th>10-Year Horizon Without Project</th>
<th>10-Year Horizon With Project</th>
<th>Sound Level Increase (With or Without Project)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver Site (Leq)</td>
<td>58 dBA</td>
<td>59 dBA</td>
<td>59 dBA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 dBA</td>
</tr>
</tbody>
</table>

The assessment of the impact of the predicted sound levels utilized the MTO/MOECC Protocol. The required mitigation effort is based on the change in future noise levels shown in Table 4.2 below. Based on the sound level increases at the receiver site being less than 5 dBA, no mitigation is required.

<table>
<thead>
<tr>
<th>Change in Noise Level Above Ambient</th>
<th>Mitigation Effort Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 dBA</td>
<td>None</td>
</tr>
<tr>
<td>&gt; 5 dBA</td>
<td>- Investigate noise control measure on right-of-way.</td>
</tr>
<tr>
<td></td>
<td>- If project cost is not significantly affected, introduce noise control measure within the right-of-way.</td>
</tr>
<tr>
<td></td>
<td>- Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, averaged over first row receivers.</td>
</tr>
<tr>
<td></td>
<td>- Mitigate to ambient, as economically and technically feasible.</td>
</tr>
</tbody>
</table>
Glossary of Terms

**AADT**
Annual Average Daily Traffic – the average 24-hour, two-way traffic for the period from January 1st to December 31st.

**GVW**
Gross Vehicle Weight is the total weight (in kilograms) transmitted to the highway by a vehicle or combination of vehicles, and load.

**Noise Assessment Report**
Undesirable and/or unwanted sound.

**NSA**
Noise Sensitive Area is a noise sensitive land use, which has an outdoor living area (OLA) associated with the residential unit. Private homes, townhouses, apartments, and hospitals are classified as NSA’s.

**OLA**
Outdoor Living Area is adjacent to a noise sensitive area (NSA) and is the part of an outdoor amenity area provided for the quiet enjoyment of the outdoor environment.

**Receiver**
The location from which the noise/sound emits.

**Retrofit (Barrier)**
A barrier candidate site, which satisfies all warrants for construction and therefore qualifies for inclusion on the capital construction program when priorities dictate and funds become available.

**Background Noise Level**
Ambient is the all-encompassing noise associated with a given environment, usually consisting of a composite of sounds from many sources. It is the noise level prior to construction of an undertaking.

**Attenuation**
See Noise Attenuation

**Barrier**
A noise barrier is a physical structure, which is located between a noise source and a noise sensitive receiver. These include walls, berms, and combinations of the two, which are effective in reducing sound level transmission from the source to the receiver.

**Berm**
Earth land form used to shield residential areas (NSA’s) from noise.

**Decibel (dB)**
Decibel is a logarithmic unit of measure used for expressing level of sound.

**Environmental Assessment Act**
This includes all reports prepared in compliance with the Environmental Assessment Act requirements and submitted to the Ministry of the Environment and Climate Change (MOECC) for acceptance, approval, informational or monitoring purposes and the public record. These include Environmental Assessment Reports, Environmental Study Reports, Environmental Status Statements, and Design and Construction Reports.

**Equivalent Sound Level (Leq)**
The level of a continuous sound having the same energy as a fluctuating sound in a given time period i.e. Leq,16h refers to 16-hour average sound levels.

**First Row Receiver**
First row receivers are those adjacent receivers where noise level differences are imperceptible (within 3 dBA) from the noisiest receiver.

**Freeway**
Freeway is defined as an existing completed, partially developed (staged) or proposed divided highway with full control of access, grade separated intersections. This definition may include some highways that are not officially designated as freeways.

**Mitigation Measures**
Actions taken to reduce the effects of noise increases. These measures include walls, berms, adjustments to horizontal and vertical alignments, and pavement types that are designated to result in reduced noise levels in NSA’s.

**Mitigation Actions**
A mitigation measure used to lessen the intensity of the noise level (dBA) where the noise level exceeds the criteria.

**Neighborhood**
A place of residence.

**Noise**
Undesirable and/or unwanted sound.

**Noise Attenuation**
A mitigation measure used to lessen the intensity of the noise level (dBA) where the noise level exceeds the criteria.

**OA**
Outdoor area.

**OADT**
See Vehicle Classification

**OADT**
See Vehicle Classification

**OA**
Outdoor area.

**OA**
Outdoor area.

**OA**
Outdoor area.
Appendix A
STAMSON Output

STAMSON 5.0 NORMAL REPORT Date: 06-01-2005 05:20:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: BFRRS1E
Description: BT Eng Project Number 16-031

Road data, segment # 1: BRFR1
---------------------------------
Car traffic volume : 286 veh/TimePeriod
Medium truck volume : 4 veh/TimePeriod
Heavy truck volume : 1 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: BRFR1
-----------------------------
Angle1 : -90.00 deg
Angle2 : 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 1.20 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Hwy400
---------------------------------
Car traffic volume : 3010 veh/TimePeriod
Medium truck volume : 177 veh/TimePeriod
Heavy truck volume : 354 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Hwy400
-----------------------------
Angle1 : -90.00 deg
Angle2 : 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 362.00 m
Receiver height : 1.20 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
Results segment # 1: BRFR1

Source height = 0.77 m

ROAD (0.00 + 51.75 + 0.00) = 51.75 dBA

<table>
<thead>
<tr>
<th>Angle1</th>
<th>Angle2</th>
<th>Alpha</th>
<th>RefLeq</th>
<th>P.Adj</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-90</td>
<td>90</td>
<td>0.66</td>
<td>58.20</td>
<td>0.00</td>
<td>-5.00</td>
<td>-1.46</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>51.75</td>
</tr>
</tbody>
</table>

Segment Leq : 51.75 dBA

Results segment # 2: Hwy400

Source height = 1.78 m

ROAD (0.00 + 57.50 + 0.00) = 57.50 dBA

<table>
<thead>
<tr>
<th>Angle1</th>
<th>Angle2</th>
<th>Alpha</th>
<th>RefLeq</th>
<th>P.Adj</th>
<th>D.Adj</th>
<th>F.Adj</th>
<th>W.Adj</th>
<th>H.Adj</th>
<th>B.Adj</th>
<th>SubLeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>-90</td>
<td>90</td>
<td>0.66</td>
<td>81.91</td>
<td>0.00</td>
<td>-22.95</td>
<td>-1.46</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>57.50</td>
</tr>
</tbody>
</table>

Segment Leq : 57.50 dBA

Total Leq All Segments: 58.52 dBA

TOTAL Leq FROM ALL SOURCES: 58.52
Results segment # 1: BRFR1

Source height = 0.89 m

ROAD (0.00 + 52.75 + 0.00) = 52.75 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 59.20 0.00 -5.00 -1.46 0.00 0.00 0.00
52.75
---

Segment Leq : 52.75 dBA

Results segment # 2: Hwy400

Source height = 1.78 m

ROAD (0.00 + 57.93 + 0.00) = 57.93 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 82.34 0.00 -22.95 -1.46 0.00 0.00 0.00
57.93
---

Segment Leq : 57.93 dBA

Total Leq All Segments: 59.08 dBA

TOTAL Leq FROM ALL SOURCES: 59.08
Road data, segment # 1: Hwy400

Car traffic volume: 3326 veh/TimePeriod
Medium truck volume: 196 veh/TimePeriod
Heavy truck volume: 391 veh/TimePeriod
Posted speed limit: 100 km/h
Road gradient: 0 %
Road pavement: 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy400

Angle1 Angle2: -90.00 deg 90.00 deg
Wood depth: 0 (No woods.)
No of house rows: 0
Surface: 1 (Absorptive ground surface)
Receiver source distance: 15.00 m
Topography: 1 (Flat/gentle slope; no barrier)
Reference angle: 0.00

Results segment # 1: Hwy400

Source height = 1.78 m
ROAD (0.00 + 80.89 + 0.00) = 80.89 dBA

TOTAL Leq FROM ALL SOURCES: 80.89 dBA
Appendix H
Stage 1 Archaeology Report
Stage 1 Archaeological Assessment
Transportation Improvements on Bell Farm Road & Ross/Collier/Bayfield Streets, City of Barrie, Part of Lots 21 and 22, Concession 3, Part of Lot 24, Concession 4 and Part of Lot 23, Concession 5, Geographic Township of Vespra, Simcoe County

ORIGINAL REPORT

March 23, 2017

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PIF No. P248-0284-2016
Laura McRae (License No. P248)

CAGI Project No. CAGI-2016-LM19

Distribution: BT Engineering
Ministry of Tourism, Culture and Sport

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ACKNOWLEDGEMENTS

The Central Archaeology Group Inc. would like to extend their gratitude to the following individuals and parties.

- Steven Taylor and Darcie Dillon, BT Engineering.
- Rob von Bitter, Ministry of Tourism, Culture and Sport.
- The Simcoe County Land Registry Office, Barrie.
- The staff at the Trent University Maps and Geospatial Resources section of the Thomas, J. Bata Library, Peterborough.

ACRONYMS

a.s.l.  above sea level
AP    Archaeological Potential
BTE   BT Engineering
cm    centimeters
CAGI  Central Archaeology Group Inc.
CoB   City of Barrie
CR    County Road
GToV  Geographic Township of Vespra
m     metres
MTCS  Ministry of Tourism, Culture and Sport
NAP   No Archaeological Potential
SC    Simcoe County

EXECUTIVE SUMMARY

The Central Archaeology Group Inc. (CAGI) was contracted by Darcie Dillon with BT Engineering (BTE) to conduct a Stage 1 archaeological assessment for a Class Environmental Assessment for proposed roadway improvements on Bell Farm Road, from St. Vincent Street to Duckworth Street and Ross/Bayfield/Collier Streets, from Toronto Street to Clapperton Street. The project areas are situated within Part of Lots 21 and 22, Concession 3, Part of Lot 24, Concession 4 and Part of Lot 23, Concession 5 in the Geographic Township of Vespra (GToV), Simcoe County (SC).

As an initial requirement of land use planning and development, the Ontario Ministry of Tourism, Culture and Sport (MTCS) has stated that three objectives must be met by way of a Stage 1 archaeological study: 1) provide information on the subject property's geography, history, previous archaeological fieldwork and current land condition; 2) evaluate the archaeological potential for the property and support recommendations for a Stage 2 survey; and, 3) recommend appropriate strategies for future assessments within the property. Therefore, the main purpose of the Stage 1 assessment is to investigate the cultural land use, archaeological history and the present conditions of the property. The majority of this process is background research conducted in the company office and other libraries and involves the examination of records such as historic settlement maps, land titles and documents, historical land use and ownership records, primary and secondary sources and the Ministry of Tourism, Culture and Sport's archaeological sites database.

Permission to access the area and to carry out the activities necessary for the completion of the Stage 1 background study was granted by Darcie Dillon, BTE. Based on the results of the archaeological assessment, the following recommendations are provided for consideration to the MTCS and the Proponent, and are subject to approval by the MTCS:

1) A Stage 2 archaeological assessment will be conducted by a licensed consultant archaeologist using the test pit survey method at 5 m intervals in all areas along the corridor which have not been recently ploughed or do not have appropriate conditions for pedestrian survey at the time of the Stage 2 assessment (as illustrated by the areas marked in red on Maps 11 and 12);

2) No further archaeological assessments are recommended for areas which have been determined to be disturbed including the following intersections; Bell Farm Road and St. Vincent Street, Bell Farm Road and Alliance Boulevard, Bell Farm Road and Duckworth Street, Ross Street and Toronto Street, Ross Street and Sophia Street West, Ross Street and Mary Street, Ross Street and Maple Avenue, Ross Street and Bayfield Street, Bayfield Street and Collier Street and Clapperton Street (as illustrated by the areas marked in yellow on Maps 11 and 12);

3) The Stage 2 archaeological assessment will follow the requirements set out in the 2011 Standards and Guidelines for Consultant Archaeologists (MTC 2011).

4) Should construction activities associated with this development extend beyond those areas assessed during this project, further archaeological investigation will be required prior to ground-disturbing activities.

5) Notwithstanding the results and recommendations presented in this study, The Central Archaeology Group Inc. notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or
deeply buried archaeological deposit. Therefore, in the event that archaeological remains are found during subsequent construction and development activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.

The MTCS is requested to review, and provide a letter indicating their satisfaction with, the results and recommendations presented herein, with regard to the 2011 Standards and Guidelines for Consultant Archaeologists and the terms and conditions for archaeological licenses, and to enter this report into the Ontario Public Register of Archaeological Reports.
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### 1.0 PROJECT CONTEXT

#### 1.1 Objectives

The objectives of a Stage 1 background study, as outlined by the *Standards and Guidelines for Consultant Archaeologists* (2011:13), are as follows:

- provide information on the subject property’s geography, history, previous archaeological fieldwork and current land condition;
- evaluate the archaeological potential for the property and support recommendations for a Stage 2 survey;
- recommend appropriate strategies for future assessments within the property.

#### 1.2 Development Context.

The Central Archaeology Group Inc. (CAGI) was retained by BT Engineering on behalf of the Town of Innisfil (ToI) to conduct a Stage 1 archaeological assessment for a Class Environmental Assessment for proposed roadway improvements on Bell Farm Road, from St. Vincent Street to Duckworth Street and Ross/Bayfield/Collier Streets, from Toronto Street to Clapperton Street. These improvements will include road widening, intersection improvements and the renewal of municipal infrastructure. The project areas are situated within the current City of Barrie (CoB) on Part of Lots 21 and 22, Concession 3, Part of Lot 24, Concession 4 and Part of Lot 23, Concession 5 in the GToV, SC (Plan 1; Map 1; Image 1).

This archaeological assessment was triggered by the *Environmental Assessment Act*. This project is in the pre-approval stage.

Permission for access to conduct the archaeological assessment was granted by Darcie Dillon. Private property was not accessed for this project. Photographs were taken from along each road right-of-way with public property access.

The archaeological assessment was undertaken in accordance with the requirements of the *Ontario Heritage Act* (R.S.O. 1990), the *Standards and Guidelines for Consultant Archaeologists* (2011) and the *Planning Act* (R.S.O. 1990). All archaeological consulting activities were performed under the Professional Archaeological License of Laura McRae (P248). The Ontario Ministry of Tourism, Culture and Sport has designated this assessment as PIF P248-0284-2016. This project is further identified as CAGI-2016-LM19 under CAGI records.
1.3 Historical Context.

1.3.1 Historic Documentation

Libraries abound with historic literary documentation on the settlement and development of the Simcoe County, from its use by the pre-contact First Nations peoples through to Euro-Canadian settlement. Some of the more useful documents include: Secrets of the Lakes: Stories from the History: Lake Simcoe and Lake Couchiching (Frim 2002), Huronia - A History and Geography of the Huron Indians, 1600-1650. (Heldenrich 1971), Soil Survey of Simcoe County, Ontario (Hoffman et al. 1962), A History of Simcoe County: Part I and Part II (Hunter 1989), Preliminary Report on an Archaeological Assessment of the Barrie Area (Hunter 1977), Sainte-Marie Among the Hurons (Jury and Jury 1954) and The Iroquoian Occupation of Southern Simcoe County: Results of the Southern Simcoe County Archaeological Project (Warrick 1986).

There are also a significant number of consultant reports (archaeological and built heritage) available for consultation from the SC, the Ministry of Tourism, Culture and Sport and various museums and historical societies in the area.

The study area is situated within the centraleast portion of SC in the GToV.

1.3.2 Pre-Contact Period

The Palaeoamerican Period. The Palaeoamerican Period represents the arrival of First Nations groups in Ontario around 11,5000 years ago following the retreat of the Laurentide ice sheets that covered most of Canada and the northern United States beginning approximately 95,000 years ago. Although there is considerable debate about whether the Palaeoamerican people were the first to cross into the Americas from Asia via Beringia, they are most likely the first culture to inhabit Ontario. The Palaeoamerican Period is represented by two distinct cultures based on the use of different tools. The Clovis culture comprised the early Palaeoamerican Period, whereas the Plano culture occupied the latter half of the Period.

The Clovis culture is defined by distinctive fluted chipped stone projectile points that are generally lance-shaped or lanceolate that lack notches or stems with a concave base and a grinding of the lower side edges. Although it is certain that these points were used as projectiles based on evidence of distinctive tip damage, it is unknown whether they were hafted onto long shafts and used as a thrusting spear or if they were mounted onto smaller shafts and used as hand-propelled spear or in combination with a spear-thrower.

Plano projectile points differ in that they lack the Clovis flute and they exhibit fine ripple flaking that is distinctive for the latter half of the Palaeoamerican Period. A number of sites dating to approximately 9,000 years ago have been found along the north shore of Lake Superior and on Manitoulin Island. High quality siliceous stone quarries exploited by Plano people have also been found along the shore of Lake Huron.

The Clovis and Plano cultures likely shared a similar subsistence strategy. They hunted migrating herds of caribou (Rangifer tarandus) along the shores of glacial lakes that appeared as the massive ice sheets receded. They also hunted large mammals such as mammoth (Mammuthus primigenius) and mastodon (Mammut americanum). Palaeoamerican groups likely hunted smaller mammals and fish as well, and gathered wild fruits and berries.

The Archaic Period. Solid evidence for the beginning of the Archaic Period in Ontario dates to around 4,000 years ago with the advent of the Laurentian Archai. The early Archai culture likely evolved from the Palaeoamerican Period. However, there was probably an introduction of new ideas and technology as more people migrated into the region. The elaborately manufactured points representative of the Palaeoamerican Period were abandoned in favour of cruder manufacturing techniques but with a greater variety of stone being exploited. This likely represents a change in the types of flora and fauna available for consumption. There is certainly a shift in subsistence practices by early Archai groups from long seasonal migration movements to a focus on regionally available food sources.

The Archai Period also represents a technological shift in the methods used in the manufacturing of stone tools with the introduction of grinding and pecking. A wide variety of axe forms are introduced indicating a shift from a more sub-arctic environment to a temperate climate. It is also during the Archai Period that the atlatl superseded the use handheld thrusting spears predominately used during the Palaeoamerican Period. Elaborately polished and decorated stone tools believed to be atlatl counterweights appear in the archaeological record. Archai people were also producing tools and ornaments manufactured from native copper found along the north shore of Lake Superior.

Based on evidence from discarded animal bones, the Laurentian Archai people hunted predominately large mammals, such as deer, elk, and bear. However, smaller game like the beaver was also exploited. The Laurentian Archai people also fished and gathered shellfish and plant material. The religious beliefs during the Archai Period can also be discerned from the burial methods practiced. This included the interment of burial goods with the deceased and sprinkling of the body with red ochre.

The Woodland Period. The Woodland Period is generally associated with the introduction of ceramic technology. Early Woodland sites in the region surrounding the project area are scarce due to the shorter duration of the period and the low visibility of sites (Ellis et al. 1990b:78). Jackson (1980) suggests that subsistence and settlement patterns during the Early Woodland Period were similar to those of the Laurentian Archai, but with greater emphasis on processing nuts and perhaps experimentation with plant cultivation.

The Middle Woodland Period in the region is defined by a number of burial mound sites located around Rice Lake with numerous associated middens and villages (Boyles 1897; Johnston 1968; Spence and Harper 1968; Shotelors 1974). The mound sites tend to be located on promontories near river mouths and may have been used to define ancestral territory. Based on the wealth and variety of burial goods, the Middle Woodland period people also had access to a wide-spread network of exotic goods which extended as far away as Ohio and Indiana (Spence et al. 1990).

During the Late Woodland Period there was a shift in the subsistence and settlement patterns which included the occupation of seasonal hunting and fishing camps on Rice Lake, often on former Middle Woodland village sites, and larger interior longhouse villages, where early domesticated corn, beans, and squash were cultivated.
The end of the Woodland Period is well known in the region due to the discovery of a number of Huron village sites (Damkjar 1990; Ramsden 1989; Ramsden 1990; Sutton 1990). These sites seem to represent both Huron and St. Lawrence Iroquois occupation, but the exact origin of the occupants is still unknown (Sutton 1990:54; Ramsden 1990). The Huron abandoned the region as a centre of occupation sometime during the late sixteenth and afterwards it was used as a buffer zone between the Huron and New York Iroquois.

The Huron. The Huron, or the Wendat as they called themselves, are a seventeenth-century Iroquoian-speaking group that occupied an area known as Huronia between Lake Simcoe and Georgian Bay (Map 2), however, archaeologists have also extended the “Huron” designation to include pre-contact period sites found in south-central Ontario, where subsistence and settlement patterns and similar material culture indicates cultural affiliation. Pre-contact period Huron sites dating to between 1,400 and 1,600 CE have been found along the north shore of Lake Ontario, from west of Toronto to Belleville, and to the north bounded to the east by the Trent River system and to the west by the Niagara escarpment.

The Hurons of Huronia, as encountered by the French in the 1600s, consisted of a confederacy of five nations or groups. The Attignawantan, who occupied the region encompassing the Penetanguishene Peninsula, appear to have been the largest group, and the Areniarhonon, the second largest group, occupied the eastern extent of Huronia, west of Lake Simcoe. Between these two groups lived the Attigneenongnahac, the Arenaronnon and the Tahontaenrat. Huronia was connected to other iroquoian-speaking groups to the south, such as the Neutral and the Tonontate, by an extensive network of trails. Using Jesuit chronicles, late nineteenth century settler accounts, and personal observations, in 1906 Andrew F. Hunter pieced together a map outlining the probable locations of the major trails. However, no trails run through or near the project area. Heidenreich (1971:156) suggests that the trails followed high ground to avoid swamps.

The Huron had readily adopted agriculture, cultivating corn, beans, squash, sunflowers and tobacco. Aside from these cultigens, the Huron gathered wild plants and berries, such as plum and raspberry. Hunting and fishing supplemented the diet. The Huron hunted such animals as the white tail deer, black bear, elk, beaver and raccoon. Common bird bones found on archaeological sites include different varieties of duck, geese, grouse and pigeons (Ramsden 1990:380). Although fish are often overlooked in the archaeological record, Trigger (2000:31) suggests that it accounted as the second most exploited subsistence resource next to agriculture. Common fish species included perch, bass, sucker and catfish.

The Huron lived in longhouses, which were elongated rectangular structures made of wood beams and bark coverings, built to house several families, related matrilineally. Although internal design was related to the number and size of families and construction methods, which varied between groups, longhouses did share similar key characteristics, such as axially aligned hearths and storage pits, sleeping compartments and storage areas along the walls and communal storage areas at either end for casks of corn and other foods.

Large-scale archaeological investigations have provided information on typical characteristics associated with Huron village sites. Some common features include multiple-row palisades encircling the village and a single longhouse located outside the defensive wall to accommodate visitors or traders (Ramsden 1988). Longhouses within the village tended to be arranged around one or more larger longhouses that were associated with different areas of the village, suggesting perhaps kin-based grouping (Warrick 1984). Village sites also tended to have several phases of expansion, where the palisades were enlarged several times over (Finlayson 1985). However, sites did not expand to any great size as the Huron periodically (every 8 to 30 years) moved settlement sites as soil fertility became depleted.

Huron villages tended to have large middens that contained large amounts of food refuse and discarded artifacts. Therefore, they are readily identifiable in areas that have been ploughed and often contain moulded middens when undisturbed (Ramsden 1990:373). Smaller middens also occur throughout the village and against the palisades. Village sites are typically located in areas with sandy soil that is easily defensible and in close proximity to a permanent streams. However, variation in location and preference for other geographical features is common. A visual inspection of the project area did not reveal any unnatural moulded features or the presence of large artifact scatters on the surface that would indicate the presence of a village site. Furthermore, the relatively poor soil and absence of a permanent water source would account for this finding. Non-village settlements used by the Huron include temporary hunting and fishing camps, and cabin sites associated with the tending of corn fields during the summer (Ramsden 1990:373). Small hamlets likely associated with larger village sites have also been found. These often include two or three longhouses and one to two middens (Ramsden 1990:376). By 1650, the Iroquois had driven the Huron off their territory and many fled to the security of the Algonquian-speaking groups to the north or were held captive by the Iroquois.

Table 1. Summary of the First Nations archaeological sequence in southern Ontario.

<table>
<thead>
<tr>
<th>Period</th>
<th>Date</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palaeoamerican</td>
<td>11,500 - 9000 BP</td>
<td>first evidence of human occupation in Ontario</td>
</tr>
<tr>
<td></td>
<td></td>
<td>family groups hunting large game</td>
</tr>
<tr>
<td></td>
<td></td>
<td>seasonal occupation along lakeshore environments</td>
</tr>
<tr>
<td>Archaic</td>
<td>9000 - 3000 BP</td>
<td>hunting and gathering subsistence economy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>seasonal occupation of resource rich environments</td>
</tr>
<tr>
<td>Early Woodland</td>
<td>2200 - 3000 BP</td>
<td>hunting and gathering subsistence economy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>seasonal occupation of resource rich environments</td>
</tr>
<tr>
<td>Middle Woodland</td>
<td>2200 - 1300 BP</td>
<td>hunting and gathering subsistence economy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>extensive trade networks for exotic raw material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>crude pottery vessels with little decoration</td>
</tr>
</tbody>
</table>
TRANSPORTATION IMPROVEMENTS: BELL FARM ROAD & ROSS/COLLIER/BAYFIELD STREETS
REPORT NO. CAGI-2016-LM19
STAGE 1 BACKGROUND STUDY

1.3.3 Post-Contact Period

In the early seventeenth century, French explorers such as Samuel de Champlain and Étienne Brûlé, encountered groups of people speaking an Algonquian language along the Ottawa River Valley. These were the Weskarini, Onotchatararonon, Kichesipirini, Matouweskarini, and Otagouotouemin Algonquians (Trigger 1976: 279). The loosely aligned First Nations groups subsisted by hunting, fishing, and gathering, and undertook limited horticulture. Champlain first met the Algonquians in 1603 at the trading centre of Tadoussac near the mouth of the St. Lawrence River (Hessel 1993:14). Searching for the Northwest Passage in 1613, Champlain entered Algonquin territory and explored the Ottawa Valley as far north as Morrison’s and Allumette Islands. The main body of the Kichesipirini lived on Morrison’s Island and controlled the portages at the base of Allumette Lake. From their strategic location, the Kichesipirini collected tolls from all French trade to and from the interior nations such as the Nipissing, Huron, Ottawa, and Ojibway (Hessel 1993; Trigger 1976). In 1615, after Champlain’s return from France, he extended his explorations to Lake Nipissing, down the French River, and along the east shore of the Georgian Bay, visiting several Huron villages, with whom he allied himself to war against their enemies, the Iroquois, thus gaining their trust (Belden 1975 [1881]: 3).

There was little game in Huron country, and the principal food of the Nation was maize (Belden 1975 [1881]: 3). As there was no concept as individual ownership of land, each family cultivated a portion until the soil was exhausted and no longer fertile and firewood became scare. Once this occurred, the village was abandoned and a new one was built in a different area. Some of the Huron villages were left open, but others located closer to the Iroquois Nations, were fortified by a trench, earthen bank, and wooden palisade.

Such was the Huron lifestyle when Champlain reached their territory in 1615. Upon his return from France, Champlain brought with him four friars of the Recollets - one of the three branches of the Franciscan brotherhood - to undertake mission work among the First Nations groups of the country. One of these Franciscans, Joseph Le Caron, journeyed into Huron country with Champlain, likely landing somewhere on the northeast shore of what is now known as Tiny Township in Simcoe County (Hunter 1998 [1909]: 1).

Joseph Le Caron has the distinction of being the first missionary priest to live among the Huron Nation. His decision to live among the Attignaunatants Huron was made due to his desire to learn their language so as to more effectively preach the word of God. Le Caron left Huron territory after a few years but continued his missionary work in New France until the capitulation of New France in England in 1629. Le Caron was the first of many Catholic missionary priests to inhabit and convert First Nations peoples.

The 1640s was a time of great upheaval in the region. The introduction of European trade had turned skirmishes between the Huron and the Iroquois Nations into a ruthless struggle for survival. Raiding parties of Iroquois became commonplace in Huron country. They would lie in ambush along river routes, attack, and carry off rich Huron flotillas; the travel routes were extremely dangerous places (Jury and Jury 1954). Surprise attacks, massacres, capture, and torture occurred more and more frequently in Huron country. In combination with European diseases, this dramatically reduced the population of the Huron Nation by the 1650s.

Unfortunately, given the dedication to archaeological and historical research of the Huron, a paucity of information exists for period between 1650 and the Euro-Canadian settlement of Simcoe County. However, given the close proximity and friendly relations the Huron had with the Algonquian speaking groups to the north, it is likely that these groups, such as the Ojibway, moved into the region. There was a French mission to the Algonquian speaking groups around Orillia at this time (Hunter 1998 [1909]: 10).

Government land surveys of the vast interior of Upper Canada began as a military endeavor to find water or an overland route through the Huron Tract to bypass the vulnerable lower Great Lakes. Lieutenant Henry Briscoe of the Royal Engineers crossed by the Madawaska Highlands from Georgian Bay to the Ottawa River in 1826, and has the distinction of being the first Euro-Canadian recorded to pass within the confines of the future Algonquin Park area (Briscoe 1826 in Wyatt 1971). Briscoe concluded that a suitable canal route was not present through the Canadian Shield, but others, notably Charles Shireff, believed that the interior could be settled by farmers and serviced by a canal (Wyatt 1971: 4). Alexander Shireff, the son of Charles, searched for a possible canal route across the uplands in 1829 (Shireff 1831 in Wyatt 1971). In his subsequent report, Alexander considered hardwood stands to reflect fertile soils, and thus promoted the Lake Opeongo area as suitable for farming settlements. In 1836, the government passed legislation to survey the Ottawa River and the waterways of bordering lands (Wyatt 1971: 22). David Thompson, the surveyor of the Thompson River in British Columbia, examined the area from Penetangushene on Georgian Bay through the Muskoka-Madawaska region. In 1827, Thompson found evidence of previous campers, likely Alexander Shireff, on a bay at the northeastern corner of Canoe Lake, in what would become Algonquin Park (Wyatt 1971: 4).

Simcoe County (Map 3), Simcoe County is located in the northwestern part of Southern Ontario. It is bordered to the northeast by Ontario County, the southwest by Dufferin, and Grey Counties, the south by Peel County, the east by Lake Simcoe and York County, and the northwest by Georgian Bay. The total land area is 429,986 hectares of which approximately 71% is utilized as farmland (Hoffman et al. 2017).
1962:9). Originally the county was composed of the Townships of Adjala, Essa, Flos, Innisfil, Matchedash, Medonte, Mono, Mulmur, Nottawasaga, North Orilla, South Orilla, Oro, Sunnidale, Tay, Tecumseth, Tiny, Tosoroto, Vespa, and West Gwillimbury. However, the Townships of Mono and Mulmur detached from Simcoe County to become part of Dufferin County.

Simcoe was initially part of the Nassau District, created in 1788, which was renamed to the Home District in 1792. The district boundaries originally were bounded to the east by a line running north from the Trent River and to the west by a line running north from Long Point on Lake Erie. As such, the first district of the town was Newark (Niagara-on-the-Lake), but was changed to York (Toronto) following district reorganization in 1798. The reorganization resulted in the creation of the separate districts of Newcastle and Niagara, thus leaving the Home District to comprise York and Simcoe Counties alone. In 1837, Simcoe County became part of a separate Simcoe District (Stephenson 2010, accessed August 25, 2011). Lake Simcoe and Simcoe County were both named by John Graves Simcoe after his father, Captain John Graves Simcoe of the Royal Navy. The Lake had a number of earlier names, aboriginal and French, with the current appellation given in 1793 (Frim 2002: viii).

Unfortunately, there is a relative paucity of information for the period between 1650 and the Euro-Canadian settlement of Simcoe County. During the late eighteenth century and early years of the nineteenth, the region at the south end of Georgian Bay was strategically important to fur traders. The route to the east, by way of Lake Simcoe, was a preferred route to the Upper Lakes for many fur traders over the Ottawa River route. In 1785, Deputy Surveyor General John Collins made a survey of the connections between the Bay of Quinte and Lake Huron, by way of Lake Simcoe (Hunter 1998 [1909]: 123). Several fur trading posts sprung up around Lake Simcoe, of particular note are those at Holland Landing (near the south end of the lake) and the Afterley Narrows, between Lake Simcoe and Lake Couchiching (Frim 2002: vii). The Narrows was a favoured location due to First Nations groups frequenting the area, and a trading post was established as early as 1802 by Quetton St. George. Several other firms maintained posts and carried out profitable trade at the Narrows and Orilla, including the Hudson’s Bay Company, who established a post there in 1862.

Euro-Canadian settlement began in Simcoe County after the War of 1812 when military authorities of Canada decided to establish a fort near the mouth of the Nottawasaga River. This decision was made due to continuing British/American hostilities and the British fear of invasion by American soldiers. Samuel de Champlain and William began to survey a road for communication between Kempenfelt Bay and Penetanguishene Harbour, portion lots for settlement, and mark the outlines of town plots at Kempenfelt Bay and Penetanguishene Harbour (Hunter 1998 [1909]: 39).

Settlement in Simcoe County did not occur at a quick pace. According to Hunter (1998 [1909]: I: 55), of all the land granted to patent holders, less than one-tenth was occupied by actual settlers. The first settlers were Donald Sutherland, James Wallace, and John Armstrong who took up land in the southern part of West Gwillimbury in 1815 (Belden 1975 [1881]: 4). Along the Penetanguishene Road there was an influx of settlers after 1815, but the shores of Lake Simcoe and Kempenfelt Bay saw few settlers before 1831.

The first groups of settlers in Simcoe County are as follows (taken from Hunter 1998 [1909] I: 65): 1. French-Canadians, beginning in 1828, settled in Tiny and Tay Townships; 2. English, from northern counties of England beginning in 1820, settled in Oro and Vespa (25 families at first), Medonte, Tecumseth, and West Gwillimbury Townships; 3. Scots, from Sutherlandshire at first and immigrants with Lord Selkirk’s Red River Colonists (17 families) located here in 1819, settled in West Gwillimbury Township; 4. Scots, from Islay, Argyleshire beginning in 1832, settled in Oro and Nottawasaga chiefly, and a few families of the same migration into Medonte, Orilla, and Sunnidale Townships; 5. Scots, from Lanarkshire and Renfrewshire, via Dalhousie Township, Ont. In 1832 (many Glasgow and Paisley weavers were among these), settled in Innisfil and Essa Townships; 6. Scots, Dumfrieshire from 1832 to 1860, settled in Innisfil Township; 7. Irish, beginning in 1830, Protestants from Ulster, settled in West Gwillimbury, Tecumseth, Innisfil, Essa, and Tosoroto Townships; 8. Irish Palatines, about 10 families in 1831, settled in West Gwillimbury; 9. Irish Catholics, beginning in 1828, settled in Adjala, Vespa, Flos, Medonte, and Nottawasaga Townships; 10. Irish, from Londonderry in 1850, settled in Innisfil Township; 11. Germans, begun with 10 families in 1834, settled in Nottawasaga Township; 12. African Americans, begun in 1828, settled in Oro (20 families) and Sunnidale Townships; and; 13. First Nations, Ojibways (about 266), settled on Beausoleil and Christian Islands.

Eight colonization roads encouraged the settlement of Simcoe County. The first colonization road was the Nine-Mile Portage. This road ran from Kempenfelt Bay to Willow Creek and was the most important road in the County. The road dates back as a portage over which First Nations peoples used to carry their canoes (Hunter 1998[1909]: 80,81). During the War of 1812, the road was widened in order to allow supply wagons to pass through, unrestrained by the forest wilderness, to deliver goods to government posts on the upper lakes. This road was in active use until the construction of the Northern Railway, built to Collingwood in 1855 (Hunter 1998[1909]: 82). The second colonization road, the Penetangusheene Road, was opened by Dr. Dunlop in December 1814 and completed in the fall of 1825 (Hunter 1998[1909]: 84,86). This road linked Kempenfelt with Penetangusheene Bay. The thir colonization road was the Coldwater Road. Originally a long, First Nations portage from Lake Couchiching to Coldwater on Matchedash Bay, it was cleared in 1830 and became a very important highway. The Gloucester Road, the fourth colonization road, ran from Penetangusheene Road at Hillside to Gloucester Bay (part of Matchedash Bay). This road opened as a government road in the winter of 1832-33 and became a leading highway through Medonte in the early years of its settlement (Hunter 1998[1909]: 91). The fifth colonization road was the Sunnidale Road. The first Sunnidale Road was surveyed by Charles Rankin from Kempenfelt Bay to the Nottawasaga River, and through Sunnidale Township to Nottawasaga Bay in 1833 (Hunter 1998[1909]: 92). The First Ridge Road, the sixth colonization road, traversed along the lakeshore through Oro Township from the head of Kempenfelt Bay as far as Shanty Bay. It was one of the first roads in the district to be opened for vehicular use (Hunter 1998[1909]: 93). The seventh colonization road of the County was the Hawkestone Pioneers’ Trail. This trail began at Hawkestone Creek and ran along the west side of the stream. Hunter (1998[1909]: 94) states that First Nations people used it from the earliest times and it was also a deer path; then the early settlers used it on their way to upper Oro from Hawkestone, where there was a landing place for settlement purposes. Finally, the eighth colonization road is the Centre Road or Hurontario Street, initially surveyed in 1837.

After the decline of the fur trade, the economy of the early settlers was focused on clearing the land for agriculture, removing trees and rocks from the land and draining swamps. The first agricultural fairs were held in Barrie and Orilla in the 1840s. Timber was an important export industry, particularly in masts for the ships of the British Navy (Hunter 1998[1909]: 324,327). Shipbuilding, logging, farming, fishing, and quarrying were the primary industries of the day. Once these declined, the
leisure and hospitality industry became the mainstay of Simcoe’s economy as cottages began to appear on the shores of many of its lakes (Frim 2002: viii).

Vespra Township (Map 3). With a history dating back to 1818, the GToV was first settled in 1819 by families along the Penetanguishene Road. It became its own municipality in 1841 after separation from Flos and Sunnidale townships. The Township remained fairly remote for a number of years, with the majority of settlement occurring within the region of Barrie and Kempenfeld.

Barrie. The area which became known as Barrie rose to prominence due to two factors: the War of 1812, and the Nine-Mile Portage, an ancient trail which linked the head of Kempenfelt Bay with Willow Creek, a tributary of the Nottawasaga River that, in turn, flowed into Georgian Bay. The portage trail was important in for early Euro-Canadian voyageurs and settlers, but became crucial to the transport of troops and supplies to and from Fort Willow and Georgian Bay during the War of 1812 (Frim 2002: 50). The head of Kempenfelt Bay (the future location of Barrie), the starting point of the Nine-Mile Portage route, thus became an important supply depot for the British forces during the war.

The first, albeit temporary, resident of Barrie was Sir George Head, a British military officer that was in charge of developing a naval base at Penetanguishene during the war. He moved to Kempenfelt Village in 1815, later moving to Barrie where he built the first dwelling on the site, a log home. The first permanent resident was Alexander Webster who arrived in 1825, settling in a building later used as a barn. The second resident David Edgar, chose to reside in abandoned military supply depot (Frim 2002: 51).

The first businesses in Barrie were two taverns, at a time when a mere thirty people occupied the area. By 1832 Barrie’s first store was opened in a shanty which had once housed settlers arriving along the Nine-Mile Portage. In the same year William Hawkins began surveying the land for town lots (Frim 2002: 52). The first streets in the town, reflecting its British military presence, were named after British officers: Collier, Bayfield, Owen and Poynitz (www.downtownbarrie.ca 2007). Likewise, shortly after the survey was completed, the town was named Barrie in 1833 after Sir Robert Barrie, the admiral in command of the naval forces in Canada (1818-1835).

Barrie became the county town of Simcoe in 1837, over the competing villages of Kempenfelt and Tollendale, however, it did not function in this capacity until 1843, when the County of Simcoe was fully established as a new district (Frim 2002: 53). This was the impetus for rapid expansion within the town during the 1840s. The county courthouse and accompanying jail was erected in 1842, and the first school was built in 1849. A brewery, tannery company, flour mill, woolen mill, and a lumber company were also established during the mid-1800s. Barrie continued to expand through the export of local resources, particularly once the railway was extended to connect the town to York in 1867. Trees were logged and shipped out, to be used as the masts for British ships, the largest of which, 116 feet long, was obtained in Innisfil (Hunter 1998 [1909] I: 323). In the winter huge blocks of ice were cut from Kempenfelt Bay and shipped to Toronto, New York, and Buffalo for refrigeration (www.tourismbarrie.ca 2010).

Many of the historic buildings were destroyed by fires in the 1870s and 1880s. One such fire destroyed the entire north side of Dunlop Street from Bayfield to Owen. This led to a prohibition in the construction of wooden-sided buildings downtown, therefore indirectly leading to the brick streetscape still apparent today (www.downtownbarrie.ca 2007).
brother continued to farm. However, Edward is identified in the 1851 Census of England as a scholar, likely for future service with the Church of England. It is not known when Edward and his family migrated to Canada. However, in the 1861 Census of Canada West, he is identified as a resident of Victoria, B.C. and a labourer on his father’s farm. On December 22, 1865, Edward married Victoria L. Armstrong and by 1871 Edward and Victoria were living in the boarding house of Elizabeth Malloy in Barrie. However, Edward is identified as a farmer. By 1881, Edward and Victoria had at least four children and Edward was occupied as a carpenter. There is no evidence to suggest that the Blain family early on lived on Lot 22, Concession 3. The Blain family are consistently identified as residents of Barrie throughout the latter half of the nineteenth century.

Unfortunately the land registry documentation is missing for the east part of Lot 22, Concession 3 from Edward Blain’s acquisition of the property until November 20, 1930, when the owner at that time, Robert Lightfoot, signed an easement agreement with the Hydro Electric Power Commission of Ontario to allow nine poles to be erected on the property. Edward died on December 19, 1905. No ownership information for the property is provided in the 1881 Illustrated Historical Atlas of the County of Simcoe, Ont. (H. Belden & Co. 1881).

Robert Lightfoot was born in England around 1867 or 1868. Robert immigrated to North America with his family, arriving in New York City aboard the City of Washington on March 15, 1870. By 1871, according to the 1871 Census of Canada, the Lightfoot family was residing in Barrie, where Robert’s father found work as a labourer. By 1881, Alfred had acquired a farm outside of Barrie, where the family lived and worked. The location of the farm was at 127 Duckworth Street, approximately 100 m south of the project area and can be seen in a 1954 aerial photograph of the project area (see Image 2). Robert never married and he continued to run the farm with his sister, Alice, and brother, Herbert, until 1938, when the property was sold to Andrew Cumming of Vespra. According to the 1949 Voters List, at that time, Robert had moved into Barrie with his sister, Alice, where they resided at 62 Parkside Drive. In 1954, the project area was still agricultural fields (see Image 2). In 1964, the project area and surrounding lands (totaling approximately 1752 acres) were annexed from the Township of Vespra to accommodate the expansion of the City of Barrie. Development of the property and nearby lands began in 1888. The project area itself now forms part of commercial and industrial space. The former Lightfoot farm has since been demolished and replaced with an apartment complex owned by the Barrie Municipal Non-Profit Housing Corporation at 380 Duckworth Street.

The Central Group Inc.
This section of the project area has traditionally been the commercial centre of the City of Barrie from its inception as a town in 1853 until today. An examination of fire insurance plans from April 1907 (revised in June 1917) offers a glimpse into the early residential and commercial development of the project area (see Plan 3 and 4). Nonetheless, in this section of the project area the location of Collier Street from the intersection of Clapperton to the intersection of Ross Street and Bayfield Street has been unaltered since the village was laid out in the 1830s. By 1907, a watermain and sewer had been installed the length of Collier Street. The exact date of construction of these utilities could not be found and was likely sometime during the latter half of the nineteenth century. In the 1907 figure insurance plan (Plan 3), the intersection of Collier Street and Clapperton Street were dominated by residences on the northwest, northeast, and southeast corners. Residences occupied the north side of Collier Street to the intersection with Bayfield Street and the location of a furniture shop. The undertaking’s residence was located at 6 Collier Street. The building at 2 Collier Street was built by James Barr and William Henry and completed in 1884 to house a carriage works. A showroom was present on the ground floor and manufacturing was conducted on the upper storeys and linked by an elevator. This building still remains. The south side of Collier Street was comprised of smaller residences and business, including a “Fancy Goods” shop on the southeast corner of Collier Street and Bayfield Street. None of these buildings remain standing to this day.

Between 1907 and 1917, the east side of Bayfield Street from the intersection of Collier Street to the intersection of Ross Street was comprised of a number of commercial buildings constructed from brick and stone. The stone building at 76/78 Bayfield Street housed a marble works in the north half and a plumber in the south half. For the exception of the single storey commercial building at 79 Bayfield Street, all these early structures have since been demolished. Today, this section of the project area is dominated by parking lots. The west side of Bayfield Street, from the intersection of Collier Street to the intersection of Ross Street was comprised of buildings associated with The Ball Planing Mill Co Ltd, which manufactured mouldings, door and window cladding, and frames. The company was incorporated in 1909 or 1910 and was in business until at least 1960. The buildings have since been demolished and replaced by a single storey commercial structure that today houses a nightclub.

Lot 23, Concession 5. This section of the project area incorporates Ross Street from the intersection of Bayfield Street to the west side of the intersection of Toronto Street in the east part of Lot 23, Concession 5 in the Geographic Township of Vespra, now the City of Barrie. The original patent for the east half of Lot 23, Concession 5, totaling 100 acres, was first granted by the Crown to the Canada Company on April 24, 1832. On March 22, 1836, the Canada Company sold the property to Donald Ross of Toronto, who in turn sold it to Donald Proctor Ross of Montreal for £700 on July 17, 1838. Donald Proctor Ross was a wealthy merchant, who had purchased Lot 23, Concession 5 as an investment. There is no evidence to suggest that Donald Proctor Ross ever resided in Barrie. At the time his primary residence was located in Oxford County. Nonetheless, between 1839 and 1841, Donald Proctor Ross severed a number of small lots off of Lot 23, Concession 5 along Bayfield Street and sold them.

By 1853, William Chisholm Ross had acquired title to Lot 23, Concession 5 from his son, Donald Proctor Ross. On July 7, 1853, William submitted a plan of subdivision to the town and he began selling off town lots shortly thereafter. These original residential town lots were concentrated south of the project area off of what is today Florence Street, Thomson Street, and Eccles Street. The project area, which comprises Ross Street, was named after William Chisholm Ross. Throughout the 1860s and 1870s residential development began here as well. William Chisholm Ross was born in Kinross-shire, Scotland on October 12, 1805. On March 9, 1830 he married Frances Ann Tiffany in Rochester, New York and together they had at least one child. Frances died in July 1832 while the family was residing in Ancaster Township. William remarried in Toronto on January 16, 1835 to Elizabeth Theresa LeLievre and together they had at least eight children. William was a grocer and investor. William and his family lived in Toronto at 77 King Street East until his death in 1856. There is no evidence to suggest that he ever resided in Barrie.

According to the 1907 fire insurance plans for Barrie (see Plan 4), Ross Street remains in the same configuration as it was defined at the beginning of the twentieth century. On the north side of Ross Street from the intersection of Bayfield Street to the intersection of Maple Avenue was The Canada Producer and Gas Engine Co. Ltd. factory. The factory opened in the autumn of 1909 and was comprised of a foundry, pattern shop, wood shop, tinsmith shop, storage buildings, and offices. The Canada Producer and Gas Engine Co. Ltd. manufactured gasoline engines. The factory was short lived, closing by the summer of 1917. Today, the east half of the former factor grounds consists of a Tim Horton’s restaurant and parking lot while the west half is a mixture of residences and small businesses. The dwellings at 12 and 14 Ross Street appear to have been built sometime during the 1920s or 1930s.

The remainder of the north and south sides of Ross Street from the intersection of Maple Avenue to the intersection of Toronto Avenue was comprised of dwellings of various sizes and building material composition. The row housing that was present on the northwest corner of the intersection of Ross Street and Maple Avenue in the 1907 fire insurance was subsequently replaced by a large brick building at 22 Ross Street sometime between 1930 and 1950. The dwellings that were constructed before 1907 on the north side of Ross Street between the intersection of Maple Avenue and Mary Street to remain to this day includes the buildings at 28, 30 and 32/34 Ross Street. Dwellings constructed before 1907 on the south side of Ross Street between the intersections of Maple Avenue and Toronto Street and remain to this day include the buildings at 80 Maple Avenue, 19 Ross Street, 31 Ross Street, 36/38 Mary Street, 37 Ross Street, and 39 Ross Street. None of the buildings have heritage designation.

1.3.6 Summary

Background research conducted for this project illustrated that the study area had been occupied for thousands of years by various First Nations group. It is specifically the ancestral territory of the Huron-Wendat which was utilized by the Seneca and Ojibway Nations for hunting and various resource procurement.

The land registries, census records and historic maps show that project area 1 (Bell Farm Road) was mainly rural agricultural with a low level of occupancy and that Bell Farm Road did not become a transportation corridor until after 1954 (Image 2). The property was occupied by two farms, Quinlan/Bell and Lightfoot. Bell Farm Road is named after the former owner Robert Bell and his family. It appears that this area was comprised of farmland until at least 1964, as the 1954 aerial photograph (Image 2) shows the property as comprised of agricultural land. Project area 2 (Ross/Bayfield/Collier) originally formed part of the town plot which was laid out by Robert Ross in the early 1830s. As mentioned in Section 1.3.5, the project area was traditionally past of the commercial centre of Barrie and the historical atlas (Map 3), fire insurance plans (Plans 3 and 4) and aerial photograph (Image 2) illustrate that the location of Collier Street from the intersection of Clapperton to the intersection of Ross Street and Bayfield Street to the intersection of Ross Street and Toronto have been unaltered.
since the village was laid out in the 1830s. Many of the early structures have been demolished and parking lots or newer structures have taken their place.

1.4 Archaeological Context

1.4.1 Current Conditions

The first project area extends along Bell Farm Road from St. Vincent Street to Duckworth Street. It is an "existing two-lane major collector with a rural cross section servicing commercial/industrial properties and multi-unit residential properties." The second project area, Ros/Bayfield/Collier Streets extends from Toronto Street to Clapperton Street. Also considered a major, two-lane collector street with urban cross-sections and sidewalk, this roadway services commercial and residential properties.

As the project area were situated within an urban area, original flora and fauna were no longer apparent. Instead, narrow, deep ditches were noted along Bell Farm Road and raised and manicured lawns, sidewalks, asphalt pavement, traffic lights, commercial structures, residential homes, water/ sewer and storm mains were noted within both project areas. Vegetation included some chicory, bullrushes and cattails, common dandelion and stunted spruce.

Maps and orthographic images were provided to CAGI for the purposes of this assessment. Site conditions are delineated on Maps 9 and 10 and photographs can be found in Section 9.0.

1.4.2 Physiography

The assessment of physical and environmental conditions of a region is important to the analysis of past human settlement behaviour as well as for the interpretation of features and site patterns on the landscape. The cultural development of every society is strongly influenced by the surrounding natural environment which provides a finite set of resources that humans use to fulfill a variety of needs. Geomorphology, soils, water sources, climate, and vegetation are all significant factors in understanding patterns on the landscape. Changes in the landscape over time influences the types of cultural materials found during an archaeological assessment as well as their visibility.

**Location.** The project area is located in Simcoe County which is situated within south-central Ontario between Georgian Bay and Lake Simcoe. It is bounded to the south by Peel County, to the southwest by Dufferin County, to the west by Grey County and Nottawasaga and Georgian Bays, to the north by the District of Muskoka, to the east by Ontario County and to the southeast by York County. The GToV is located within the centraleast portion of the county and is situated within the CoB (Image 1).

**Glacial History and Geomorphology.** Landscape features seen today are the result of the most recent period of glaciation. Beginning with the Illinoian glacier and ending with the Wisconsinan glaciation, the ice masses advanced as far south as Ohio and as far east as the continental shelf edges. The first interstadial period, the Sangamonian, witnessed ice retreat of the Illinoisan glacier as far north as Hudson Bay. At this time, Easton (1992) posits that global temperatures were warmer or similar to that which we experience today. This period extended until approximately 75,000 years BP with the onset of the Wisconsinan glaciation.

<table>
<thead>
<tr>
<th>Period</th>
<th>Stadial / Interstadial</th>
<th>Years BP</th>
<th>Feature / s</th>
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<tbody>
<tr>
<td>Nicolet</td>
<td>Stadial</td>
<td>70,000</td>
<td>-blocked the St. Lawrence River</td>
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<td>-caused water to dam into Lake Scaborough</td>
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<td>-created the Scaborough Bluffs</td>
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<td>-St. Lawrence River is free of ice</td>
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<td>-Great Lakes waters drain towards the Atlantic Ocean</td>
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<td>Stadial</td>
<td>55,000</td>
<td>-ice covers all of Ontario and extends into northern US</td>
</tr>
<tr>
<td>Port Talbot</td>
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<td>48,000-36,000</td>
<td>-two warm intervals separated by a cold phase</td>
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<td>-palynological studies indicate boreal tree taxa</td>
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<td>-meltwaters drain through present-day New York</td>
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<td></td>
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<td>-formation of Glacial Lake Thorncliffe</td>
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<td>Stadial</td>
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<td></td>
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<td>-split exposes a dome of higher land called Ontario Island</td>
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<td></td>
<td></td>
<td>-Proglacial Lakes Arkona I, II, and III form at southern ice margins</td>
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<tr>
<td>Port Huron</td>
<td>Stadial</td>
<td>12,900</td>
<td>-short-lived advance</td>
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<td></td>
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<td>-ice retreats across Canadian Shield</td>
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<td>-drainage flows east</td>
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<td>-formation of Glacial Lake Grassmere</td>
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more common to herbaceous tundra environs grew (i.e., herbs, mosses and lichens) followed by shrub tundra communities (i.e., sedges and small shrubs) and then to spruce (Picea ssp.) and poplar (Populus ssp.) woodlands. Warming temperatures also encouraged deciduous growth like hemlock and beech and also caused treelines to shift northward, terrestrial and marine species to increase their range northward, and in the mountains, caused the above to shift to higher elevations. 

Taxa noted within the project area is today, not much different from that which it would have been thousands of years ago. The project area lies within the Northern Hardwood Forest, which is within the Great Lakes-St. Lawrence Forest ecoregion. This is a transitional forest which illustrates an overlap of northern needle-leaved trees and southern broad-leaved deciduous trees and produces a mosaic of various vegetative communities controlled by local climate and soils.

Climatic upheavals wrought diverse changes amongst terrestrial and marine animal and bird migration patterns and habitats. It may be assumed that mammals typically found today in these environments, would have been present during the late Pleistocene and early Holocene Periods in the project area (i.e., caribou, bear, fox, hare, chipmunk, squirrel, mouse, weasel, lemming, vole, moose, porcupine and bat) (Remmel 2009:32). Today, mammals such as black bear (Ursus americanus), moose (Alces alces), white-tailed deer (Odocoileus virginianus) and wolf (Canis lycaon) are commonly seen throughout the region. Furthermore, marine fossils in the vicinity of the former Champlain Sea indicate large mammals such as whale, walrus and seal inhabited the area during the open-water season (Chapman and Putnam 1984; Cronin 1977; Loring 1980). As these mammals would have migrated into the region following their food sources, it is also safe to assume that smaller marine life, whose skeletal existence may not have survived to become part of the archaeological record, were present.

Moreover, as the prevailing climate of the time would likely have meant that the Champlain Sea would have frozen over during the winter season, marine mammals would have been forced to migrate into the Gulf of St. Lawrence, where the waters were open. However, as hypothesized by Loring (1980:35), "local populations of belugas or seals might have been trapped in areas of open water surrounded by ice and would have been easily killed by hunters..." This suggests that marine as well as terrestrial exploitation of food resources would have been an important aspect of subsistence practices of the local indigenous populations. Therefore, the probability of at least a partial maritime-based economy in the region of the project area is high.

Physiography and Geology. The project area is located within the Mixed Wood Plains ecozone (Map 4). According to Natural Resources Canada (2011), the Mixed Wood Plains can be characterized by the following description:

"... topography ranges from extremely flat areas in the southwest and southeast to rugged terrain of the Niagara Escarpment. Vegetation is diverse, characterized by mixed deciduous-evergreen forests and tolerant hardwood forests including those forests known as Carolinian forests. Alvars and tallgrass prairies also occur. Wetlands are numerous in certain areas, although many wetlands have been drained. Carolinian Canada (the most southerly portion of this ecozone) boasts the highest concentration of species in Canada. The number of species at risk is also high." 

The entire project area is underlain with sedimentary strata from the Middle Ordovician period. The strata consists mostly of limestone, dolostone, shale, arkose and sandstone of the Ottawa Group,
Simcoe Group and Shadow Lake Formations (Map 5). However, the western region of the county also includes chert formations.

One of the most common characteristics of Palaeoamerican material assemblages is the prevalence of cherts and similarities of lithic tools across wide ranging regions (Mason 1981, 1986; Goodyear 1989). Chert is a fine-grained, siliceous material which is easy to knap and therefore commonly used in the production of stone tools. In addition to chert use, quartz materials were also widely utilized, particularly in more northern regions or within the Canadian Shield, where quartz and quartzite materials were more locally available.

The project areas are situated primarily atop drumlinized till plains, immediately next to sand plains, but in addition, both areas are in extremely close proximity to, possibly situated upon, ancient beaches/shorecliffs (the dotted red line next to the Bell Farm Road area indicates beaches/shorecliffs but the exact location is not yet known). In addition, the surrounding physiography encompasses an additional five other surficial geology types (Map 6). These include sand plains, peat and muck, clay plains, kame moraines and boulder pavement along the current shoreline of Lake Simcoe. These types are the result of glacial recession across the landscape and the deposition of various sand and gravel materials.

Soils. Soil, in terms of its morphological characteristics, is defined as unconsolidated surface material forming "natural bodies" made up of mineral and organic materials as well as the living matter within them. It is a dynamic entity with materials continually and simultaneously absorbed, released and transformed. The formation of soils is heavily influenced by its parent material, climate, topography, bio-activity and time, however, it is mainly the combined effects of climate and living matter that convert a material to soil. For example, in moisture-rich environs, the dampness and rich vegetation may lead to deep, richly organic soils, good for agricultural production. However, in desert areas, where precipitation is low, the lack of moisture and vegetation may lead to sparse soil development and where soils exist, they may be thin and highly mineral. Furthermore, human disturbances such as grave sites, dwellings, agricultural activities and garbage dumps may also affect soil development, giving it other unique characteristics.

The soils of the project area are comprised of Schomberg silty clay loam (Shsc), Vasey sandy loam (Vasl) and Tioga loamy sand (Tis) (Map 7) (Hoffman et al. 1962). The table below list the characteristics of each soil type found in the project area.

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Topography</th>
<th>Soil Materials</th>
<th>Drainage</th>
<th>Great Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schomberg silty clay loam</td>
<td>smooth, moderately</td>
<td>calcareous lacustrine</td>
<td>imperfect</td>
<td>Gray Brown</td>
</tr>
<tr>
<td></td>
<td>to steeply sloping</td>
<td>carved silt loam and clay</td>
<td></td>
<td>Podzolic</td>
</tr>
<tr>
<td>Vasey sandy loam</td>
<td>smooth, moderately</td>
<td>light grey, calcareous and</td>
<td>good</td>
<td>Brown Podzolic</td>
</tr>
<tr>
<td></td>
<td>to steeply sloping</td>
<td>non-calcereous sandy loam</td>
<td></td>
<td>and Grey Brown</td>
</tr>
<tr>
<td>Tioga loamy sand</td>
<td>smooth, gently to</td>
<td>grey, calcereous outwash</td>
<td>good</td>
<td>Podzol</td>
</tr>
<tr>
<td></td>
<td>irregular, steeply</td>
<td>sand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hydrology. The modern water courses we see today evolved as their ancestral waterways and their tributaries adjusted to the retreat of the Champlain Sea, and to a lesser degree, Lake Iroquois. During glacial melt and ice retreat at the end of the Pleistocene and beginning of the Holocene periods, there was a much larger flow of water through the project area than at present and on several occasions, rivers shifted into new channels. However, by approximately 8,000 years ago, modern drainage patterns were established (Kennedy 1970).

The project area is now located within the St. Lawrence watershed which is within the larger Atlantic Ocean drainage basin (Map 8) and is drained via a number of meandering waterways (Map 1; Image 1). Watersheds are typically defined by the topography of the surrounding landscape and includes such factors as shape, contours and elevations. They are comprised of streams, creeks, brooks, rivers, lakes, ponds, wetlands, estuaries, uplands, forests and meadows and also shorelines.

Present within, or within relative close vicinity to the project area today, are lakes (i.e., Lake Simcoe, Little Lake, etc.), rivers (i.e., Nottawasaga River, Mad River, Holland River, etc.), creeks and streams (i.e., Coates Creek, Bear Creek, Willow Creek, Lovers Creek, Matheson Creek, Hawkestone Creek, etc.) and low-lying areas (i.e., wetlands, swamps, marshes) (Map 1). Tributaries of the Nottawasaga and Holland Rivers were used to traverse the interior of the province and move between Lake Simcoe and Georgian Bay prior to the construction of railways and roads. The potential for the discovery of archaeological resources increases drastically in particularly difficult areas along these routes, such as at rapids or chutes, where a portage was necessary. In addition, the shores of rivers and creeks were particularly attractive for temporary and semi-permanent settlement, especially in areas of the shore that were easily accessible by water. These areas were of particular interest, not only for their transportation value, but for access to potable water and foodstuffs, especially fish. The presence of secondary water sources, including permanently or seasonally inundated swamps, offered access to a variety of resources, including migratory birds, rice, and reeds for basket-making. Willow Creek played a crucial role during the War of 1812 as it was used by British forces, Aboriginal peoples and fur traders to maintain control of the upper Great Lakes. It was part of the Nine Mile Portage, a trail which led from Kempenfeldt Bay to Georgian Bay.

Climate. Modern climatic variation depends almost entirely upon location and human impacts on the environment. The project area, located in south-central Ontario, is influenced by the modifying factor of the Great Lakes; specifically Lake Huron. The Great Lakes tend to add moisture to the air in the autumn and winter in conjunction with protecting the region from the worst of the cold during the winter months, and during the spring and summer as they act to moderate the temperature of the region. This produces an ideal environment for agricultural practices as the growing season tends to be longer and the cold months not as harsh as through the remainder of Canada.
1.4.3 Previous Archaeological Assessments

Archaeological research within southwest Ontario, close to the project area, is often limited to discoveries made during development activities. However, this does not necessarily reflect the known and unknown, yet unrecorded archaeological history of the area. Throughout the eighteenth, nineteenth and early twentieth centuries, as Euro-Canadian settlers and loggers penetrated the forests and lakes of the region, some would encounter and collect evidence of past First Nations activities, in the form of stone and copper tools, or organic paraphernalia. This practice continued well into the twentieth century and is still carried out to this day by cottagers, tourists, and local residents, some who have amassed significant collections.

Furthermore, there are oral references to evidence of pre-contact First Nations occupation made by the first Euro-Canadian settlers to the region, which sometimes results in sites being “recreationally” excavated by non-professional archaeologists. With increased sensitivity towards the need to preserve cultural heritage within the Province, hundreds of archaeological projects have been recently undertaken within Ontario. Often initiated by development projects, including infrastructure development and improvement, subdivision applications, and construction activity, First Nations and early Euro-Canadian history of the region is being revealed.

Although a number of assessments have been conducted within the CoB and its outlying, suburban region, a search of the database indicated that no archaeological assessments have been conducted within a 50 metre radius the project area.

1.4.4 Registered Archaeological Sites

The Ontario Ministry of Tourism, Culture and Sport maintains a database (OASD) of all known registered archaeological sites in the Province. A search of the database within a one kilometre radius around the study area indicates the remains of three archaeological sites near the Bell Farm Road project area (Bell Site, Vespra 49 and Vespra 50) and one near the Ross/Bayfield/Collier area (Vespra 52). The Bell Site (BcGw-2) is bounded by St. Vincent Street and Highway 400. It is approximately 175 metres to the north of the project area. The site was noted by Hunter in 1906 and notes can be found in J.V. Wright’s notes.

Vespra 49 is situated on the lot north of the project area, within 1.6 kilometres of Little Lake. The site is situated upon an elevated portion of land and is approximately 2 acres in size. It was comprised of 20 lodges with a number of ceramic, faunal and lithic materials. Hunter (1906:54, 55) mentions a single burial and a clay pipe with a human effigy etched on its surface. The site is located on the main trail to the Neutrals.

The Vespra 50 site was situated a short distance from Little Lake. No mention of specific artifacts or burials are mentioned within Hunter’s monograph (1906:55). He only mentions that it was “on ground raised above the level of the lake, with springs immediately below.” (1906:55).

Vespra 52 is an archaeological site situated at least 325 metres south of the archaeological site (according to the archaeological data co-ordinator, these sites are “probably only accurate to the quarter lot,” so we’re unsure as to its exact location). This site was documented by Andrew Hunter in his 1906 monograph on Huron Sites within Simcoe County. He describes this site as having a “bonepit” (called the Tim Haggart pit) and it being “close to the southwest corner of Toronto and Elizabeth (now Dunlop Street West [Tourism Barrie n.d.:4]) Streets. This “bonepit” was one of the first discovered in the area and was described as having a diameter of 20 feet with between 200 to 300 crania and other bone fragments, brass kettles and other artifacts nestled within (Hunter 1906:55).

Hunter claims that two smaller “bonepits” were noted in the area.

1.4.5 Historical Plaques

Aside from the presence of nearby registered archaeological sites, other indicators of the presence of extant archaeological remains are the proximity of historical plaques to the study area that commemorate important events in a region’s past, whether it be the birth of an individual, the site a specific battle, or the construction of a unique building. Generally, historical plaques and markers point to a specific locale on the landscape that can be visited by the public. Although plaques and markers may not be placed in the exact location that the event has occurred, generally it is in close proximity, taking into consideration access to the public. In Ontario, historical plaques may be erected by the federal government through the Historic Sites and Monuments Board of Canada (HSMBC), the Ontario Heritage Trust (OHT), and local heritage agencies or historical societies. There are no historical plaques located within the study area but there are two within 300 metres project corridor (Image 1, Map 10).

The first is a plaque commemorating William Edward Gallie, M.D. 1882-1969. Dr. Gallie was born in Barrie and graduated from the Faculty of Medicine at the University of Toronto in 1903. He was responsible for establishing a systematic course on surgery training which was widely adopted throughout Canada.

The second plaque was placed to indicate the eastern terminus of the Nine Mile Portage route. Extending from Kempenfeldt Bay to Willow Creek, this portage route was utilized by British forces and First Nations peoples during the War of 1812 to transport provisions from the interior to Fort Michilimackinac. On December 1, 2014, the site was designated part of a National Historic Event.

1.4.6 Summary

Archaeological and cultural heritage work conducted in the area surrounding project properties have provided evidence of archaeological remains. Furthermore, archaeological potential is increased by the proximity of known archaeological sites, specific topographic features (past and present water sources, presence of knappable lithic materials) and historic features (early settlement, historic concession road, historic buildings). Research conducted for the Bell Farm Road project area showed the presence of three archaeological sites, with one site, the Bell Site (BcGw-2), within 175 metres no longer present due to construction in the area) and its proximity to an ancient shorecliff/beach. The Ross/Bayfield/Collier project area indicates that it is within close proximity to ancient shorecliffs or beaches, the Nine Mile Portage historical plague and historic concession roads.
2.0 FIELD METHODS

A property inspection was undertaken on December 1, 2016. The inspection was undertaken to determine if there were any areas of disturbance which would affect archaeological potential and to determine which survey strategies would be appropriate for a Stage 2 property survey, should one be required.

The site inspection covered all of the study area. Unfortunately, as portions of the study area were comprised of privately owned land, only those areas publicly accessible were visited. However, as the 6th Line and Highway 400 both traversed the project area, CAGI was able to visually assess the entire property.

The weather on December 1, 2016 was cool and overcast and an average temperature of 6°C.

Bell Farm Road Project. The property inspection started at the Bell Farm Road project area. Starting at the intersection of Bell Farm Road and St. Vincent Street, CAGI moved in an easterly direction towards Duckworth Street. A number of stops were made along the right-of-way to note vegetation, topography, soils, to make note of watercourses and disturbance and to take photographs of these physical characteristics. The project area was noted as level to slightly undulating and primarily disturbed with asphalt pavement, concrete sidewalks, deeply excavated ditches for drainage, commercial and residential buildings and gravel shoulders. Small flags and paint indicating municipal infrastructure (gas, water, storm, etc.) were noted throughout the project area. Common dandelion, chicory, bullrushes and cattails and stunted spruce were noted along the corridor (Map 9).

Ross/Bayfield/Collier Streets Project. Beginning at the intersection of Collier Street and Clapperton Street, CAGI moved in as westerly direction towards Bayfield Street and on to Ross Street until the its intersection with Toronto Street. As with the Bell Farm Road project area, a number of stops were made along the right-of-way to note vegetation, topography, soils, to make note of watercourses and disturbance and to take photographs of these physical characteristics. The project area was noted as completely disturbed with asphalt pavement, concrete sidewalks and commercial and residential buildings. Common dandelion and manicured grass were noted along the corridor (Map 10).

Topographic maps and orthographic images were examined to confirm if features of archaeological potential were present and if there were any areas of extensive disturbance which would have removed archaeological potential.

Through the course of the property inspection, no archaeological remains were noted within the proposed project area.

Field notes and photographs of the study areas were taken during the inspection by Laura McRae. Image locations and orientations were noted and are illustrated on the site conditions maps (Maps 9 and 10).

The archaeological assessment was carried out following project approval. Therefore, the Proponent was able to provide a schematic of the study area in advance of the stage 1 archaeological assessment. These plans and a .kmz file (google earth) were used for base mapping of conditions and potential.
3.0 ANALYSIS AND CONCLUSIONS

3.1 Archaeological Potential

Assigning levels of potential archaeological significance is employed by applying provincial environmental assessment guidelines (Weiler 1980). The information includes the identification and evaluation of any feature that has one or more of the following attributes:

- Potential can be determined via archaeological exploration, survey, or fieldwork. The information gleaned from these activities can provide answers to hypothesized questions (i.e., relate to particular times and places) regarding events and/or processes that occurred in the past, thereby adding to our knowledge and appreciation of history.

- Potential may be determined through archaeological exploration, survey, and fieldwork that may contribute to testing the validity of anthropological principles, cultural change and ecological adaptation, thereby contributing to the understanding and appreciation of our human-made heritage.

- The possibility that various technical, methodological, and theoretical advances might occur during archaeological investigation of a feature, alone or in association with other features exists. This therefore may contribute to the development of better scientific means of understanding and appreciating our human-made heritage.

The Ontario Ministry of Tourism, Culture and Sport also provide the Archaeological Potential Checklist which identifies land features that could indicate where archaeological resources are more likely to be located (Table 5).

Evaluating archaeological potential of an area involves the assessment of various criteria. The most common criteria used to evaluate archaeological potential relates to its physical setting which may include potable water sources, elevated landforms, and well-drained areas to which First Nations settlement was often oriented, as well as the presence of fertile soils suitable for cultivation.

Additional factors may include: the presence of known archaeological sites and whether they are located within a radius of 250 metres of the study area; the presence of watersources in the area (i.e., primary water source within 300 metres, secondary water source within 300 metres, ancient water source within 300 metres); the presence of elevated topography within or immediately adjacent to the project area; the presence of pockets of sandy soil within clay or rocky areas; the presence of particular land formations such as mounds, caverns, or waterfalls which may denote spiritual significance; the presence of resource rich areas such as primary, secondary, or ancient watersources, spawning fish, concentration of wild plants; the presence of Euro-Canadian colonization indicators such as cemeteries, standing structures; the presence of transportation routes within a 100 metres radius, such as portages, trails, colonization roads, railways, canals, harbours; whether the property has been designated a Heritage Property; and, that there is evidence from documentary sources, local knowledge, or oral histories concerning the property with historical events or activities.

Furthermore land registry and census records, historic maps, photographs, road and infrastructure plans and a property inspection all assist in determining historic archaeological potential.

<table>
<thead>
<tr>
<th>Feature of Archaeological Potential</th>
<th>Yes</th>
<th>No</th>
<th>NA</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Known archaeological site within 250 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined.</td>
</tr>
<tr>
<td><strong>PHYSICAL FEATURES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Is there water on or near the property?</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, what kind of water?</td>
</tr>
<tr>
<td>2a Primary water source within 300 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined</td>
</tr>
<tr>
<td>2b Secondary water source within 300 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined</td>
</tr>
<tr>
<td>2c Past water source within 300 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined</td>
</tr>
<tr>
<td>3 Elevated topography.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 4-9, potential determined</td>
</tr>
<tr>
<td>4 Pockets of sandy soil in a clay or rocky area.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3, 5-9, potential determined</td>
</tr>
<tr>
<td>5 Distinctive land formations.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-4, 6-9, potential determined</td>
</tr>
<tr>
<td><strong>HISTORIC USE FEATURES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Associated with food or scarce resource harvest areas.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-5, 7-9, potential determined</td>
</tr>
<tr>
<td>7 Indications of early Euro-Canadian settlement.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-6, 8-9, potential determined</td>
</tr>
<tr>
<td>8 Associated with historic transportation route within 100 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-7, 9, potential determined</td>
</tr>
<tr>
<td>9 Contains property designated under the Ontario Heritage Act.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-8, potential determined</td>
</tr>
<tr>
<td><strong>APPLICATION SPECIFIC INFORMATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Local knowledge.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined</td>
</tr>
<tr>
<td>11 Recent (post-1960) disturbance (confirmed extensive and intensive) Some (roadways, utilities, buildings, etc.)</td>
<td></td>
<td></td>
<td></td>
<td>If Yes, no potential</td>
</tr>
</tbody>
</table>
Table 6. Checklist for determining archaeological potential for Ross/Bayfield/Collier Streets.

<table>
<thead>
<tr>
<th>Feature of Archaeological Potential</th>
<th>Yes</th>
<th>No</th>
<th>NA</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Known archaeological site within 250 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined.</td>
</tr>
<tr>
<td>PHYSICAL FEATURES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Is there water on or near the property?</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, what kind of water?</td>
</tr>
<tr>
<td>2a Primary water source within 300 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined</td>
</tr>
<tr>
<td>2b Secondary water source within 300 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined</td>
</tr>
<tr>
<td>2c Past water source within 300 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined</td>
</tr>
<tr>
<td>3 Elevated topography.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 4-9, potential determined</td>
</tr>
<tr>
<td>4 Pockets of sandy soil in a clay or rocky area.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3, 5-9, potential determined</td>
</tr>
<tr>
<td>5 Distinctive land formations.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-4, 6-9, potential determined</td>
</tr>
<tr>
<td>HISTORIC USE FEATURES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Associated with food or scarce resource harvest areas.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-5, 7-9, potential determined</td>
</tr>
<tr>
<td>7 Indications of early Euro-Canadian settlement.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-6, 8-9, potential determined</td>
</tr>
<tr>
<td>8 Associated with historic transportation route within 100 m.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, and Yes for any of 3-7, 9, potential determined</td>
</tr>
<tr>
<td>9 Contains property designated under the Ontario Heritage Act.</td>
<td></td>
<td></td>
<td>x</td>
<td>If Yes, and Yes for any of 3-8, potential determined</td>
</tr>
<tr>
<td>APPLICATION SPECIFIC INFORMATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Local knowledge.</td>
<td>x</td>
<td></td>
<td></td>
<td>If Yes, potential determined</td>
</tr>
<tr>
<td>11 Recent (post-1980) disturbance (confirmed extensive and intensive)</td>
<td>Some (roadways, utilities, buildings, etc.)</td>
<td>x</td>
<td></td>
<td>If Yes, no potential</td>
</tr>
</tbody>
</table>

3.2 Conclusions

Bell Farm Road. The Bell Farm Road study area was assessed for disturbances (i.e., quarrying, grading below topsoil, building footprints, infrastructure development) that would have removed archaeological potential. Within the Standards and Guidelines for Consultant Archaeologists (2011:18-19), Section 1.3.2 considers infrastructure development among those “features indicating that archaeological potential has been removed.”
4.0 RECOMMENDATIONS

Based on the background research and the results of the property inspection, none of the culvert locations have been determined to retain archaeological potential. The Stage 1 archaeological assessment has provided the basis for the following recommendations:

1) A Stage 2 archaeological assessment will be conducted by a licensed consultant archaeologist using the test pit survey method at 5 m intervals in all areas along the corridor which have not been recently ploughed or do not have appropriate conditions for pedestrian survey at the time of the Stage 2 assessment (as illustrated by the areas marked in red on Maps 11 and 12);

2) No further archaeological assessments are recommended for areas which have been determined to be disturbed including the following intersections; Bell Farm Road and St. Vincent Street, Bell Farm Road and Alliance Boulevard, Bell Farm Road and Duckworth Street, Ross Street and Toronto Street, Ross Street and Sophia Street West, Ross Street and Mary Street, Ross Street and Maple Avenue, Ross Street and Bayfield Street, Bayfield Street and Collier Street and Collier Street and Clapperton Street (as illustrated by the areas marked in yellow on Maps 11 and 12);

3) The Stage 2 archaeological assessment will follow the requirements set out in the 2011 Standards and Guidelines for Consultant Archaeologists (MTC 2011).

4) Should construction activities associated with this development extend beyond those areas assessed during this project, further archaeological investigation will be required prior to ground-disturbing activities.

5) Notwithstanding the results and recommendations presented in this study, The Central Archaeology Group Inc. notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. Therefore, in the event that archaeological remains are found during subsequent construction and development activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.

The MTCS is requested to review, and provide a letter indicating their satisfaction with, the results and recommendations presented herein, with regard to the 2011 Standards and Guidelines for Consultant Archaeologists and the terms and conditions for archaeological licenses, and to enter this report into the Ontario Public Register of Archaeological Reports.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, C. 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regards to alterations to archaeological sites by the proposed development.

It is an offense under Sections 48 and 69 of the Ontario Heritage Act for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological Report referred to in Section 65.1 of the Ontario Heritage Act.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the Ontario Heritage Act.

6.0 BIBLIOGRAPHY AND SOURCES

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7.0 PLANS

Plan 1. Schematic of the Bell Farm Road project area (City of Barrie RFP 2016:55).

Plan 2. Schematic of the Ross/Bayfield/Collier project area (City of Barrie RFP 2016:56).
Plan 3. 1907 Fire Insurance Plan (Goad 1907, revised 1917). Project area is outlined in red.

Plan 4. 1907 Fire Insurance Plan (Goad 1907, revised 1917). Project area is outlined in red.
8.0 MAPS

Map 1. Location of the project area.

Map 3. Historical atlas maps of Simcoe County, the Geographic Township of Vespra and a close up of the project area (Belden 1881).


Map 3. Project Area
Map 4. Terrestrial ecozones of Canada

REFERENCES:
1. Map of the Simcoe County
2. Map of the Geographic Township of Vespra
3. Close-up of the project area

NOTE: This drawing to be used in conjunction with the CAGI accompanying report.


LEGEND
Project Location
Bell Farm Road & Ross/Colliver/Bayfield Streets
December 2016

The Central Archaeology Group Inc.
2401 5th Line East, Collingwood, ON L9L 1L1
info@centralarchaeology.ca

BASE:
Natural Resources Canada "Tornado 2010"
NTSG;
Projection: Transverse Mercator Datum: NAD 1972
Coordinate System: UTM Zone 18

NOTE: This drawing to be used in conjunction with the CAGI accompanying report.
Map 5. Bedrock geology of the project and surrounding area.

Map 6. Surficial geology of the project and surrounding area.
Map 7. Soil of the project and surrounding area.

Map 8. Watersheds of Canada.
Map 9. Site conditions for Bell Farm Road.

Map 10. Site conditions for Ross/Bayfield/Collier Streets.
Map 11. Archaeological potential for Bell Farm Road.

9.0 IMAGES

Image 1. Orthographic image of the project and surrounding area (Google Earth 2014).

Image 2. 1954 aerial photograph of the project area (NAPL 444.793).
TRANSPORTATION IMPROVEMENTS: BELL FARM ROAD & ROSS/COLLIERS/BAYFIELD STREETS
STAGE 1 BACKGROUND STUDY

REPORT NO. CAGI-2016-LM19

JANUARY 2017

56

Image 7

Image 9

Image 8

Image 10

The Central Group Inc.
CARCHAEOLOGY
TRANSPORTATION IMPROVEMENTS: BELL FARM ROAD & ROSS/COLLIER/BAYFIELD STREETS  
REPORT No. CAGI-2016-LM19
STAGE 1 BACKGROUND STUDY

Image 15

Image 16

Image 17

Image 18
10.0 GLOSSARY OF TERMS

A Horizon - mineral horizon at or near the ground surface (topsoil). May be dark brown due to accumulated humus (Ah) or grey or lighter brown when clay, iron and humus have been leached out (Ae). It is most commonly disturbed by human activities.

Archeological Site - is a place in which physical evidence of past human activity is preserved and which has been, or may be, investigated using the discipline of archaeology.

Archaic Period - in Ontario is characterized by the appearance of ground stone tools, notched or stemmed projectile points, the predominance of less extensively flaked stone tools, increased reliance on local chert resources, a lack of pottery and smoking pipes, and an increase in the numbers and sizes of sites.

Atlatl - a tool used to throw spears faster and with more accuracy. It consists of a short pole with a handle at one end and a hook for engaging the spear in the other.

B Horizon - below the A Horizon (subsoil). It could be enriched with iron (Bt), with iron and organic matter (Bfr), with organic matter (Bh) or with clay (Bt). If saturated for extended periods, B horizons show signs of gleying or mottling (Bg, Btg, Bf).

Bioturbation - results in changes to the nature, form, and arrangement of archaeological deposits and sediments as a result of biological activity in the ground. This includes root action, animal activity, and the degeneration of organic matter.

BP - Before Present. Years before present (1950), used in dating sites and/or artifacts from an archaeological site.

Borden Number - a borden number is an identifier given to an archaeological site in Canada. It was created by Charles E. Borden and contains four letters and one to several numbers.

Burial Goods or Burial Paraphernalia - items interred with an individual (or group) burial that may give clues to their social and/or economic and/or political position within their culture.

Chert - is a fine-grained, sedimentary rock, similar to flint. In antiquity, chert was one of the universally preferred materials for making stone tools.

Contact Period - refers to the period when European and First Nations peoples were first exposed to one another. In Ontario from 450 BP to 200 BP.

Cultural Resources - are sites, structures, landscapes, and objects of particular importance to a culture or community.

Diagnostic - a distinguishing characteristic serving to identify or determine the artifact.

Disarticulated - this occurs when bones are found separated at the joints.

Disturbed - refers to a study area that has recently been excavated or altered from its original characteristics.

Ecozone - classification system that defines different parts of the environment with similar geography, vegetation, animals, climate, topography and water sources.

Environmental Assessment Act - sets up a process for reviewing the environmental impact of proposed activities prior to the granting of government funds.

Erratic - large rock or boulder that differs from the surrounding rock and is believed to have been transported a long distance as a result of glacial action.

Excavation - is the systematic digging and recording of an archaeological site.

Flake - is a fragment of stone removed from a core or from another flake.

Feature - is a collection of one or more contexts representing some human activity that has a vertical characteristic to it in relation to site stratigraphy.

Fluted - grooved or channelled. A fluted point is a projectile point which has had one or more long thinning flakes removed from the base along one or both faces.

Glaciofluvial - sediments laid down by glacial meltwater action (i.e., rivers or streams).

Ground Stone - is a stone artifact shaped by sawing, grinding, and/or polishing with abrasive materials.

Historic Period - the period when written records become available.

Holocene - the most recent period. Began approximately 10,000 years ago following the end of the Pleistocene.

Knap - to shape a piece of stone material by striking it at specific angles. Term used by archaeologists to denote the manufacture of a lithic tool.

Lanceolate - lance-shaped, much longer that wide, widened at or above the base and opening to the apex.

Lithic - stone, or made of stone.

Maize - also known as corn, is a cereal grain that was first domesticated in Mesoamerica and then spread throughout the American continents.

Mitigation - measures undertaken to limit the adverse impact of construction methods on archaeological sites or cultural resources.

Ochre - used as a natural pigment, colour is commonly reddish-brown to yellow.
Ontario Heritage Act - allows municipalities and the provincial government to designate individual properties and districts in Ontario as being of cultural heritage value or interest.

Palaeoamerican Period - first evidence of human occupation in Ontario. This period is characterized by groups hunting large game and seasonal occupation along shore environments.

Pleistocene - an epoch within the Quaternary Period which began approximately 2,000,000 millions years ago and ended approximately 10,000 years ago. Immediately preceded the Holocene Period.

Projectile Point - is an artifact used to tip an arrow, atlatl dart, spear, or harpoon. Usually made of chipped or ground stone, however, some are also made of copper.

Stage 1 Background Study - The purpose of a Stage 1 assessment is to investigate the cultural land use, archaeological history, and the present conditions of a property. The majority of the Stage 1 process is conducted in the office and involves the examination of records such as historic settlement maps, land titles, and documents, historical land use and ownership records, primary and secondary documentary sources, and the Ministry of Culture’s archaeological site database. The study may also involve interviews with individuals who can provide information about the property and consultation with local First Nations communities. The background study is followed by a property inspection to examine geography, topography and current conditions, and to determine the potential for archaeological resources. Stage 1 background research is usually completed in conjunction with a Stage 2 property survey.

Stage 2 Property Survey - A Stage 2 property survey is undertaken if the Stage 1 background study finds that a property retains archaeological potential. It involves the documentation of archaeological resources by collecting artifacts and mapping cultural features. Depending on the nature of the property environment, two methods are employed in the survey: 1) pedestrian survey on cultivable properties, and; 2) test-pit survey on properties not cultivable due to tree growth, rock content, etc.

Strata - are layers of rock, soil, cultural material, etc. with internally consistent characteristics that distinguish contiguous.

Stratigraphy - the layering of deposits on archaeological sites. Cultural remains and natural sediments become buried over time, forming strata.

Subsistence - obtaining food and shelter necessary to support life.

Survey - is used to accurately determine the terrestrial or three-dimensional space position of points and the distances and angles between them.

Woodland Period - is a period of time following the Archaic Period. It is sub-divided into Early, Middle, and Late.
Appendix I
Built Cultural Heritage Report
Memo

To: BT Engineering  From: Stantec Consulting Ltd.
Barrie, Ontario  London, Ontario
File: 160940389  Date: November 22, 2016

Reference: Heritage Screening Checklist and Inventory, Bell Farm Road and Ross/Collier/Bayfield Street Environmental Assessments

Stantec Consulting Ltd. (Stantec) was retained by BT Engineering to carry out a Heritage Screening Checklist and Inventory for the Bell Farm Road and Ross/Collier/Bayfield Streets Improvement Environmental Assessments (EAs) in the City of Barrie, Ontario. This project involves the following work:

Bell Farm Road:
- Widening Bell Farm Road with provisions for pedestrians and cyclists from St. Vincent Street to a four-lane cross section east of Alliance Boulevard, and maintaining the four-lane cross section with improvements for pedestrians and cyclists from east of Alliance Boulevard to Duckworth Street

Ross/Collier/Bayfield Streets:
- Proposed widening and realignment of Ross Street from Toronto Street to Bayfield Street to three lanes with buffered bicycle lanes and sidewalks on both sides
- Intersection improvements will be considered for the intersection of Ross Street, Collier Street, and Bayfield Street, including signalization, and roundabout or traffic operations improvement
- Improvements would extend to Collier Street and Clapperton Street

This heritage screening consists of the completion of the Ministry of Tourism, Culture and Sport’s (MTCS) Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes (the Checklist). The Checklist identifies protected properties within the study area as well as properties where a potential heritage resource is situated and further work is required prior to development. Completion of the Checklist included consultation with the municipality and relevant agencies, review of available online materials, and a site inventory. Consultation with the City of Barrie, Ontario Heritage Trust (OHT), and MTCS determined that there are no previously identified heritage properties within, or adjacent to, the Bell Farm Road study area and that there is one designated property and one potential heritage property within, or adjacent to, the Ross/Collier/Bayfield Streets study area.

The site inventory includes any properties within, or adjacent to, the study areas that are 40 years or older or have known cultural heritage value. No potential heritage resources were identified within, or adjacent to, the Bell Farm Road study area and 64 known and/or potential heritage resources were identified within, or adjacent to, the Ross/Collier/Bayfield Streets study area.

The Checklist and site inventory were prepared by a member of the Canadian Association of Heritage Professionals (CAHP) who specializes in the identification of heritage resources and the evaluation of cultural heritage value or interest (CHVI).

Reference: Heritage Screening Checklist and Inventory, Bell Farm Road and Ross/Collier/Bayfield Street Environmental Assessments

REGULATORY REQUIREMENTS

The requirement to consider cultural heritage in Municipal Class EAs is discussed in the Municipal Class Environmental Assessment Manual (MCEA Manual) and the revised 2014 Provincial Policy Statement (PPS). The MCEA Manual considers cultural heritage, including built heritage resources and cultural heritage landscapes as well as archaeological resources, as one in a series of environmental factors to be considered when undertaking an MCEA, particularly when describing existing and future conditions, development alternatives, and determination of the preferred alternative.

The MCEA Manual further suggests that cultural heritage resources that retain heritage attributes should be identified early in the EA process and avoided where possible. Where avoidance is not possible, potential effects to these attributes should be identified and minimized. Adverse impacts should be mitigated according to provincial and municipal guidelines. It is suggested that this happen early in the process so that potential impacts to significant features can be included in an understanding of project impacts and plans established to mitigate these impacts.

In addition to requirements outlined in the MCEA Manual, provisions made under the PPS should also be considered when carrying out a cultural heritage study. Section 2.6 of the PPS addresses cultural heritage in the land use planning process and as such was considered. The applicable provisions include:

2.6.1 - Significant built heritage resources and significant cultural heritage landscapes shall be conserved.
2.6.3 - Planning authorities shall not permit development and site alteration on adjacent lands to protected heritage property except where the proposed development and site alteration has been evaluated and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved.

(Government of Ontario 2014: 29)

METHODOLOGY

The heritage screening was composed of a program of agency consultation, field review, and desktop background research for the study area.

Agency consultation was conducted to determine the presence of protected properties within the study areas. Protection of heritage resources may include, but is not limited to, designation under the Ontario Heritage Act (OHA), a provincial easement made under the OHA, or listing/registering of potential resources by the municipality. Consultation included correspondence with the following agencies and individuals:

- MTCS
- OHT
- The City of Barrie
For the purposes of this heritage screening, the term heritage resource refers to a property where CHVI has been determined according to Ontario Regulation 9/06. Prior to evaluation, resources that are 40 years of age or older are considered to be potential heritage resources. There are two categories of heritage resources: built heritage resources (BHR) and cultural heritage landscapes (CHL). Other terms used are protected heritage property, which refers to properties that are designated under or subject to an easement made under the Ontario Heritage Act, and protected property, which is any property previously identified by municipal staff or provincial that has CHVI. This includes properties identified on municipal registers, lists, or inventories of potential heritage resources.

BACKGROUND RESEARCH

High level background research was carried out to place the study area in a historical context and identify any potential heritage resources that are 40 years old or more. Historically, the study area is located in the Township of Vespra, Simcoe County in the following lots and concessions:

Bell Farm Road Study Area:
- Lots 21-22, Concession 3

Ross/Collier/Bayfield Study Area:
- Lots 23-24, Concession 4
- Lots 23-24, Concession 5

Township of Vespra

The Township of Vespra is the central township of Simcoe County. It was founded in 1818 when the Penetanguishene Road was cut through from Kempenfelt Bay to Georgian Bay by the British government (Mika and Mika 1983:578). Settlement began along Penetanguishene Road in 1819 but it took several more years before settlement spread to the interior of the township (Mika and Mika 1983:578). Early settlers in Vespra Township include John Lawrence, Thomas and John Mar, John Partidge, John Jones, John and Samuel Brown, Peter White, Charles Debinham, and John Gilroy. General settlement in Vespra began around 1830 and a post office was established in 1835. The first school in Barrie was built in 1836. Historical settlements in Vespra Township include the City of Barrie, Minesing, Midhurst, Grenfell, Dalfston, Craighurst, and Antlon Mills. The Bell Farm Road study area borders the historical limits of the City of Barrie on the north and the Ross/Collier/Bayfield Streets study area is located within the historical limits of the City of Barrie. In general, buildings and structures of more than 40 years of age were identified during the survey for their potential to satisfy criteria. The use of the 40 year threshold is generally accepted by both the federal and provincial authorities as a preliminary screening measure for cultural heritage interest or value. This practice does not imply that all buildings and structures more than 40 years of age are inherently of significant heritage value, nor does it exclude exceptional examples constructed within the past 40 years of being of significant cultural heritage value.

City of Barrie

The City of Barrie lies within the former Township of Vespra and is situated at the head of Kempenfelt Bay (Lake Simcoe). Barrie was founded by an unnamed agent of the Hudson’s Bay Company, who came across the sheltered bay on the west shore of Lake Simcoe and was impressed by the layout of the land (Mika and Mika 1977:136). Subsequently, a Hudson’s Bay Company storehouse was erected at this site in 1812. The first dwelling built in the limits of the City of Barrie was a log house constructed for Sir George Head, who arrived in the area in 1813 to supervise a proposed naval establishment at Penetanguishene (Mika and Mika 1977:136). In 1827, an Aboriginal trader named Andrew Borland took out a patent on lands within the city limits. This parcel of land became known as the Berczy Block in Barrie (Mika and Mika 1977:136). Settlement in Barrie began in the 1830s and steadily progressed as a number of settlers took up the town lots. Barrie contained two log taverns and a general store by 1832, a post office by 1835, and a schoolhouse by 1836 (Mika and Mika 1977:137). A number of churches were constructed between 1834 and 1855. Barrie was incorporated as a “town without any municipal organization” in 1851 and became an organized town in 1871 with Robert Simpson as the first mayor (Mika and Mika 1977:137). Barrie was incorporated as a city in 1959.

AGENCY CONSULTATION

The MTCS and OHT were contacted to determine if there are any protected or potential heritage resources within or adjacent to the study areas. At the time of writing, no response was received from these agencies.

Kathy Brûlin, Senior Planner, City of Barrie, reported that there are no designated or listed heritage properties within, or adjacent to, the Bell Farm Road study area. She also noted that the Ross/Collier/Bayfield Streets study area contains two previously identified heritage resources, including:
- 105 Toronto Street (designated under Part IV of the OHA)
- 37 Clapperston Street (on the City of Barrie Walking Tour)

Brûlin also noted that the Ross/Collier/Bayfield Streets study area falls within one of the oldest areas of the City of Barrie and that this area likely contains numerous properties that have potential heritage value but have not yet been identified or studied.

FIELD PROGRAM

A vehicular windshield survey of the Bell Farm Road study area was conducted on October 28, 2016 and the Ross/Collier/Bayfield Streets study area was conducted on November 4, 2016 from publicly accessible roadways, to complete the MTCS checklist, document the properties identified by the municipality, and identify potential cultural heritage resources. During the survey, the study area was surveyed for potential heritage resources, including both potential built heritage resources and components of cultural heritage landscapes. Where identified, these were photographed and their locations recorded. Characteristics of each potential heritage resource were noted while in the field.

In general, buildings and structures of more than 40 years of age were identified during the survey for their potential to satisfy Ontario Regulation 9/06 criteria. The use of the 40 year threshold is generally accepted by both the federal and provincial authorities as a preliminary screening measure for cultural heritage interest or value. This practice does not imply that all buildings and structures more than 40 years of age are inherently of significant heritage value, nor does it exclude exceptional examples constructed within the past 40 years of being of significant cultural heritage value.
The field survey revealed that the Bell Farm Road study area does not contain any buildings or structures that were estimated to be more than 40 years of age. The field survey also revealed that the Ross/Collier/Bayfield Streets study area contains a total of 64 properties that contain buildings that are estimated to be older than 40 years of age. One is designated under the OHA, one is included in the City of Barrie Heritage Walking Tour, and 62 were identified during the field review. A list of the protected and potential heritage properties is provided in Table 1 and an inventory of these resources is included in Appendix B.

Table 1: Ross/Collier/Bayfield Study Area - Protected and Potential Heritage Properties

<table>
<thead>
<tr>
<th>Address</th>
<th>Heritage Status</th>
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<tbody>
<tr>
<td>87 Mary Street</td>
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<td>88 Mary Street</td>
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<td>89 Mary Street</td>
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MTCS CHECKLIST

The Checklist was completed for both study areas based on the results of the background research, agency consultation, and field survey. No indicators of CHVI were identified for the Bell Farm Road study area and two indicators of CHVI were identified for the Ross/Collier/Bayfield Streets study area. Results of the Checklist for both study areas are summarized in Table 2 and Table 3 and the completed checklists are included in Appendix A.

Table 2: Bell Farm Road - Indicators of CHVI According to the MTCS Checklist

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Identified within the Study Area</th>
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<tbody>
<tr>
<td>Identified, designated or otherwise protected under the Ontario Heritage Act</td>
<td>No</td>
</tr>
<tr>
<td>A National Historic Site (or part of it)?</td>
<td>No</td>
</tr>
<tr>
<td>Designated under the Heritage Railway Stations Protection Act</td>
<td>No</td>
</tr>
<tr>
<td>Designated under Heritage Lighthouse Protection Act</td>
<td>No</td>
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</table>
Table 2: Bell Farm Road - Indicators of CHVI According to the MTCS Checklist

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Identified within the Study Area</th>
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</thead>
<tbody>
<tr>
<td>Identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBO)</td>
<td>No</td>
</tr>
<tr>
<td>Located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site</td>
<td>No</td>
</tr>
<tr>
<td>Is the subject of a municipal, provincial, or federal, commemorative or interpretive plaque</td>
<td>No</td>
</tr>
<tr>
<td>Has or is adjacent to a known burial site and/or cemetery</td>
<td>No</td>
</tr>
<tr>
<td>Is in a Canadian Heritage River watershed</td>
<td>No</td>
</tr>
<tr>
<td>Contains buildings or structures that are 40 or more years old</td>
<td>No</td>
</tr>
<tr>
<td>Local or Aboriginal knowledge identified that the study area is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area</td>
<td>No</td>
</tr>
<tr>
<td>Local or Aboriginal knowledge identified that the study area has a special association with a community, person or historical event</td>
<td>No</td>
</tr>
<tr>
<td>Local or Aboriginal knowledge identified that the property contains or is part of a cultural heritage landscape</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 3: Ross/Collier/Bayfield Streets - Indicators of CHVI According to the MTCS Checklist

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Identified within the Study Area</th>
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<tbody>
<tr>
<td>Identified, designated or otherwise protected under the Ontario Heritage Act as being of cultural heritage value?</td>
<td>Yes</td>
</tr>
<tr>
<td>A National Historic Site (or part of)</td>
<td>No</td>
</tr>
<tr>
<td>Designated under the Heritage Railway Stations Protection Act</td>
<td>No</td>
</tr>
<tr>
<td>Designated under Heritage Lighthouse Protection Act</td>
<td>No</td>
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<tr>
<td>Identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBO)</td>
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<tr>
<td>Located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site</td>
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</tr>
<tr>
<td>Is the subject of a municipal, provincial, or federal, commemorative or interpretive plaque</td>
<td>No</td>
</tr>
<tr>
<td>Has or is adjacent to a known burial site and/or cemetery</td>
<td>No</td>
</tr>
<tr>
<td>Is in a Canadian Heritage River watershed</td>
<td>No</td>
</tr>
<tr>
<td>Contains buildings or structures that are 40 or more years old</td>
<td>Yes</td>
</tr>
</tbody>
</table>

RECOMMENDATIONS

Based on consultation with the appropriate regulatory bodies, desktop data collection, and field survey, it was determined that the Bell Farm Road study area contains no potential heritage resources. Therefore, the Checklist should be amended to the EA and the results included in EA reporting. No further cultural heritage work is anticipated.

Based on consultation with the appropriate regulatory bodies, desktop data collection, and field survey, it was determined that the Ross/Collier/Bayfield study area contains a total of 64 protected and/or potential heritage resources.

- A cultural heritage evaluation report (CHER) should be carried out for the Ross/Collier/Bayfield study area to determine the cultural heritage significance of the known and potential heritage properties within, or adjacent to, the study area. These properties should be evaluated against Ontario Regulation 9/06 to determine whether CHVI is present. A statement of significance and heritage attributes should be identified as required. As part of the CHER, recommendations for heritage impact assessments should be prepared as appropriate. The CHER should be carried out by a qualified heritage professional who is a professional member of the Canadian Association of Heritage Professionals.
CLOSURE

This memo has been prepared for the sole benefit of BTE Engineering, and may not be used by any third party without the express written consent of Stantec Consulting Ltd. and the BTE Engineering.

We trust this report meets your current requirements. Please do not hesitate to contact us should you require further information or have additional questions about any facet of this report.

Sincerely,
Stantec Consulting Ltd.

Lashia Jones, MA, CAHP
Cultural Heritage Specialist
Phone: 519-675-6635
Fax: 519-645-6575
lashia.jones@stantec.com

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Senior Associate, Environmental Services
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tracie.carmichael@stantec.com

REFERENCES CITED


APPENDIX A: MTCS CHECKLISTS

Project or Property Name: Bell Farm Road Improvements Study Design

Project or Property Location (upper and lower or single tier municipality): City of Barrie, Ontario

Proponent Name: BT Engineering

Proponent Contact Information: n/a

Screening Questions

1. Is there a pre-approved screening checklist, methodology or process in place?

If Yes, please follow the pre-approved screening checklist, methodology, or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

If Yes, do not complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- Summarize the previous evaluation and
- Add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken.

The summary and appropriate documentation may be:

- Submitted as part of a report requirement
- Maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

Part B: Screening for Potential Cultural Heritage Value

4. Does the property (or project area) contain a parcel of land that:

a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?

b. has or is adjacent to a known burial site and/or cemetery?

c. is in a Canadian Heritage River watershed?

d. contains buildings or structures that are 40 or more years old?

Part C: Other Considerations

5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):

a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?

b. has a special association with a community, person or historical event?

c. contains or is part of a cultural heritage landscape?

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area. You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property. The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the Environmental Assessment Act, Planning Act processes
- maintained by the property owner, proponent or approval authority
**Project or Property Name:**
Ross/Collier/Bayfield Streets Study Design

**Project or Property Location (upper and lower or single tier municipality):**
City of Barrie, Ontario

**Proponent Name:**
BT Engineering

**Proponent Contact Information:**
n/a

### Screening Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Is there a pre-approved screening checklist, methodology or process in place?</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>If Yes, please follow the pre-approved screening checklist, methodology, or process.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If No, continue to Question 2.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Part A: Screening for known (or recognized) Cultural Heritage Value**

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Has the property (or project area) been evaluated before and found not to be of cultural heritage value?</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If Yes, do <strong>not</strong> complete the rest of the checklist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The proponent, property owner and/or approval authority will:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Summarize the previous evaluation and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The summary and appropriate documentation may be:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Submitted as part of a report requirement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintained by the property owner, proponent or approval authority</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If No, continue to Question 3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Part B: Screening for Potential Cultural Heritage Value**

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Does the property (or project area) contain a parcel of land that:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. has or is adjacent to a known burial site and/or cemetery?</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>g. is in a Canadian Heritage River watershed?</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>h. contains buildings or structures that are 40 or more years old?</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

**Part C: Other Considerations**

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. has a special association with a community, person or historical event?</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. contains or is part of a cultural heritage landscape?</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area. You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property. The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the Environmental Assessment Act, Planning Act processes
- maintained by the property owner, proponent or approval authority

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.
# APPENDIX B: Ross/Collier/Bayfield Site Inventory

<table>
<thead>
<tr>
<th>Address</th>
<th>Heritage Status</th>
<th>Description</th>
<th>Photograph</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 Clapperton Street</td>
<td>Identified during field survey</td>
<td>Two storey residence - Neo-Classical style elements, symmetrical façade, portico over front entrance - Older than 40 years</td>
<td><img src="image" alt="31 Clapperton Street" /></td>
</tr>
<tr>
<td>33 Clapperton Street</td>
<td>Identified during field survey</td>
<td>One and one half storey residence - Gable roof, brick façade, front bay window, pediment over front entrance, decorative vergeboard - Appears on the 1907 Fire Insurance Map of Barrie</td>
<td><img src="image" alt="33 Clapperton Street" /></td>
</tr>
<tr>
<td>35 Clapperton Street</td>
<td>Identified during field survey</td>
<td>Two and one half storey residence - Brick exterior, two storey bay, hipped gable roof, offset gable with half round window - Appears on the 1907 Fire Insurance Map of Barrie</td>
<td><img src="image" alt="35 Clapperton Street" /></td>
</tr>
<tr>
<td>36 Clapperton Street</td>
<td>Identified during field survey</td>
<td>One and one half storey residence - Red brick exterior, gable roof with centre gable, ogee shaped window in centre gable, covered front verandah - Appears on the 1907 Fire Insurance Plan of Barrie</td>
<td><img src="image" alt="36 Clapperton Street" /></td>
</tr>
<tr>
<td>37 Clapperton Street</td>
<td>Included in the City of Barrie Downtown West Walking Tour</td>
<td>Built 1878 - Built by Baptist Congregation - Converted to commercial use in 1997 - Irregular plan, dichromatic brick exterior, gothic pointed arch windows</td>
<td><img src="image" alt="37 Clapperton Street" /></td>
</tr>
<tr>
<td>40 Clapperton Street</td>
<td>Identified during field survey</td>
<td>One and one half storey residence - Gothic Revival style architecture - Steeply sloped cross gable roof with centre gable, pointed arch windows in gables, stucco exterior - Currently in use as a law office - Older than 40 years</td>
<td><img src="image" alt="40 Clapperton Street" /></td>
</tr>
<tr>
<td>89 Bayfield Street</td>
<td>Identified during field survey</td>
<td>Two and one half storey residence - Painted brick exterior, symmetrical façade, bay with pediment on both sides of house - Appears to be recently updated - Appears on the 1907 Fire Insurance Map of Barrie</td>
<td><img src="image" alt="89 Bayfield Street" /></td>
</tr>
<tr>
<td>Address</td>
<td>Heritage Status Description</td>
<td>Photograph</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>98 Bayfield Street</td>
<td>Identified during field survey</td>
<td><img src="https://example.com/photograph98" alt="Photograph" /></td>
<td></td>
</tr>
<tr>
<td>11 Sophia Street</td>
<td>Identified during field survey</td>
<td><img src="https://example.com/photograph11" alt="Photograph" /></td>
<td></td>
</tr>
<tr>
<td>30 Sophia Street</td>
<td>Identified during field survey</td>
<td><img src="https://example.com/photograph30" alt="Photograph" /></td>
<td></td>
</tr>
<tr>
<td>34 Sophia Street</td>
<td>Identified during field survey</td>
<td><img src="https://example.com/photograph34" alt="Photograph" /></td>
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</tr>
<tr>
<td>36 Sophia Street</td>
<td>Identified during field survey</td>
<td><img src="https://example.com/photograph36" alt="Photograph" /></td>
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</tr>
<tr>
<td>38 Sophia Street</td>
<td>Identified during field survey</td>
<td><img src="https://example.com/photograph38" alt="Photograph" /></td>
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<tr>
<td>40 Sophia Street</td>
<td>Identified during field survey</td>
<td><img src="https://example.com/photograph40" alt="Photograph" /></td>
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</tr>
<tr>
<td>42 Sophia Street</td>
<td>Identified during field survey</td>
<td><img src="https://example.com/photograph42" alt="Photograph" /></td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td>Heritage Status</td>
<td>Description</td>
<td>Photograph</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
</tbody>
</table>
| 23 Worsley Street  | Identified during field survey | Two and one half storey residence  
- Gambrel roof, brick exterior, asymmetrical façade, oval window in centre of upper storey, covered verandah on front façade  
- Older than 40 years | ![Image](image1) |
| 66 Maple Avenue    | Identified during field survey | One and one half storey commercial building  
- Rectangular plan, gable roof with additional gables on north and south sides, segmentally arched window openings, recent front and rear additions  
- Older than 40 years | ![Image](image2) |
| 80 Maple Ave       | Identified during field survey | One and one half storey commercial building  
- Rectangular (long façade) plan, two gable dormers with projecting eaves, covered front verandah, stucco exterior  
- Older than 40 years | ![Image](image3) |
| 31 Maple Avenue    | Identified during field survey | One and one half storey residence  
- Irregular plan, hipped roof, plain pediment offset to right, hip dormer, appears to be updated  
- Older than 40 years | ![Image](image4) |
| 81 Maple Avenue    | Identified during field survey | One and one half storey residence  
- Cross gable roof, first storey brick exterior, second storey stucco exterior with half timbering, attached garage  
- Older than 40 years | ![Image](image5) |
| 65 Maple Avenue    | Identified during field survey | One storey residence  
- Gable roof, bay offset to right with gable roof, stucco exterior, small pediment over front entrance  
- Older than 40 years | ![Image](image6) |
| 83 Maple Avenue    | Identified during field survey | One and one half storey residence  
- Cross gable roof with returned eaves, first storey clad in stone veneer, second storey clad in stucco, two storey porch on right  
- Older than 40 years | ![Image](image7) |
| 87 Maple Avenue    | Identified during field survey | Two storey residence  
- L-shaped plan, cross gable roof with returned eaves, two storey porch in stone veneer, second storey clad in stucco, two storey porch on right  
- Older than 40 years | ![Image](image8) |
| 92 Maple Avenue    | Identified during field survey | Two and one half storey residence  
- Red brick exterior, two storey bay offset to left, simple pediments at gable end of front façade, segmentally arched structural openings, two storey porch on front façade, three storey porch on south elevation  
- Older than 40 years | ![Image](image9) |
<table>
<thead>
<tr>
<th>Address</th>
<th>Heritage Status</th>
<th>Description</th>
<th>Photograph</th>
</tr>
</thead>
</table>
| 97 Toronto Street | Identified during field survey | - Two and one half storey institutional building (former residence)  
- Hipped roof, centrally placed dormer with hipped roof, first storey clad in brick, second storey clad in stucco, bay window offset to left, asymmetrical façade  
- Older than 40 years | ![Image](image1) |
| 105 Toronto Street | Designated under the Part IV of the Ontario Heritage Act | - Second Empire style  
- Architect George Brown and builder George Ball  
- Built 1872 for Charles Robinson, American stove manufacturer  
- Sold in 1887 to Martin Burton, lumber dealer  
- A fountain was formerly located on the property  
- Older than 40 years | ![Image](image2) |
| 109 Toronto Street | Identified during field survey | - Two and one half storey residence  
- Hipped roof, red brick exterior, two storey bay offset to left, half round window in gable, rounded structural openings with header voussoirs on first storey  
- Older than 40 years | ![Image](image3) |
| 111 Toronto Street | Identified during field survey | - Two and one half storey residence  
- Hipped roof, red brick exterior, bay offset to left, half round window in gable, rounded structural openings with header voussoirs on first storey  
- Older than 40 years | ![Image](image4) |
| 117 Toronto Street | Identified during field survey | - Two and one half storey residence  
- Hip roof, brick exterior, simple structural openings, asymmetrical façade  
- Older than 40 years | ![Image](image5) |
| 119 Toronto Street | Identified during field survey | - Two and one half storey residence  
- Gable roof, pediment, asymmetrical façade, covered front verandah  
- Older than 40 years | ![Image](image6) |
| 121 Toronto Street | Identified during field survey | - Two and one half storey residence  
- Rectangular plan, brick exterior, hipped roof, asymmetrical façade, covered verandah  
- Older than 40 years | ![Image](image7) |
| 123 Toronto Street | Identified during field survey | - Two and one half storey residence  
- Brick exterior (first storey) stucco exterior with brick quoins (second storey), asymmetrical façade, bay window  
- Older than 40 years | ![Image](image8) |
<table>
<thead>
<tr>
<th>Address</th>
<th>Heritage Status</th>
<th>Description</th>
<th>Photograph</th>
</tr>
</thead>
</table>
| 79 Mary Street | Identified during field survey | One and one half storey residence  
- Rectangular plan, brick exterior, shed style dormer, closed porch on front façade  
- Older than 40 years | ![Photograph](image1.jpg) |
| 81 Mary Street | Identified during field survey | Two and one half storey residence  
- Rectangular plan, centre gable, decorative vergeboard, closed front porch  
- Older than 40 years | ![Photograph](image2.jpg) |
| 83 Mary Street | Identified during field survey | Two and one half storey residence  
- Hipped gable roof, brick exterior, segmentally arched structural openings, covered porch with pediment surrounding front entrance  
- Older than 40 years | ![Photograph](image3.jpg) |
| 84 Mary Street | Identified during field survey | One and one half storey residence  
- Semi-detached (with 86 Mary Street), stucco exterior, covered verandah on front façade  
- Older than 40 years | ![Photograph](image4.jpg) |
| 85 Mary Street | Identified during field survey | One and one half storey residence  
- Rectangular plan, brick exterior, shed style dormer, closed porch on front façade  
- Older than 40 years | ![Photograph](image5.jpg) |
| 86 Mary Street | Identified during field survey | Residence  
- Semi-detached (with 84 Mary Street)  
- House not visible from the right-of-way due to tree cover  
- Property appears to be older than 40 years | ![Photograph](image6.jpg) |
| 87 Mary Street | Identified during field survey | Two and one half storey residence  
- Irregular plan, gable hip roof, projecting eaves, segmentally arched structural openings, two storey verandah (covered on first storey, closed on second storey)  
- Older than 40 years | ![Photograph](image7.jpg) |
| 88 Mary Street | Identified during field survey | One and one half storey residence  
- Mansard roof, inset second storey balcony, Neo-classical style portico over front entrance  
- Appears older than 40 years | ![Photograph](image8.jpg) |
<table>
<thead>
<tr>
<th>Address</th>
<th>Heritage Status</th>
<th>Description</th>
<th>Photograph</th>
</tr>
</thead>
</table>
| 89 Mary Street| Identified during field survey | One storey commercial property  
  - Flat roof, stucco exterior, plain parapet on front façade  
  - Appears older than 40 years | ![Image](image1.jpg) |
| 90A Mary Street| Identified during field survey | Two storey residence  
  - Semi-detached (with 90B Mary Street), hipped roof, covered verandah on front façade, brick exterior, asymmetrical façade  
  - Older than 40 years | ![Image](image2.jpg) |
| 90B Mary Street| Identified during field survey | Two storey residence  
  - Semi-detached (with 90B Mary Street), hipped roof, covered verandah on front façade, brick exterior, asymmetrical façade  
  - Older than 40 years | ![Image](image3.jpg) |
| 92 Mary Street | Identified during field survey | Two and one half storey residence  
  - Semi-detached (with 94 Mary Street), brick exterior, central dormer, closed porch on front façade  
  - Older than 40 years | ![Image](image4.jpg) |
| 94 Mary Street | Identified during field survey | Two and one half storey residence  
  - Semi-detached (with 92 Mary Street), brick exterior, central dormer, closed porch on front façade  
  - Older than 40 years | ![Image](image5.jpg) |
| 96 Mary Street | Identified during field survey | Two and one half storey residence  
  - Semi-detached (with 98 Mary Street), brick exterior, hipped roof, canopy on front façade, segmentally arched structural openings  
  - Older than 40 years | ![Image](image6.jpg) |
| 98 Mary Street | Identified during field survey | Two and one half storey residence  
  - Semi-detached (with 94 Mary Street), brick exterior, hipped roof, central dormer, covered porch on front façade, segmentally arched structural openings  
  - Older than 40 years | ![Image](image7.jpg) |
| 10 Ross Street | Identified during field survey | Two storey commercial building  
  - Mansard roof, stucco exterior, bay windows on first storey, appears to be recently refurbished  
  - Appears older than 40 years | ![Image](image8.jpg) |
<table>
<thead>
<tr>
<th>Address</th>
<th>Heritage Status Description</th>
<th>Photograph</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Ross Street</td>
<td>Identified during field survey - One and one half storey residence - Gable hip roof, brick exterior, bay window with pediment featuring half timbering on front façade, recessed and offset entrance, asymmetrical façade - Older than 40 years</td>
<td><img src="image1" alt="Photograph" /></td>
</tr>
<tr>
<td>14 Ross Street</td>
<td>Identified during field survey - One storey residence - Brick exterior, hipped roof, bay window on first storey, asymmetrical façade - Older than 40 years</td>
<td><img src="image2" alt="Photograph" /></td>
</tr>
<tr>
<td>17 Ross Street</td>
<td>Identified during field survey - One and one half storey residence - Rectangular plan, brick exterior, central dormer, covered verandah on front façade - Older than 40 years</td>
<td><img src="image3" alt="Photograph" /></td>
</tr>
<tr>
<td>19 Ross Street</td>
<td>Identified during field survey - One and one half storey residence - Rectangular plan, gable roof, central dormer, asymmetrical façade, shutters around windows - Older than 40 years</td>
<td><img src="image4" alt="Photograph" /></td>
</tr>
<tr>
<td>23 Ross Street</td>
<td>Identified during field survey - One and one half storey residence - Brick exterior, hipped gable roof, decorative vergeboard, central second storey window, asymmetrical façade, bay window offset to right - Older than 40 years</td>
<td><img src="image5" alt="Photograph" /></td>
</tr>
<tr>
<td>24 Ross Street</td>
<td>Identified during field survey - Two and one half storey residence - Buff brick exterior, hipped roof with central dormer, segmentally arched structural openings, covered front porch with hipped roof, asymmetrical façade - Older than 40 years</td>
<td><img src="image6" alt="Photograph" /></td>
</tr>
<tr>
<td>25 Ross Street</td>
<td>Identified during field survey - One and one half storey residence - Semi-detached (with 27 Ross Street), gable roof with central gable, symmetrical façade, covered porch with hipped roof on front façade - Older than 40 years</td>
<td><img src="image7" alt="Photograph" /></td>
</tr>
<tr>
<td>26 Ross Street</td>
<td>Identified during field survey - Two storey residence - Brick exterior, asymmetrical façade, cross gable roof, front entrance surrounded by covered porch with pediment, closed porch offset to right - Older than 40 years</td>
<td><img src="image8" alt="Photograph" /></td>
</tr>
<tr>
<td>Address</td>
<td>Heritage Status Description</td>
<td>Photograph</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>27 Ross Street</td>
<td>Identified during field survey</td>
<td><img src="image1" alt="27 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>One and one half storey residence</td>
<td><img src="image2" alt="27 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Semi-detached (with 25 Ross Street), gable roof with central gable, symmetrical façade, covered porch with hipped roof on front façade</td>
<td><img src="image3" alt="27 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Older than 40 years</td>
<td><img src="image4" alt="27 Ross Street" /></td>
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<tr>
<td>28 Ross Street</td>
<td>Identified during field survey</td>
<td><img src="image5" alt="28 Ross Street" /></td>
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<tr>
<td></td>
<td>Two storey residence</td>
<td><img src="image6" alt="28 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Brick exterior, asymmetrical façade, two storey bay gable with pediment, closed porch offset to right</td>
<td><img src="image7" alt="28 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Older than 40 years</td>
<td><img src="image8" alt="28 Ross Street" /></td>
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<tr>
<td>29 Ross Street</td>
<td>Identified during field survey</td>
<td><img src="image9" alt="29 Ross Street" /></td>
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<tr>
<td></td>
<td>One and one half storey residence</td>
<td><img src="image10" alt="29 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Gable roof with dormer, brick exterior, covered verandah on front façade</td>
<td><img src="image11" alt="29 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Older than 40 years</td>
<td><img src="image12" alt="29 Ross Street" /></td>
</tr>
<tr>
<td>30 Ross Street</td>
<td>Identified during field survey</td>
<td><img src="image13" alt="30 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Two and one half storey residence</td>
<td><img src="image14" alt="30 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Brick exterior, two storey bay with pediment offset to left, asymmetrical façade, segmentally arched structural openings, hipped gable roof</td>
<td><img src="image15" alt="30 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Older than 40 years</td>
<td><img src="image16" alt="30 Ross Street" /></td>
</tr>
<tr>
<td>31 Ross Street</td>
<td>Identified during field survey</td>
<td><img src="image17" alt="31 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>One and one half storey commercial building</td>
<td><img src="image18" alt="31 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Stucco exterior, gable roof with central dormer, shed style dormer, asymmetrical façade, bay window offset to left</td>
<td><img src="image19" alt="31 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Older than 40 years</td>
<td><img src="image20" alt="31 Ross Street" /></td>
</tr>
<tr>
<td>32-34 Ross Street</td>
<td>Identified during field survey</td>
<td><img src="image21" alt="32-34 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Two and one half storey commercial building (former residence)</td>
<td><img src="image22" alt="32-34 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Brick exterior, hipped roof, symmetrical façade, two storey bay windows located on east and west sides, two storey porch with curved railing, segmentally arched structural openings</td>
<td><img src="image23" alt="32-34 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Older than 40 years</td>
<td><img src="image24" alt="32-34 Ross Street" /></td>
</tr>
<tr>
<td>37 Ross Street</td>
<td>Identified during field survey</td>
<td><img src="image25" alt="37 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Two and one half storey residence</td>
<td><img src="image26" alt="37 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Brick exterior, gable roof, asymmetrical façade, segmentally arched structural openings, covered porch on front façade, covered porch on east elevation, shutters around first storey window</td>
<td><img src="image27" alt="37 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Older than 40 years</td>
<td><img src="image28" alt="37 Ross Street" /></td>
</tr>
<tr>
<td>39 Ross Street</td>
<td>Identified during field survey</td>
<td><img src="image29" alt="39 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Two and one half storey residence</td>
<td><img src="image30" alt="39 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Gable roof with offset gable, brick exterior, asymmetrical façade, segmentally arched structural openings, covered porch offset to left</td>
<td><img src="image31" alt="39 Ross Street" /></td>
</tr>
<tr>
<td></td>
<td>Older than 40 years</td>
<td><img src="image32" alt="39 Ross Street" /></td>
</tr>
<tr>
<td>Address</td>
<td>Heritage Status</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 54 Ross Street | Identified during field survey         | Built 1957 (date stone)  
- Church built in modernist style  
- Shed style roof with brackets (north elevation)  
- Brick exterior, tower with stained glass, two storey windows on north elevation  
- Older than 40 years old |
Appendix J
Natural Heritage Impact Assessment
TECHNICAL MEMORANDUM

TO: File
DATE: March 2, 2017
CC: Darcie Dillon, Steve Taylor, BT Engineering
BTE PROJECT #: BTEng16-031
SUBJECT: Bell Farm Road Improvements Environmental Assessment
City of Barrie
Ecological Site Review - Terrestrial Environment

Preamble

The City of Barrie initiated a Class Environmental Assessment (EA) in September of 2016 to consider options for the widening of Bell Farm Road from St. Vincent Street easterly to Duckworth Street and improvements related to pedestrian and cyclist movements. A technically preferred alternative (TPA) was selected — a 3-lane cross section including shared centre left turn lane, 1.5 m dedicated bike lanes in each direction and sidewalk improvements from St. Vincent Street to east of Alliance Boulevard and maintaining a 4 lane cross section and bike lanes from east of Alliance Boulevard to Duckworth Street.

The Study Area is located within the downtown core area of the city of Barrie with the main vehicle entrance to Georgian College on Duckworth Street at the east end of the Study Area. The urbanized setting has left little in the way of natural areas of non-transformed land in place. There are no areas of significant wildlife habitat, no designated Environmentally Significant Areas (ESAs), Areas of Natural and/or Scientific Interest (ANoSIs) or Provincially Significant Wetlands (PSWs) identified in the immediate vicinity. No significant vegetation species were noted, nor were any avian or terrestrial species of note identified.

No impacts to the limited terrestrial features identified in the Study Area are therefore anticipated.

Background and Study Area

UTM Co-ordinates: 17T E 605156 N 4918190

The existing Bell Farm Road is a 2-lane major collector with a rural cross section mainly servicing commercial / industrial properties. The west end of Bell Farm Road towards Duckworth Street includes a fully urbanized 280 m 4-lane section that serves a mix of commercial and multi-unit residential properties. The road structure is in poor condition and requires renewal. The City’s Multi Modal Active Transportation Master Plan (MMATMP) recommended that the westerly section of Bell Farm Road be widened to 3 lanes with bicycle lanes and sidewalks on both sides. The easterly section is to maintain 4 lanes but include buffered bicycle lanes and sidewalks on both sides of the road.

The topography of the surrounding area is flat with no areas of natural landscape within the study area. No watercourses were noted. Roadside ditches were present in the easterly section but were dry. Ground cover of manicured grass dominated the road right-of-way for the majority of its length. Tree groupings and individual specimen trees were scattered along the corridor, primarily located on private property. Norway maple and Colorado spruce were the dominant planted tree species with ages typically ranging from 20 to 50 years since planting.

Bird sightings were limited to the most common of urban species including English sparrow, robin, starling, grackle and rock dove. The trees scattered throughout the study area provide ample perching and nesting sites. No herptiles were observed as anticipated due to the lack of moist habitats.

Representative photographs of the Study Area green spaces are presented in Attachment A.

Significant Features, Species at Risk (SAR)

The study area was reviewed on October 12, 2017 between the hours of 1:30 and 3:30 pm. The weather on the day of the field visit was sunny and mild. No precipitation had occurred for the past several days.

The Provincial Species at Risk listing2 for the Simcoe region including the City of Barrie identifies 38 avian, aquatic and terrestrial SAR that may be present in the area (see Attachment B). None of these individual species would normally be present in an urban setting other than as a casual visitor. Suitable undisturbed habitats are simply not available.

Environmental Management During Construction

Standard measures to control erosion and sediment transport and prevent its movement off site will be a requirement, as will maintenance of equipment to avoid spills. Necessary vegetation trimming or clearing must only occur during non-nesting periods. Where it is deemed necessary, tree replacement with similar native species is recommended (e.g. Austrian pine, white pine, Norway maple, sugar maple).

1 Bell Farm Road at Alliance Boulevard east intersection

Photographic Diary

A tree row east of St. Vincent Street on the south side of Bell Farm Road screens the homes on Cynthia Court to the south. Any tree removals required will occur outside of the bird breeding season.

Scattered trees along the north side of the grassed right-of-way are located well away from proposed roadway improvements where they approach Alliance Boulevard.
A small grove of trees and shrubs in the northwest quadrant of Bell Farm Road and Alliance Blvd. obstructs views at the intersection.

East of Alliance Boulevard, a grouping of Norway maples and spruce trees on the north side are located well back from the grassed ROW.

The small stand of maples located in the southwest quadrant of Bell Farm Road and Duckworth Street is distant from the intersection.

Another tree grouping in the southeast quadrant is also well away from the proposed intersection improvements.
Birds

Bald Eagle (*Haliaeetus leucocephalus*)

*Status*: special concern

The raspy scream of the bald eagle often heard on movies and TV is actually from a red-tailed hawk. This bird actually gives a sort of watery, gurgling trill that doesn't sound like it suits the bird.

Barn Swallow (*Hirundo rustica*)

*Status*: threatened

Barn Swallows make the long flight to Central and South America each fall, returning to southern Canada - including Ontario - each spring.

Black Tern (*Chlidonias niger*)

*Status*: special concern

The Black Tern is very social. It breeds in loose colonies and usually forages, roosts and migrates in flocks of a few to more than 100 birds, occasionally up to tens of thousands.

Bobolink (*Dolichonyx oryzivorus*)

*Status*: threatened

These birds migrate from Ontario to Argentina - one of the longest migrations of any North American songbird.

Cerulean Warbler (*Dendroica cerulea*)

*Status*: threatened

Since this warbler is a bird of the tree tops, it is often best identified from below. Birdwatchers will recognize adult males by the thin dark band that crosses the upper part of the predominantly white breast.

Eastern Meadowlark (*Sturnella magna*)

*Status*: threatened

The Eastern Meadowlark is not actually a lark, but a member of the same family as blackbirds and orioles.
**Eastern Whip-poor-will** (*Antrostomas vociferus*)

**Status:** threatened

Chicks seem to hatch near full moons, giving parents more light for foraging so they can supply the extra energy demands of their rapidly-growing brood.

**Henslow’s Sparrow** (*Ammodramus henslowii*)

**Status:** endangered

The Henslow’s Sparrow is a short-distance migrant, travelling only as far as the southern United States, primarily from Texas to Georgia.

**King Rail** (*Rallus elegans*)

**Status:** endangered

During courtship, males present crayfish or small crabs to females in their bill.

**Least Bittern** (*Ixobrychus exilis*)

**Status:** threatened

The Least Bittern is more likely to be heard than seen in its dense marsh habitat. The typical call given by males is a hollow, quiet coo-coo-coo. When alarmed, they can give a harsh kek-kek-kek call. They are most vocal in early morning and evening, but could potentially call anytime during the day or night.

**Loggerhead Shrike** (*Lanius ludovicianus*)

**Status:** endangered

Shrikes are sometimes called butcher bird because they impale their prey on thorns, barbed wire or sharp twigs.

**Louisiana Waterthrush** (*Seiurus motacilla*)

**Status:** special concern

The Louisiana Waterthrush is among the earliest long-distance migrating birds to arrive back to Canada in the spring, typically arriving by mid-April.
**Peregrine falcon (Falco peregrinus)**

*Status:* special concern

The peregrine falcon is one of the world's fastest animals, and has been clocked diving for prey at speeds of 160 km an hour.

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**Piping Plover (Charadrius melodus)**

*Status:* endangered

Within an hour of hatching and drying off, chicks are able to find their own food.

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**Red-headed Woodpecker (Melanerpes erythrocephalus)**

*Status:* special concern

In addition to a bill, woodpeckers have special anatomical features to help them dig holes in wood and find insects. A covering of feathers over the nostrils keeps out pieces of wood and wood powder. A long, barbed tongue searches crevices and cracks for food. And the bird's salivary glands produce a glue-like substance that coats the tongue and, along with the barbs, helps it capture insects.

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**Yellow Rail (Coturnicops noveboracensis)**

*Status:* special concern

In the breeding season, males can be heard almost always at night giving their distinct clicking sounds tic-tic, tic-tic-tic, which sound like two stones being banged together. Birdwatchers will use pebbles to imitate the call and attract rails out to the edge of the reeds where they can be briefly observed.

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**Fish and Mussels**

**Lake Sturgeon (Acipenser fulvescens)**

*Status:* special concern (Southern Hudson Bay/James Bay population), threatened Northwestern Ontario and Great Lakes–Upper St. Lawrence River populations. The oldest known specimen of this fish, from Lake Huron, is 155 years old.

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**Northern Brook Lamprey (Ichthyomyzon fossor)**

*Status:* special concern. Unlike some other lamprey species, the Northern Brook Lamprey is non-parasitic and does not attach itself to larger host fish. The larvae are filter-feeders, consuming microscopic plant and animal life and decaying matter. Adults have a non-functional intestine and do not feed.

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**Insects**
Hine's Emerald (*Somatochlora hineana*)

*Status:* endangered

Hine's Emerald lives for three to five years, spending most of that time underwater as larvae.

---

Rusty-patched Bumble Bee (*Bombus affinis*)

*Status:* endangered

The Rusty-patched Bumble Bee gets nectar from flowers by biting a hole in the outside of it and sucking up the nectar with its tongue. This behaviour, called nectar-robbing, leaves marks on the flower that can help researchers detect the bees' presence in an area.

---

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Hart's-tongue Fern (*Asplenium scolopendrium*)

*Status:* special concern

Hart's-tongue Fern has very specific habitat requirements, making transplantation and artificial propagation difficult.

---

Broad Beech Fern (*Phegopteris hexagonoptera*)

*Status:* special concern

Broad Beech Fern reproduces through spores. The spores are contained in a case-like structure called a sporangium. The sporangia burst upon maturity at the end of summer and the spores are scattered through the air.

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Eastern prairie fringed-orchid (*Platanthera leucophaea*)

*Status:* endangered

This orchid's seeds are produced in huge numbers, but germination and seedling growth depend on the presence of special fungi in the soil.

---

Forked Three-awned Grass (*Aristida basiramea*)

*Status:* endangered

Since Forked Three-awned Grass is an annual, its growth and reproduction are influenced by each year's environmental conditions. This makes estimating population size difficult, as a number of plants present in an area may remain relatively undetectable in the soil seed bank during any given year.
**Hill's Thistle (Cirsium hillii)**

*Status:* threatened

In Ontario, Hill's Thistle often grows with other species at risk such as Lakeside Daisy and Houghton's Goldenrod.

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**Spotted Wintergreen (Chimaphila maculata)**

*Status:* endangered

Aboriginal peoples used Spotted Wintergreen for a variety of medicinal purposes including as a poultice, for rheumatism, and for the treatment of colds and fevers.

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### Snakes and Lizards

**Common Five-lined Skink (Plestiodon fasciatus)**

*Status:* endangered (Carolinian population), special concern (Great Lakes/St. Lawrence population)

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**Eastern Ribbonsnake (Thamnophis sauritus)**

*Status:* special concern

Many species of snakes lay eggs, but Eastern Ribbonsnakes give birth to live young.

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**Massasauga (Sistrurus catenatus)**

*Status:* threatened

The Massasauga is very shy and prefers to hide or retreat from enemies rather than bite them. If threatened, it will shake its tail as a warning and strike only as a last resort to protect itself if it can not escape.

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### Turtles

**Blanding's Turtle (Emydoidea blandingii)**

*Status:* threatened

When attacked by a potential predator, a skink's tail can autotomize: spontaneously break off and thrash for several minutes, distracting the predator so the lizard can escape. The tail is able to grow back at a rate of about six millimetres a week.
These turtles can survive in the wild for more than 75 years.

**Eastern Musk Turtle** (*Sternotherus odoratus*)

**Status:** threatened

Unlike other turtles, the Eastern Musk Turtle rarely leaves the water except when females lay eggs. It spends most of the day resting on the soft lake bottom, foraging for food or basking in the sun under floating aquatic vegetation in shallow water.

**Northern Map Turtle** (*Graptemys geographica*)

**Status:** special concern

The Northern Map Turtle is extremely wary and will dive into the water at the slightest provocation.

**Snapping Turtle** (*Chelydra serpentina*)

**Status:** special concern

These turtles spend so much time underwater that algae grow on their shells. This helps them blend in with their surroundings.

*Updated: June 20, 2016*
Appendix K
Design Alternative – Cost Estimates