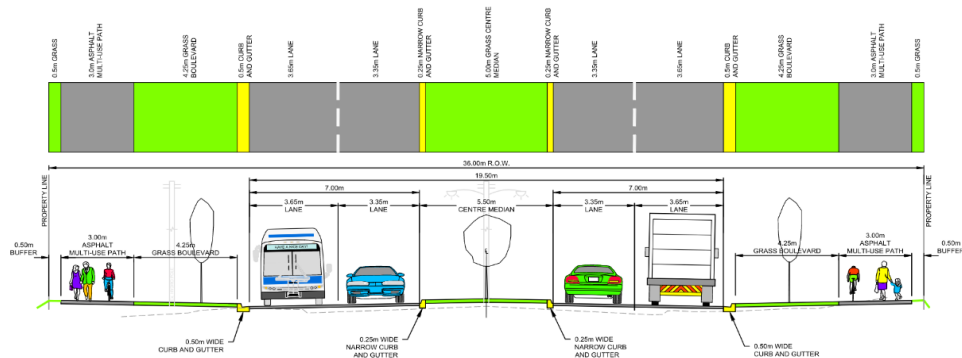




IBI GROUP



Environmental Study Report

# Maple Grove Road Improvements from Hespeler Road to Vondrau Drive, Municipal Class Environmental Assessment, Schedule C

## Volume 1 - Environmental Study Report

Prepared for the Region of Waterloo  
by Arcadis IBI Group  
September 2023

## Document Control Page

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|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CLIENT:</b>           | Region of Waterloo                                                                                                                             |
| <b>PROJECT NAME:</b>     | Maple Grove Road Improvements from Hespeler Road to Vondrau Drive, Municipal Class Environmental Assessment, Schedule C and Preliminary Design |
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|                          | Draft_v3.0 – MECP Project Review Unit submission                                                                                               |
|                          | Draft_v4.0 – Final Review submission (July 5, 2023)                                                                                            |
|                          | Final v5.0 – September 2023                                                                                                                    |

## Executive Summary

The Region of Waterloo has undertaken a Municipal Class Environmental Assessment (Class EA) Study, Schedule C, to investigate alternative solutions required for improvement opportunities along Maple Grove Road between Hespeler Road and Vondrau Drive in the City of Cambridge: the “Study Area” (Exhibit 1-1). The 2018 Regional Transportation Master Plan identified this section of Maple Grove Road for widening from two (2) lanes to four (4) lanes to provide required improvements for vehicular traffic, as well as active transportation improvements for pedestrians and cyclists and transit facilities along the corridor, due to existing and planned development.

To support the evaluation process, background studies established a comprehensive inventory of existing site conditions and identified areas of concern related to potential impacts along the corridor. Studies include Traffic and Transportation, Natural Environment, a Tree Inventory, Drainage and Stormwater Management, Noise Impact Assessment, Geology and Physiography, Fluvial Geomorphology, Structural, Cultural and Built Heritage, Stage 1 Archaeological, and Geotechnical.

The Project Team reviewed several possible Alternative Solutions, which could address the opportunities for improvement along Maple Grove Road. Alternative Solutions included Widening Maple Grove Road from two (2) lanes to four (4) lanes, additional through lanes and turn lanes at existing intersections, new roundabouts (in place of traffic signals), new active transportation facilities along the corridor, and improvements to existing Grand River Transit (GRT) services. The Project Team considered ten (10) Alternative Solutions (Exhibit 7-1).

Due to the impacts of the COVID-19 public meeting restrictions, the first Public Consultation Centre (PCC #1) occurred online between July 27, 2020, and August 31, 2020, using the Region’s EngageWR website. The purpose of PCC #1 was to obtain public input after reviewing the study scope and project materials including alternative solutions, environmental considerations, and evaluation criteria.

After collecting public feedback following PCC #1, the Preferred Solution for Maple Grove Road was:

- Widen Maple Grove Road from two (2) to four (4) lanes;
- New roundabouts at Beaverdale Road and Hespeler Road;
- Improvements to existing signalized intersections at Vondrau Drive, and Speedsville Road, as well as a new signalized intersection at Boxwood Drive (including additional through lanes and turn lanes);

- New Active Transportation facilities (multi-use path) along both sides of the corridor; and,
- Transit facility improvements.

The next phase of the study involved identifying Alternative Design Concepts for the Preferred Solution. The Preferred Alternative Design resulted from two separate evaluations:

- Roadway Design Cross-Section Alternatives; and,
- Roadway Widening Alignment Concepts.

Both evaluations considered the following key criteria, described in detail in s. 9, Natural Environment, Social Environment, Transportation, and Cost.

Roadway Design Cross-Section Alternatives evaluated include:

- Do Nothing Alternative – Reconstructing the road in it's current 2-lane rural (ditch drainage) cross-section with no active transportation facilities or additional transit facilities;
- Alternative A – Widen the road to 4-through lanes with a New 5.0m wide Raised Centre Median, and 3.0m wide Multi-use Path (MUP) along both sides; and
- Alternative B – Widen the road to 4-through lanes with a New 5.0m wide Raised Centre Median and 1.8m wide Sidewalk and 1.7m Separated Cycling Facility along both sides.

Roadway Widening Alignment Concepts evaluated include:

- Concept 1 – Widening equally about the existing centreline of Maple Grove Road;
- Concept 2 – Widen to the north side;
- Concept 3 – Widen to the south side; and
- Concept 4 – Modified “Hybrid Widening Concept” to minimize overall impacts.

Following a comprehensive evaluation (detailed in s. 9), Design Cross-Section Alternative A and Widening Concept No. 4 were identified as the combined overall preferred alternative by the Project Team and presented to the public for input.

Public Consultation Centre #2 (PCC #2) was presented online between June 28, 2021, and July 30, 2021, using the Region's EngageWR website.

Following receipt of public input from PCC #2, the Project Team unanimously supported the preferred alternative and has carried that alternative forward for implementation as the Project Team's Recommended Design Alternative.

The approved Project Team's Recommended Design Alternative provides required capacity for long-term needs on this section of Maple Grove Road, improves traffic

operations, and provides enhanced active transportation and transit facilities as recommended in the Region's Transportation Master Plan.

The estimated cost for design and construction of the Project Team's Recommended Design Alternative is \$53.2 million. Detailed design and utility relocations were scheduled in the 2022 Regional Transportation (10-Year) Capital Program to be completed through 2022 and 2023, with construction planned between 2023 and 2026.

# Table of Contents

---

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| <b>Executive Summary.....</b>                                        | <b>A</b>  |
| <b>1 Introduction and Background .....</b>                           | <b>1</b>  |
| 1.1 Study Purpose .....                                              | 1         |
| 1.2 Study Area .....                                                 | 2         |
| 1.3 Study Objectives .....                                           | 2         |
| 1.4 Problem and Opportunity .....                                    | 4         |
| 1.5 Related Studies.....                                             | 4         |
| 1.6 Municipal Class Environmental Assessment Process .....           | 6         |
| 1.7 Provincial Policy Statement .....                                | 9         |
| 1.8 Project Team.....                                                | 9         |
| <b>2 Consultation .....</b>                                          | <b>12</b> |
| 2.1 Consultation Process .....                                       | 12        |
| 2.2 Study Webpage .....                                              | 12        |
| 2.3 Agency and Stakeholder Contact List.....                         | 13        |
| 2.4 Indigenous Communities Consultation .....                        | 14        |
| 2.5 Technical Agencies Consultation.....                             | 14        |
| 2.6 Grand River Transit Consultation .....                           | 14        |
| 2.7 Ontario Ministry of the Environment, Conservation and Parks..... | 15        |
| <b>3 Notice of Study Commencement .....</b>                          | <b>16</b> |
| <b>4 Existing Conditions.....</b>                                    | <b>17</b> |
| 4.1 Land Use.....                                                    | 17        |
| 4.2 Built Environment and Municipal Infrastructure .....             | 19        |
| 4.3 Natural Environment .....                                        | 22        |
| 4.4 Utilities .....                                                  | 24        |
| <b>5 Background Studies.....</b>                                     | <b>25</b> |
| 5.1 Natural Environment Impact Study .....                           | 25        |
| 5.2 Tree Inventory.....                                              | 25        |
| 5.3 Drainage and Stormwater Management.....                          | 25        |
| 5.4 Noise .....                                                      | 28        |
| 5.5 Geology and Physiography.....                                    | 29        |
| 5.6 Fluvial Geomorphology .....                                      | 33        |
| 5.7 Structural Review.....                                           | 35        |

|           |                                                                        |           |
|-----------|------------------------------------------------------------------------|-----------|
| 5.8       | Cultural & Built Heritage .....                                        | 36        |
| 5.9       | Archaeological Assessment.....                                         | 37        |
| <b>6</b>  | <b>Transportation .....</b>                                            | <b>40</b> |
| 6.1       | Background and Traffic Analysis Approach.....                          | 40        |
| 6.2       | VISSIM Model .....                                                     | 40        |
| 6.3       | Recommended Operational Improvements .....                             | 41        |
| <b>7</b>  | <b>Alternative Solutions.....</b>                                      | <b>44</b> |
| 7.1       | Alternative Solutions Considered.....                                  | 44        |
| 7.2       | Alternative Solutions Evaluation .....                                 | 45        |
| 7.3       | Preferred Solutions .....                                              | 45        |
| <b>8</b>  | <b>Public Consultation Centre #1 .....</b>                             | <b>49</b> |
| 8.1       | Notice of Public Consultation Centre #1 .....                          | 49        |
| 8.2       | Public Comments Received and Project Team Responses .....              | 49        |
| <b>9</b>  | <b>Development and Evaluation of Alternative Design Concepts .....</b> | <b>51</b> |
| 9.1       | Assessment and Evaluation Methodology and Criteria .....               | 51        |
| 9.2       | Evaluation Criteria for Alternative Designs .....                      | 52        |
| 9.3       | Evaluation of Roadway Design Cross-Section Alternatives .....          | 55        |
| 9.4       | Evaluation of Roadway Widening Alignment Alternatives .....            | 62        |
| 9.5       | Evaluation Outcome.....                                                | 68        |
| 9.6       | Recommended Preliminary Design .....                                   | 68        |
| <b>10</b> | <b>Public Consultation Centre #2 .....</b>                             | <b>78</b> |
| 10.1      | Notice of Public Consultation Centre #2 .....                          | 78        |
| 10.2      | Public Comments Received and Project Team Responses .....              | 79        |
| <b>11</b> | <b>Recommended Preliminary Design Concept.....</b>                     | <b>80</b> |
| 11.1      | Summary of Recommended Design.....                                     | 80        |
| 11.2      | Additional Recommended Improvements.....                               | 80        |
| 11.3      | Satisfaction of Study Objectives .....                                 | 81        |
| 11.4      | Estimated Project Costs .....                                          | 81        |
| <b>12</b> | <b>Environmental Impacts, Mitigation, and Commitments .....</b>        | <b>83</b> |
| 12.1      | Natural Environment .....                                              | 83        |
| 12.2      | Archaeology and Cultural Heritage.....                                 | 95        |
| 12.3      | Active Transportation .....                                            | 96        |
| 12.4      | Noise Attenuation.....                                                 | 96        |
| 12.5      | Air Quality .....                                                      | 97        |
| 12.6      | Drinking Water Source Protection .....                                 | 97        |
| 12.7      | Supply Wells .....                                                     | 98        |

|           |                                                                                   |            |
|-----------|-----------------------------------------------------------------------------------|------------|
| 12.8      | Erosion and Sediment Control Plan.....                                            | 99         |
| 12.9      | Contamination of Surface Water from Other Sources/Best Management Practices ..... | 101        |
| 12.10     | Climate Change .....                                                              | 102        |
| 12.11     | Traffic Management and Control .....                                              | 103        |
| 12.12     | Other Construction Commitments .....                                              | 103        |
| <b>13</b> | <b>Implementation Schedule .....</b>                                              | <b>106</b> |
| <b>14</b> | <b>Study Completion.....</b>                                                      | <b>107</b> |
| 14.1      | Region of Waterloo Council Approval.....                                          | 107        |
| 14.2      | Notice of Study Completion .....                                                  | 107        |

## List of Exhibits

---

|                                                                                    |    |
|------------------------------------------------------------------------------------|----|
| Exhibit 1-1: Study Area .....                                                      | 3  |
| Exhibit 1-2: Municipal Class EA Project Schedules and Applicable Phases .....      | 7  |
| Exhibit 1-3: Steps involved for each Phase of Municipal Class EA Process .....     | 8  |
| Exhibit 1-4: Maple Grove Road Class EA Study Team .....                            | 11 |
| Exhibit 4-1: Regional Official Plan Urban Area Land Use Map .....                  | 17 |
| Exhibit 4-2: City of Cambridge Official Plan Urban Area General Land Use Plan..... | 18 |
| Exhibit 4-3: Intersections within the Study Area .....                             | 21 |
| Exhibit 4-4: Study Area and Natural Features .....                                 | 23 |
| Exhibit 5-1: Study Area Drainage Plan .....                                        | 27 |
| Exhibit 5-2: Creek Crossings at Maple Grove Road within Class EA Study Area.....   | 33 |
| Exhibit 5-3: Stage 1 Archaeological Assessment – Field Observations.....           | 39 |
| Exhibit 6-1: 2036 Recommended Intersection Configuration .....                     | 43 |
| Exhibit 6-2: 2041 Recommended Intersection Configuration .....                     | 43 |
| Exhibit 7-1: Summary of Alternative Solutions.....                                 | 47 |
| Exhibit 9-1: Evaluation of Cross-Section Alternatives .....                        | 58 |
| Exhibit 9-1: Evaluation of Cross-Section Alternatives - Continued.....             | 60 |
| Exhibit 9-1: Evaluation of Cross-Section Alternatives - Continued.....             | 61 |
| Exhibit 9-2: Road Widening Alignment Alternatives .....                            | 62 |
| Exhibit 9-3: Evaluation of Widening Alternatives .....                             | 64 |
| Exhibit 9-3: Evaluation of Widening Alternatives - Continued .....                 | 65 |
| Exhibit 9-3: Evaluation of Widening Alternatives – Continued.....                  | 66 |
| Exhibit 9-3: Evaluation of Widening Alternatives – Continued.....                  | 67 |
| Exhibit 9-4: Proposed Intersection Types along Maple Grove Road.....               | 70 |

|                                                                                                            |    |
|------------------------------------------------------------------------------------------------------------|----|
| Exhibit 11-1: Estimated Project Cost .....                                                                 | 82 |
| Exhibit 12-1: Summary of Potential Impacts / Mitigation on Natural Features within the<br>Study Area ..... | 83 |
| Exhibit 12-2: Recommended Restoration and Enhancement Activities .....                                     | 91 |
| Exhibit 12-3: Terrestrial Habitat Impacts and Mitigation .....                                             | 94 |

## List of Appendices

---

|                                                                                              |
|----------------------------------------------------------------------------------------------|
| Appendix A – Project Team Meeting Minutes                                                    |
| Appendix B – Public Consultation Centre Information Packages                                 |
| Appendix C – Agency and Stakeholder Contact List                                             |
| Appendix D – Indigenous Communities Consultation Log                                         |
| Appendix E – Public Notices                                                                  |
| Appendix F – Environmental Impact Study (NRSI)                                               |
| Appendix G – Tree Preservation Plan (NRSI)                                                   |
| Appendix H – Stormwater Management Report (IBI Group)                                        |
| Appendix I – Noise Study (IBI Group)                                                         |
| Appendix J – Geotechnical Report (Peto MacCallum)                                            |
| Appendix K – Hydrogeological Site Assessment (Peto MacCallum)                                |
| Appendix L – Fluvial Geomorphological Assessments (GEOMorphix Ltd.)                          |
| Appendix M – Detailed Bridge Condition Survey of Ellis Creek Bridge (Orbit Engineering)      |
| Appendix N – Cultural Heritage Report (ASI)                                                  |
| Appendix O – Stage 1 Archaeological Assessment (ASI)                                         |
| Appendix P – Traffic Study VISSIM Technical Report (IBI Group)                               |
| Appendix Q – Intersection Control Study (CIMA)                                               |
| Appendix R – Public Consultation Centre #1 Materials, Comments and Project Team<br>Responses |
| Appendix S – Preliminary Design Drawings                                                     |
| Appendix T – Preliminary Property Impact Plans                                               |
| Appendix U – Geometric Design Criteria                                                       |
| Appendix V – Public Consultation Centre #2 Materials, Comments and Project Team<br>Responses |
| Appendix W – Cost Estimate                                                                   |
| Appendix X – Regional Committees / Council Reports                                           |

# 1 Introduction and Background

The Region of Waterloo and their consultants IBI Group Professional Services (Canada) Inc. (IBI Group) have undertaken and completed a Municipal Class Environmental Assessment (Class EA) study following the Schedule C process. The study started with data collection activities in 2018 and 2019. Subsequently, a global pandemic was experienced and contributed to a revised overall approach to the study, in particular the presentation of study findings to the public and the pace of overall communications.

The related study is supported by associated preliminary design work for proposed future improvements for Maple Grove Road between Vondrau Drive and Hespeler Road in the City of Cambridge.

The study investigates traffic capacity and intersection operations along the corridor where there is ongoing area development and community growth. The study considers improvements to active transportation including walking and cycling facilities, and transit operations, vehicular capacity, intersections, and infrastructure. Considerations include corridor enhancements for users of all ages and abilities and overall potential environmental impacts due to existing and future services. Study considerations include active transportation facility types, trail connections, potential impacts on the natural environment, cultural heritage, archaeological resources, existing area drainage features, municipal infrastructure, existing utilities, and the bridge crossing of Ellis Creek east of Beaverdale Road.

The Class EA process, documented herein, includes existing and projected future traffic conditions, existing environmental conditions, alternative solutions considered, evaluation of alternative solutions, identification of the preferred combination of solutions, potential impacts and mitigation measures, identification of several possible design alternatives and a detailed evaluation of their potential impacts, identification of the preferred design alternative, and input from consultation with the public and stakeholders.

## 1.1 Study Purpose

The purpose of the study was to investigate alternative solutions for required improvement opportunities along Maple Grove Road between Hespeler Road and Vondrau Drive, including:

- Ongoing development and community growth leading to higher traffic volumes;
- The need for new Active Transportation facilities;
- Existing intersection operational improvements;

- Grand River Transit (GRT) improvements; and,
- Previous improvements between King Street and Fountain Street and planned improvements on the east leg of the Fountain Street intersection as determined under previous study.

## 1.2 Study Area

The Study Area includes Maple Grove Road and immediately adjacent lands between Vondrau Drive and Hespeler Road in the City of Cambridge (Exhibit 1-1).

Maple Grove Road is currently a two-lane rural arterial road, running in an east-west direction. Posted speed limits are:

- 70 km/hr from Vondrau Drive to 400m west of Compass Trail, and
- 60 km/hr from 400m west of Compass Trail to Hespeler Road.

Within the Study Area, Maple Grove Road carries approximately 18,000 to 20,000 vehicles per day (2018 traffic counts) and has a right-of-way width ranging from 21.8 metres to 71.7 metres with an average width of 46.8 metres. Included in the traffic makeup is a high volume of transport trucks, which is in the range of 5 - 8% depending on location within the corridor.

Maple Grove Road is a key goods movement corridor within the Region of Waterloo. It is also a Highway 401 Emergency Detour Route (EDR).

## 1.3 Study Objectives

The study sought to achieve the following objectives:

- Support the direction of the 2018 Regional Transportation Master Plan;
- Improve transportation needs for all users, including drivers, pedestrians, cyclists, and transit users;
- Minimize potential impacts to surrounding natural environment, built and cultural heritage and scenic landscape, socio-economic activity, and existing infrastructure;
- Improve existing intersection operations and provide facilities for all users;
- Consider adjacent land uses and community growth to develop effective and sustainable recommendations for improvement; and
- Consult the public and stakeholders to receive input on potential impacts to ensure appropriate criteria are used to select the preferred alternative solution.

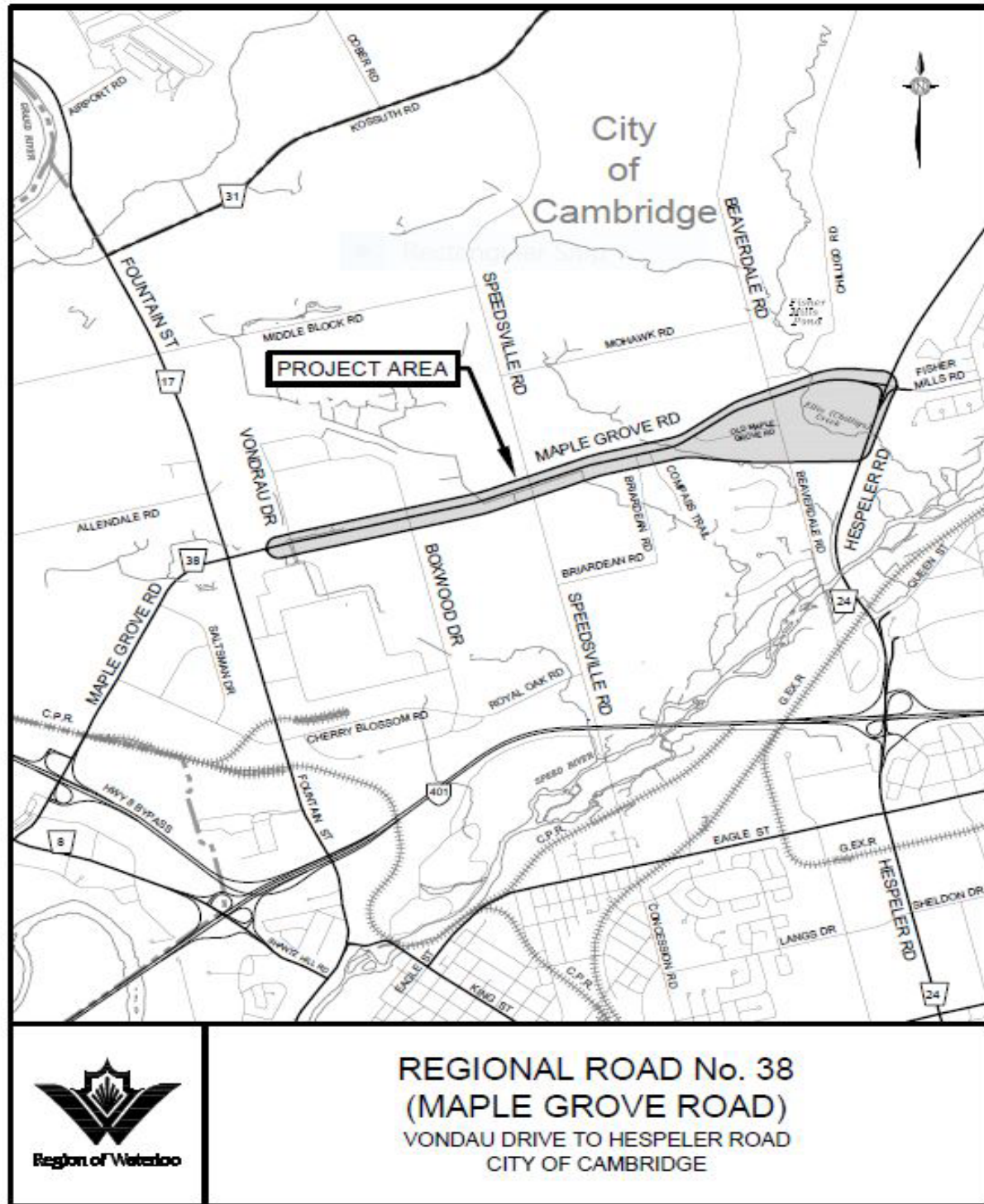


Exhibit 1-1: Study Area

## 1.4 Problem and Opportunity

Ongoing local growth and development will increase traffic congestion. Traffic generated by adjacent developments, in other parts of Cambridge, and neighbouring municipalities will also contribute to increased traffic volumes. As an existing two-lane cross-section, insufficient through traffic capacity exists to accommodate anticipated traffic volumes.

This study offers the following opportunities for improvements to the corridor, including:

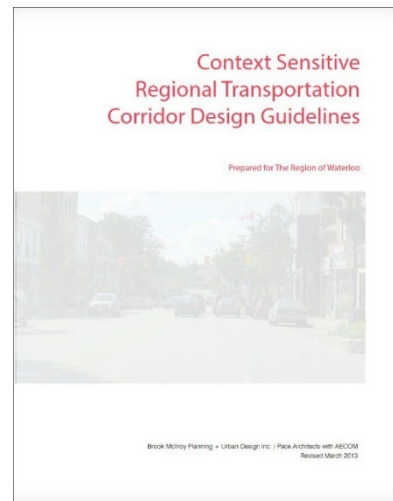
- Increases to vehicular capacity to reduce current traffic concerns at intersections;
- Addition of active transportation infrastructure to support walking, cycling, and public transit use; and
- Support for planned enhancements to existing Grand River Transit routes and stops.

## 1.5 Related Studies

### 1.5.1 Region of Waterloo Transportation Master Plan (2018)

The Region's 2018 Transportation Master Plan update identified the need to:

- Widen Maple Grove Road from two to four through lanes between Hespeler Road and Vondrau Drive within the next five (5) years to provide adequate capacity for forecasted traffic volumes along this corridor;
- Provide pedestrian and cycling (active transportation) facilities along Maple Grove Road within the Study Area; and
- Rehabilitate or replace asphalt on Maple Grove Road between Vondrau Drive and Hespeler Road.



### 1.5.2 Context Sensitive Regional Transportation Corridor Design Guidelines (2013)

The Context Sensitive Regional Transportation Corridor Design Guidelines (CDG) identifies design guidelines for required features within the road allowance such as vehicle lanes, cycling facilities, sidewalks, and boulevards, and is a planning document which guides the design of Regional roads. The CDG identifies Maple Grove Road as a "Community Connector", which has the following design characteristics:

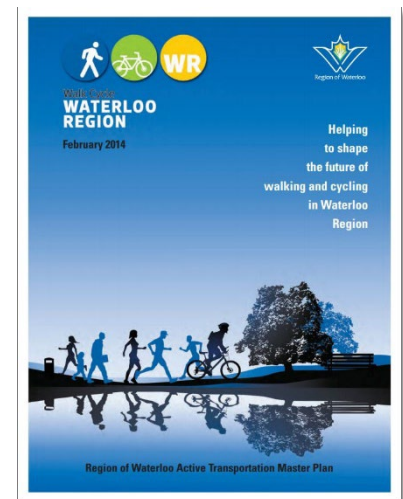
- Connects to 400 series highway, Conestoga Parkway (expressway), or other Community Connectors;

- Connect communities within the Region and include a high degree of access control;
- Focus on moving vehicles and can be considered for higher order transit;
- Active transportation is accommodated with roadway separation considered; and,
- Typically include wide, landscaped centre median.

Designing Maple Grove Road to support active transportation modes, including walking and rolling, is a fundamental character of this road classification.

### 1.5.3 Maple Grove Road (King Street to Fountain Street) Class EA (2004)

A Class EA study completed in 2004 included Maple Grove Road between King Street in Kitchener and Hespeler Road in Cambridge. Implementation of the recommended improvements occurred between King Street and Fountain Street between 2006 and 2014. Prior to planned construction between Fountain Street and Hespeler Road, the Region released new Context Sensitive Design Guidelines, the Active Transportation Master Plan, and the Transportation Master Plan Update, all with an emphasis on providing different and improved alternatives to meet active transportation and transit needs. Maple Grove Road intersection improvements at Fountain Street have since been considered as part of a separate study; as a result of that study, a roundabout has been approved by Regional Council at that location. The works proposed at Fountain Street are reflected in this study including the works that will extend to the west side of the existing Vondrau Drive intersection. The remaining section of Maple Grove Road between Vondrau Drive and Hespeler Road is the subject of this separate Class EA that will consider the new guidelines and master plans in determining a recommended design solution.



### 1.5.4 Active Transportation Master Plan (2014)

The Region's 2014 Active Transportation Master Plan (ATMP) provides a strong basis for the delivery of the active transportation network and supporting strategies. Through the development of the 2014 ATMP, the Transportation Capital Program (TCP) Action Plan confirmed walking and rolling facilities are to be included as part of the other transportation projects as part of a broader Network Action Plan approach.

Maple Grove Road is a 5 to 10-year Transportation Capital Program (TCP) project for both the walking and cycling (/rolling) network.

## **1.6 Municipal Class Environmental Assessment Process**

This study was conducted as a Municipal Class EA Schedule “C” project in accordance with the planning and design process outlined in the Municipal Engineers Association Municipal Class Environmental Assessment (as amended to 2015). The approved process is a five-phase planning process, mandated by the Ontario Environmental Assessment Act. The Class EA process defines four schedules of applicable projects based on scale and potential for adverse environmental impact, identifying which of the five phases are required (Exhibit 1-2).

The five phases of the Class EA are:

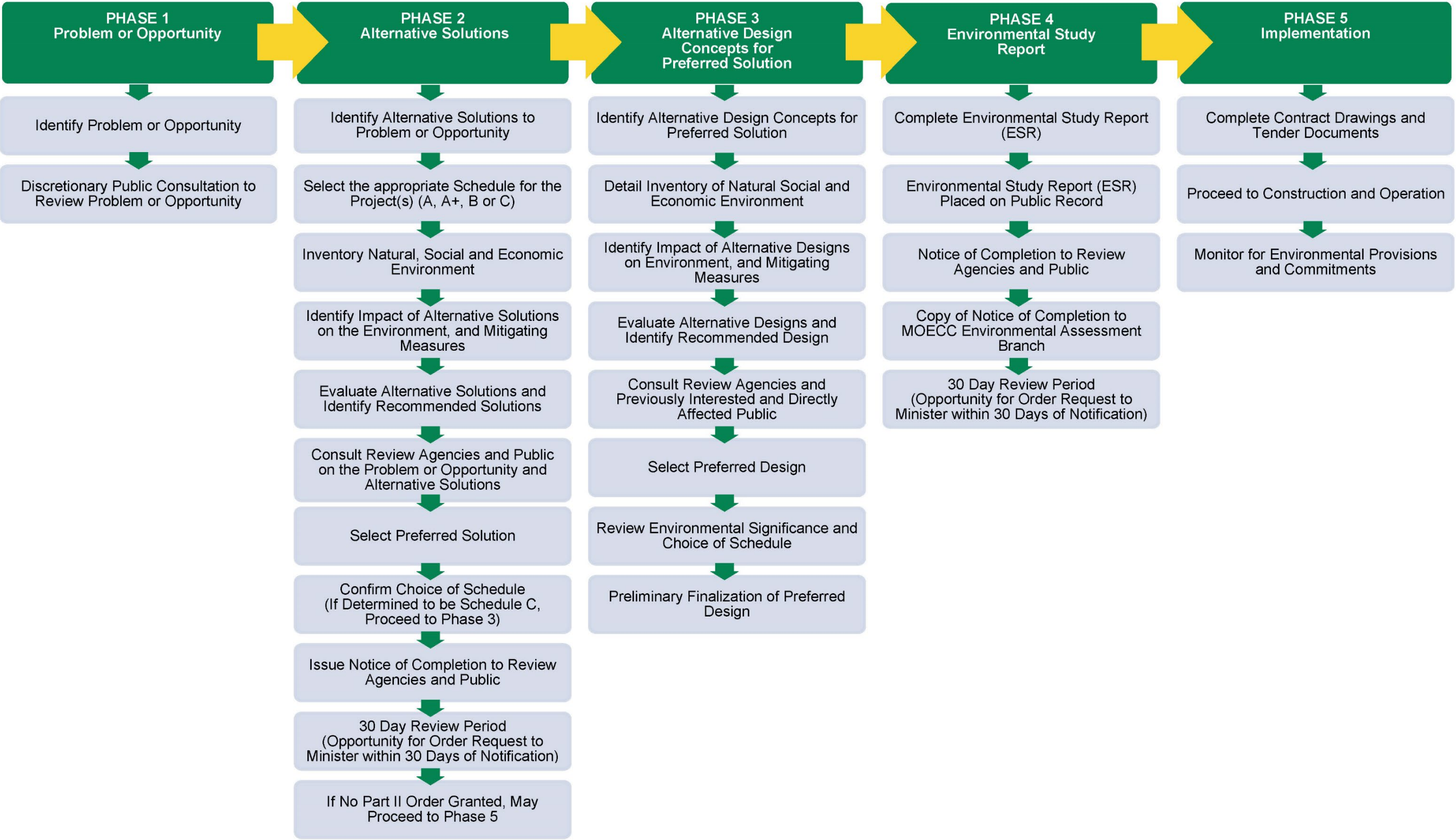
- Phase 1: Problem or Opportunity;
- Phase 2: Alternative Solutions;
- Phase 3: Alternative Design Concepts for Preferred Solution;
- Phase 4: Environmental Study Report; and
- Phase 5: Implementation.

## Exhibit 1-2: Municipal Class EA Project Schedules and Applicable Phases

|                    |                                                                                                                                                                                                                                                                                                                                     | Phases |   |   |   |   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---|---|---|---|
|                    |                                                                                                                                                                                                                                                                                                                                     | 1      | 2 | 3 | 4 | 5 |
| <b>Schedule A</b>  | <ul style="list-style-type: none"> <li>Minimal and predictable adverse environmental impacts – easily mitigated (i.e. emergency operational and maintenance activities)</li> <li>Pre-approved to proceed to Phase 5</li> </ul>                                                                                                      | ✓      |   |   |   | ✓ |
| <b>Schedule A+</b> | <ul style="list-style-type: none"> <li>Similar to Schedule A, but required to notify public prior to Phase 5</li> <li>No ability for public to request Part II order – comments directed to municipal council</li> </ul>                                                                                                            | ✓      |   |   |   | ✓ |
| <b>Schedule B</b>  | <ul style="list-style-type: none"> <li>Some potential for adverse environmental impacts (i.e. improvements or minor expansions to existing facilities)</li> <li>Must include evaluation of alternative solutions and public consultation</li> </ul>                                                                                 | ✓      | ✓ |   |   | ✓ |
| <b>Schedule C</b>  | <ul style="list-style-type: none"> <li>Potential for significant environmental impacts (i.e. construction of new facilities and major expansion of existing facilities)</li> <li>Must include evaluation of alternative solutions, evaluation of alternative designs for the preferred solution, and public consultation</li> </ul> | ✓      | ✓ | ✓ | ✓ | ✓ |

Each of the five phases have specific requirements (Exhibit 1-3). This study is Schedule C, which requires the completion of the first four phases, and leads into the fifth phase, following acceptance and approval of the Environmental Study Report by the Ministry of the Environment, Conservation and Parks (MECP). The Class EA process includes the requirement for consultation with the public and external agencies. This approach offers those persons and agencies who may be affected by, or have an interest in, the proposed project an opportunity to participate in the study.

Exhibit 1-3: Steps involved for each Phase of Municipal Class EA Process



In addition to consultation, the Class EA process includes evaluation of alternative solutions and alternative design concepts, assessment of potential impacts associated with the proposed improvements, and development of measures to mitigate potential identified impacts. The Class EA identifies, assesses, and recommends strategies to:

- Manage future transportation demand;
- Optimize local intersection capacity and operations;
- Address future transportation infrastructure opportunities; and
- Enhance transportation, including active, transit, and vehicle, capacity.

## **1.7 Provincial Policy Statement**

The Provincial Policy Statement (PPS) is a document which provides direction on policies relating to land use planning and development in Ontario. The PPS was first implemented under the authority of Section 3 of the Planning Act in 1996, then amended in 1997, and has since been replaced with revised versions in 2005, 2014, and 2020.

The PPS provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment. It also supports improved land use planning and management, which contributes to a more effective and efficient land use planning system.

The PPS requires that planning for transportation and infrastructure corridors considers significant resources such as natural heritage, water, agriculture, minerals and petroleum, mineral aggregate resources, cultural heritage, and archaeology. Section 2.1 of the PPS identifies natural heritage resources to be protected. Sub-section 2.1.5 identifies that development and site alteration shall not be permitted within areas identified for protection, unless it has been demonstrated that there will be no negative impacts on the natural heritage features or their ecological functions. As part of this study, a comprehensive natural environmental inventory was completed, as well as an environmental impact study. Natural heritage considerations are outlined further in Section 4 Existing Conditions, Sub-section 4.3 Natural Environment of this study.

## **1.8 Project Team**

In 2018, IBI Group was retained to complete a Municipal Class EA for Maple Grove Road improvements between Hespeler Road and Vondrau Drive.

The study has been directed by a Project Team (Exhibit 1-4) of staff from the Region of Waterloo and City of Cambridge, including Region and City Council representatives, as

well as Consultant staff. Four (4) Project Team meetings were held throughout the course of the study, copies of the meeting minutes are included in Appendix A.

As the lead consultant, IBI Group has supported this study with additional expertise and support from sub-consultants: CIMA Canada Inc., Natural Resource Solutions Inc., Archaeological Services Inc., J.D. Barnes Ltd., GEO Morphix Ltd., Orbit Engineering Ltd., and Peto MacCallum Ltd.

Exhibit 1-4: Maple Grove Road Class EA Study Team

Municipal Team

|                                                                                                                               |                                                                                                    |                                                        |                                                                     |                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <br><b>Karl Kiefer</b><br>Regional Councilor | <b>Justin Armstrong</b><br>Senior Engineer<br>Design and Construction,<br>Transportation Expansion | <b>Mike Jones</b><br>Supervisor<br>Traffic Engineering | <b>Darryl Spencer</b><br>Senior Engineer<br>Transportation Planning | <b>Marcos Kroker</b><br>Head<br>Design and Construction,<br>Transportation Expansion |
| <br><b>Donna Reid</b><br>Councilor<br>Ward 1 | <b>Alex Nichols</b><br>Project Engineer<br>Development Engineering                                 |                                                        |                                                                     |                                                                                      |

Consultant Team

|                                                                                                                                                     |                                                                         |                                                                                                                                           |                                                                                                                                                                          |                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br><b>John Bayley</b><br>Consultant Lead<br>Municipal Engineering | <b>Scott Johnston</b><br>Transportation Lead<br>Transportation Planning | <b>Patrick Garel</b><br>Environmental Assessment Lead<br>Transportation Planning                                                          | <br><b>Phil Weber</b><br>Lead<br>Roundabout Analysis                                  | <br><b>Ron Querubin</b><br>Surveyor<br>Topographic Survey            |
| <br><b>Brett Woodman</b><br>Arborist<br>Natural Environment      | <b>Gina MacVeigh</b><br>Aquatic Biologist<br>Natural Environment        | <br><b>Lisa Merritt</b><br>Role<br>Cultural Heritage | <br><b>Hafiz Muneeb Ahmad</b><br>Senior Principal Engineer<br>Structural Assessment | <br><b>Kevin Tabata</b><br>Senior River Scientist<br>Geomorphology |
| <br><b>Andrew Cooke</b><br>Senior Engineer<br>Hydrogeology       | <b>Shamsul A. Tarafder</b><br>Senior Geoscientist<br>Hydrogeology       | <b>William Loghrin</b><br>Project Engineer<br>Geotechnical Engineering                                                                    | <b>Gerry Mitchell</b><br>Senior Consultant<br>Geotechnical Engineering                                                                                                   |                                                                                                                                                         |

## 2 Consultation

### 2.1 Consultation Process

Consultation was a key component of this study. In accordance with Municipal Class EA Schedule 'C' requirements, four points of public contact were made:

- Notice of Study Commencement (Section 3) in January 2020;
- Public Consultation Centre #1 (Section 8) in July – August 2020;
- Public Consultation Centre #2 (Section 10) in June – July 2021; and,
- Notice of Study Completion (Section 14) (to be completed) 2023.

Each point of contact offered an opportunity for the public to review information, ask questions, and/or provide comments. The input received through consultation identified concerns and assisted in preferred solution selection and development of the preferred design alternative. Project consultation materials have been summarized (Appendix B).

The global pandemic announced in early 2020 had a significant impact on consultation. Due to associated restrictions, a new online approach to public communications was introduced and has since been adopted for numerous projects of a similar nature.

### 2.2 Study Webpage

Due to COVID-19 public meeting restrictions, Public Consultation Centres (PCCs) were held online, hosted on the Study webpage EngageWR at [www.engagewr.ca/cambridge-maple-grove-road](http://www.engagewr.ca/cambridge-maple-grove-road).

The Study webpage was active for the duration of the Study and was visited by 1,861 people between August 15, 2018 and November 23, 2022.



**EngageWR** is the Region of Waterloo's online engagement site which allows users to contribute ideas and provide feedback on projects and studies. It provides a centralized site where users can find out about new and upcoming projects and provide feedback through a variety of tools, including online surveys, Q&As, and forums.

For more information please visit:  
[www.engagewr.ca](http://www.engagewr.ca)

## 2.3 Agency and Stakeholder Contact List

As part of consultation for this Study, various agencies and stakeholders were identified and provided all notices (Appendix C), including:

- Federal Agencies:
  - Department of Fisheries and Oceans
  - Transport Canada
- Provincial Agencies:
  - Ministry of the Environment, Conservation and Parks
  - Municipal Class EA (West Central Region), EA Notification
  - Ministry of Citizenship and Multiculturalism (formerly Ministry of Heritage, Sport, Tourism and Culture Industries)
  - Ministry of Indigenous Affairs
  - Ministry of Natural Resources and Forestry
  - Infrastructure Ontario
- Indigenous Communities
  - Mississaugas of the Credit First Nation
  - Six Nations of the Grand River
  - Haudenosaunee Development Institute and Resource Centre
- Region of Waterloo:
  - Transportation Planning
  - Traffic Engineering
  - Transit Development (Grand River Transit)
  - Active Transportation Advisory Committee
  - Council
- City of Cambridge:
  - Development Engineering
  - Ward Councillor
- Conservation Authority
  - Grand River Conservation Authority
- Emergency Services:
  - Region of Waterloo Paramedic Services
  - Waterloo Regional Police

- City of Cambridge Fire Department
- Stakeholders:
  - Active & Safe Routes to School (ASRTS) c/o Region of Waterloo Public Health
  - Student Transportation Services of Waterloo Region
  - Allstream
  - Hydro One Networks Inc.
  - Enbridge Gas Inc.
  - GrandBridge Energy Inc. (formerly Energy + Inc.)
  - TriTAG
- Local Member of Parliament and Provincial Parliament
  - Member of Parliament
  - Member of Provincial Parliament
- School Boards:
  - Waterloo Region District School Board
  - Waterloo Catholic District School Board

## **2.4 Indigenous Communities Consultation**

Indigenous Communities were notified of the commencement of this study, invited to attend all Public Consultation Centres, and review documentation and provide input regarding the Maple Grove Road Class EA study approach, problems and opportunities, background information, and development and evaluation of alternatives. A summary of Indigenous Communities correspondences for this study is included herein (Appendix D).

## **2.5 Technical Agencies Consultation**

Technical agencies were notified of the commencement of this study and invited to review and provide input regarding the Maple Grove Road Class EA study approach, problems and opportunities, background information, and development and evaluation of alternatives.

## **2.6 Grand River Transit Consultation**

The Region of Waterloo Community Building Strategy envisions Maple Grove Road as a major transit corridor and encourages development in the Cambridge Business Park to become more transit-supportive. Maple Grove Road is an integral part of the regional transit network, which connects the Hespeler area of Cambridge, Cambridge Business Park, and Sportsworld Station.

Grand River Transit (GRT) service on Maple Grove Road is currently provided by iXpress Route 203 (Maple Grove). Currently, this route operates 7 days a week, every 30 minutes, connecting Conestoga College Doon Campus, Sportsworld Station, Hespeler (Cambridge) and Cambridge Centre Station.

Between Fountain Street and Boxwood Drive, GRT also operates Route 72 (Flex Boxwood) during peak periods and late evenings on weekdays. An extension of this route between Boxwood Drive and Speedsville Road operates by request only (i.e., flex routing). Route 72 will be reviewed in the future to reduce duplication with iXpress Route 203 and extend service to developing areas of the Cambridge Business Park and River Mills subdivision to the south and east. A service change would be part of service improvement review and require Regional Council approval.

There are currently nine (9) bus stops within the project area, as well as four (4) future stop locations planned based on current iXpress Route 203 planning, subsequent customer requests, and development activity.

Upgrades to existing bus stops and plans for future bus stop locations are to be confirmed during detailed design in consultation with Grand River Transit.

## **2.7 Ontario Ministry of the Environment, Conservation and Parks**

Upon completion of this Environmental Study Report (ESR), a Draft version of the Final Report was provided to the MECP's Project Review Unit, Environmental Assessment Branch for a 30-day technical review period on March 3, 2023. MECP provided a response letter on April 6, 2023, including a number of comments. MECP comments were reviewed by Region staff, and the ESR including Appendices were updated accordingly. A copy of the updated ESR, as well as an accompanying response letter acknowledging all MECP comments, was sent to MECP in July 2023.

### 3 Notice of Study Commencement

As a first point of contact, a Notice of Study Commencement was delivered to property owners and published on the Study webpage on January 10, 2020, and in The (KW) Record and Cambridge Times on January 14 and January 16, 2020 respectively. A copy of the Notice was also sent to agencies and stakeholders, including Indigenous Communities. Public notices, including the Notice of Study Commencement, are included with this Environmental Study Report (Appendix E); the Study agency and stakeholder contact list is also included (Appendix C).

The Notice of Study Commencement invited the public to participate in the study and provided information on the:

- Study and its purpose;
- Study Area and streets to be examined;
- Project being subject to the requirements of the Class EA Schedule C;
- Stages of the study, noting future PCCs and where notices would be published;
- Contact information for the Region, City, and Consultant project leads;
- Study webpage address; and
- How to participate actively in the study through the planned PCCs and/or requesting to be added to the project mailing list.

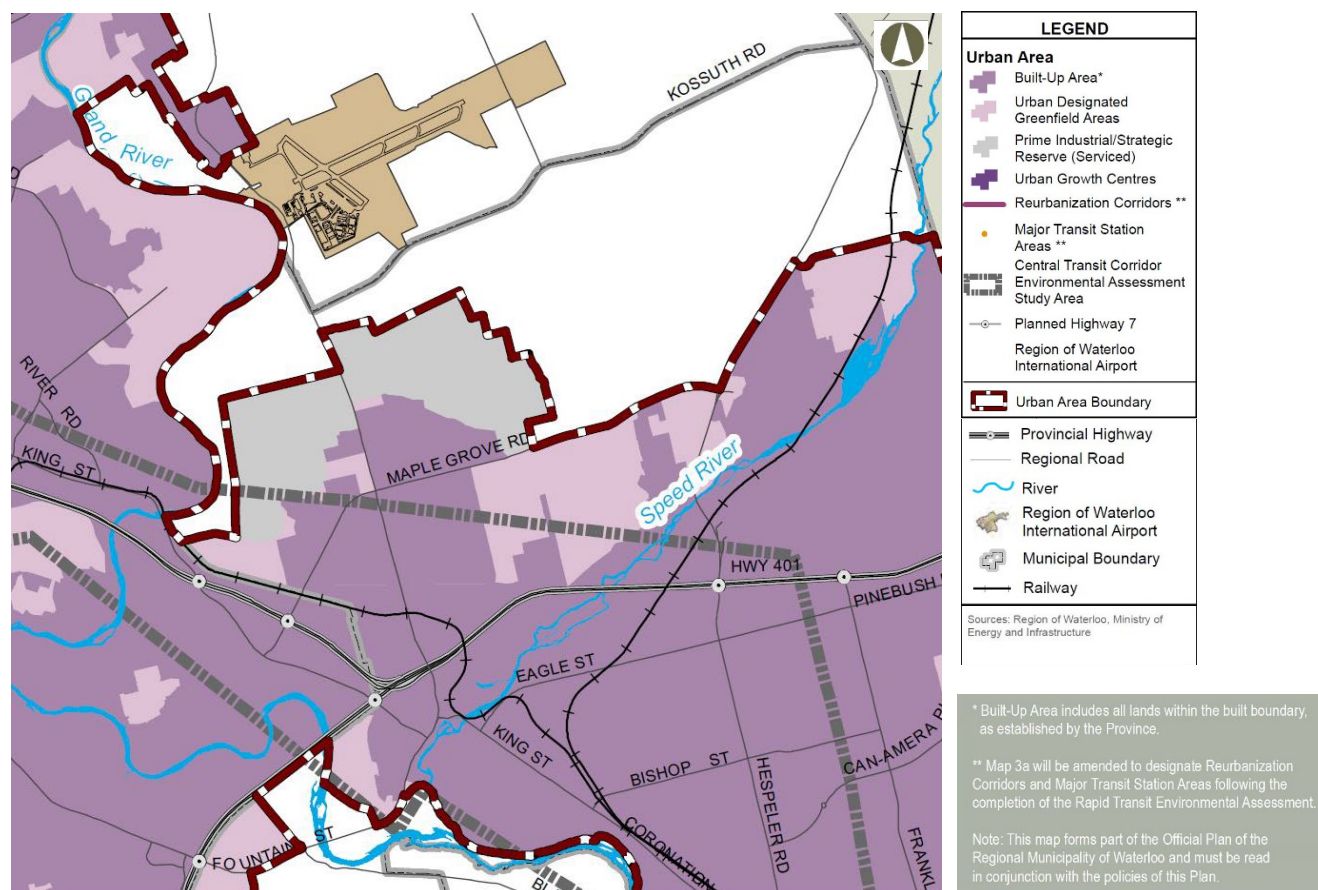
## 4 Existing Conditions

### 4.1 Land Use

#### 4.1.1 Region of Waterloo Official Plan (2015)

The majority of the Study Area falls within the Urban Area boundary in the Region of Waterloo Regional Official Plan (2015), with adjacent lands identified as Built-Up Area to the west, Prime Industrial/Strategic Reserve (Served) to the northeast, and Urban Designated Greenfield Areas to the southeast (Exhibit 4-1).

**Exhibit 4-1: Regional Official Plan Urban Area Land Use Map**

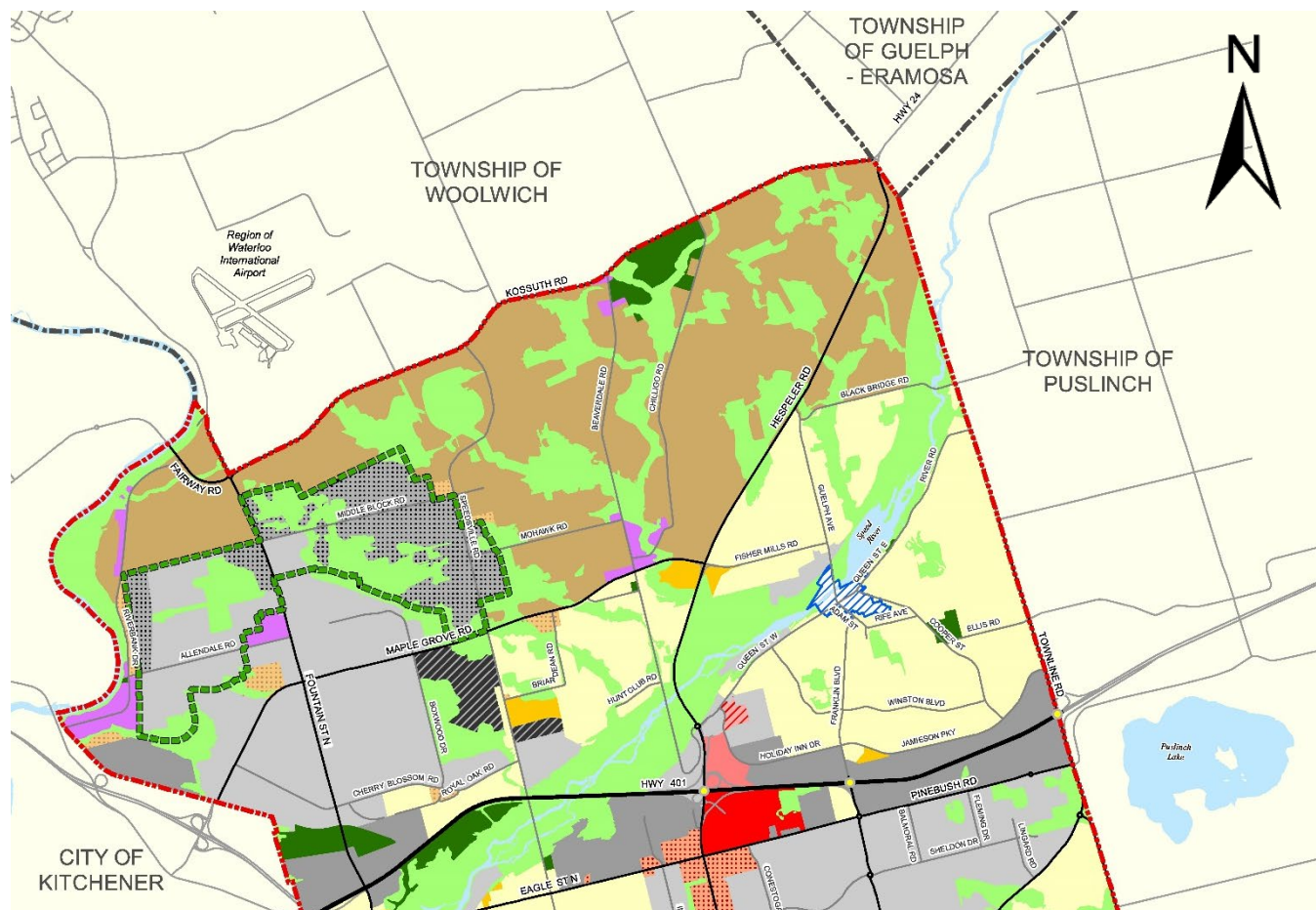


#### 4.1.2 City of Cambridge Official Plan (2018)

The City of Cambridge Official Plan (2018) also identifies land uses in the General Land Use Plan (Exhibit 4-2). The western section of the Study Area is generally made up of Business Industrial, Prime Industrial Strategic Reserve (Served), Prestige Industrial and Natural Open Space System lands, and the eastern section is generally made up of Prime Agricultural, Natural Open Space System, Low/Medium Density Residential, Future

Urban Reserve and Rural Residential lands. The lands designated as Prime Industrial Strategic Reserve (Served) also fall within the East Side Lands (RMW).

## Exhibit 4-2: City of Cambridge Official Plan Urban Area General Land Use Plan



### Legend

City Limits

Municipal Boundaries



Blair Village



East Side Lands (RMW)



Future Urban Reserve

#### Roads - Ownership

Province of Ontario or Region of Waterloo

City of Cambridge

Rivers and Lakes



Deferrals

#### 1. Community Core Areas

Galt City Centre; Preston Towne Centre; Hespeler Village

#### 2. Residential Designations

Low / Medium Density Residential

High Density Residential

Blair Core Area

Rural Residential

Rural

Prime Agricultural

#### 4. Commercial Designations

Regional Commercial

Community Commercial

Hespeler Road Mixed-Use Corridor

Neighbourhood Commercial

#### 5. Employment Designations

Business Industrial

Prime Industrial Strategic Reserve (Served)

Employment Corridor

Industrial

Prestige Industrial

#### 6. Open Space Designations

Recreation, Cemetery and Open Space

Natural Open Space System

## 4.2 Built Environment and Municipal Infrastructure

Maple Grove Road is a major east-west arterial road in Cambridge, which is within the Region of Waterloo. To the west, the road becomes Sportsworld Drive at Highway 8 and extends to King Street East. To the east, the road becomes Fisher Mills Road at Hespeler Road and extends to Guelph Avenue.

Maple Grove Road at Vondrau Drive is an existing signalized intersection with dedicated eastbound (EB) to northbound (NB) left-turn and eastbound to southbound (SB) right-turn lane and westbound (WB) to southbound (SB) left-turn and westbound (WB) to northbound (NB) right-turn lane and supports two lanes of traffic in both the eastbound and westbound directions. Included on the south leg is a NB to WB left turn/through lane and a dedicated right turn lane for NB to EB.

Approximately 150 metres east of the Vondrau Drive intersection, Maple Grove Road tapers to one lane in each direction and a rural cross-section with shoulders and drainage ditches. The eastbound approach at Boxwood Drive includes a dedicated EB to NB left-turn lane and a WB to SB right-turn lane. On the westbound approach to Boxwood Drive there is a dedicated WB to SB left-turn lane and on the south leg there is a NB to WB left turn lane. Boxwood Drive currently has two-way stop control at Maple Grove Road.

Maple Grove Road at Speedsville Road is an existing signalized intersection with a dedicated EB to NB left-turn lane and an EB to SB right-turn lane on the east approach and a dedicated WB to SB left-turn lane on the west approach. Continuing easterly Maple Grove Road continues as a two-lane roadway with one lane in each direction past Briardean Road, which is permanently closed, to Compass Trail where a dedicated WB to SB left-turn lane has been added for vehicles destined to the residential development area to the south.

The intersection at Compass Trail has been urbanized with concrete curb and gutters at the north and south side of the roadway. Urbanization started in 2019 and finished in 2020 as part of ongoing development agreement conditions for developments to the south. On the west and east approach legs to Compass Trail there is an existing raised concrete median separating eastbound and westbound traffic.

Two new Grand River Transit stops with shelters and landing pads have been constructed immediately west of the Compass Trail intersection. Access to transit stops is provided via new concrete sidewalks and an Ontario Traffic Manual (OTM) Book 15 Level 2 Type D pedestrian crossover (PXO) through the raised median is provided at the west side of the intersection. Concrete sidewalk is included as a connection for pedestrians to the south transit stop, and a paved asphalt multi-use path offers pedestrians access to the north transit stop. Curb and gutter and raised concrete median continue east of

Compass Trail on both sides of the roadway to the west side of the intersection at Old Maple Grove Road.

East of Old Maple Grove Road the roadway reverts to a two-lane rural roadway cross-section, one lane in each direction, with roadside drainage ditches and gravel shoulders.

Approximately 150 metres west of the Beaverdale Road intersection, Maple Grove Road widens to a four-lane cross-section, providing two through traffic lanes in each direction with concrete curb and gutter and remains a four-lane section from Beaverdale Road easterly across the Ellis Creek bridge and then reverts to a two-lane rural cross-section with drainage ditches and gravel shoulders.

At the Beaverdale Road intersection there are traffic signals and dedicated left turn lanes for all directional movements. Maple Grove Road is four lanes wide at this location with two through traffic lanes in each direction and dedicated left turn lanes. Beaverdale Road provides two through traffic lanes, one in each direction, and dedicated left turn lanes in both directions. Right turns are shared at this intersection with through/curb lanes in all directions.

Maple Grove Road curves southerly moving easterly toward Hespeler Road. On the eastbound approach approaching the existing signalized Hespeler Road and Maple Grove Road intersection, a channelized right turn lane provides a free-flowing transition from EB Maple Grove Road to SB Hespeler Road, including an acceleration lane and taper to the south.

There are dedicated left turn lanes provided on all approaches to the intersection and a dedicated right turn lane is provided for SB to WB movements from Hespeler Road. On the northbound approach on Hespeler Road there is also a channelized right turn lane, which provides a free-flowing transition from Maple Grove Road to Fisher Mills Road and includes a transition taper and deceleration lane for movements to the east on Fisher Mills Road. Hespeler Road provides two through traffic lanes in the northbound and southbound directions through the intersection.

Portions of Maple Grove Road have been fully or partially urbanized in the past; at the west end of the Study Area, around Vondrau Drive, for a small distance both east and west of Compass Trail, at the former Beaverdale Road intersection, and over portions of the Hespeler Road intersection. The remainder of the road exhibits a rural cross-section with gravel shoulders and drainage ditches.

This Class Environmental Assessment evaluates future widening of the corridor from two to four through lanes, as planned in the Region's Transportation Master Plan (2018) and matching the four-lane roadway west of Vondrau Drive and through Fountain Street. This study also provides recommended configurations and preliminary design for all intersections within the Study Area (Exhibit 4-3).

### Exhibit 4-3: Intersections within the Study Area



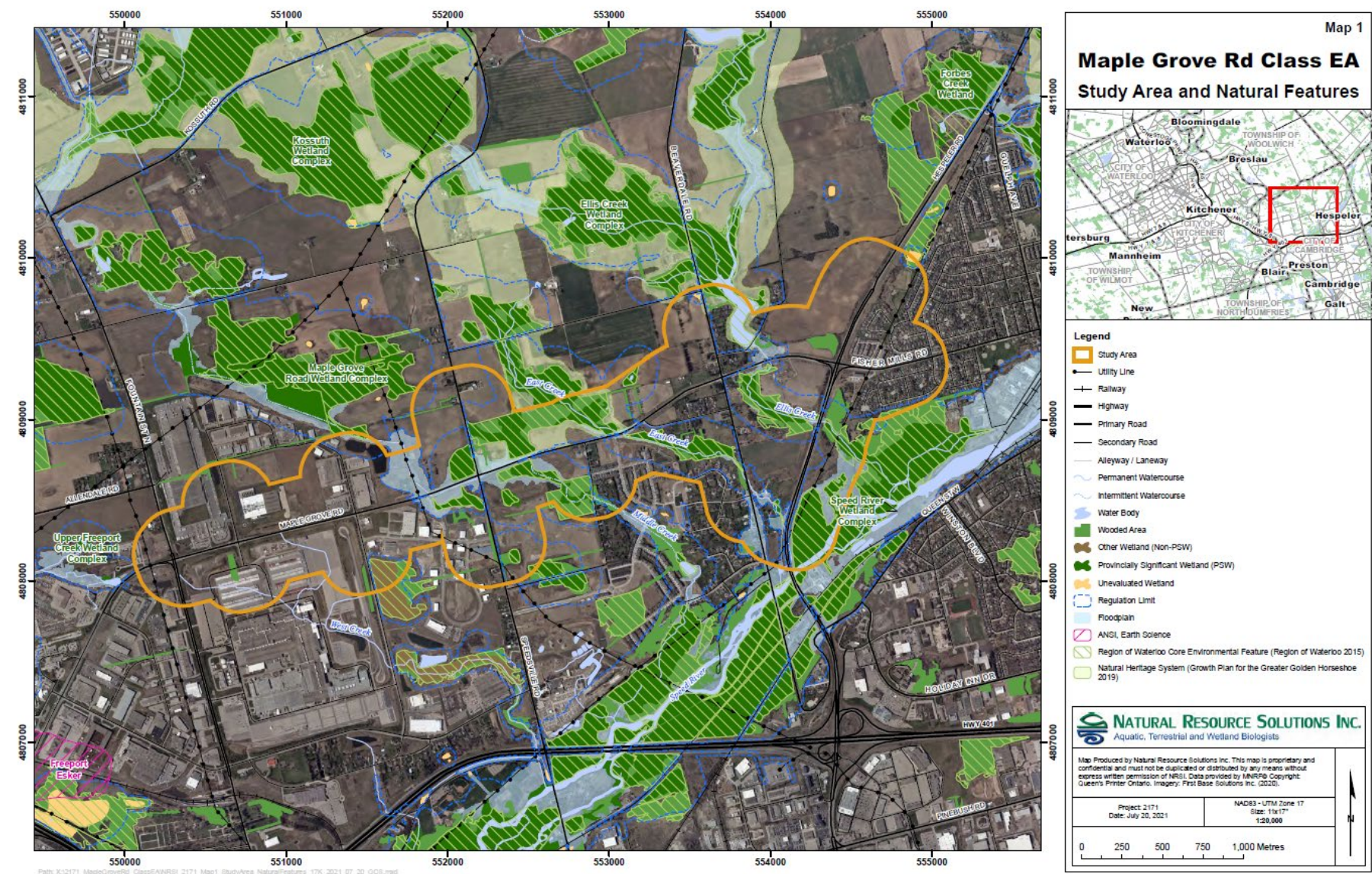
\* Note: The Briardean Road connection to Maple Grove Road was removed during the Study as a condition of development.

## **4.3 Natural Environment**

The Study Area includes lands within 250 m of the Maple Grove Road right-of-way between Fountain Street and Hespeler Road (Exhibit 4-4). The western portion of the Study Area is mainly Industrial land use, while remaining areas consist of active Agricultural, existing and future Residential/Mixed Use, and small and fragmented Natural Open Space lands, including swamp, deciduous forest, coniferous forest, meadow, marsh, and planted vegetation areas. Several watercourse features and wetlands can be found within the Study Area, including Ellis Creek, East Creek, West Creek, Middle Creek, Ellis Creek Wetland Complex, Speed River Wetland Complex, and Maple Grove Road Wetland Complex. Approximately half of the Study Area is within Grand River Conservation Authority (GRCA) Floodplain and/or Regulation Limits.

As part of this Municipal Class EA, specialist firm Natural Resource Solutions Inc. (NRSI) completed a comprehensive natural environmental inventory of the Study Area, as well as an environmental impact study (Appendix F). NRSI also supported the project technical team through evaluation of alternatives.

Exhibit 4-4: Study Area and Natural Features



## 4.4 Utilities

Existing GrandBridge Energy (formerly Energy+) hydro lines are located on the north side of Maple Grove Road within the project limits (Vondrau Drive to Hespeler Road).

On adjacent streets existing hydro lines vary:

- On Boxwood Drive, the north leg of Speedsville Road and the south leg of Beaverdale Road, existing hydro lines are located on the east side;
- On the south leg of Speedsville Road, Briardean Road, the north leg of Beaverdale Road, and Hespeler Road, existing hydro lines run on the west side; and
- Along Old Maple Grove Road existing hydro runs on the south side.

Enbridge Gas Inc. (Enbridge) has a gas main running line on the north side of Maple Grove Road. The gas main is generally parallel to existing hydro with an approximate distance of 2.4m separating the two and extending from Fountain Street to approximately 170 metres east of Vondrau Drive where it crosses to the south side (of Maple Grove Road) and continues easterly until it ends at Compass Trail. Enbridge gas mains can be found on the west side of Vondrau Drive, but only north of Maple Grove Road; on Boxwood Drive and Beaverdale Road the gas mains run along the east side. Enbridge also has a running line on the north side of Old Maple Grove Road, fed from Beaverdale Road. There are no gas mains currently present on Speedsville Road or Hespeler Road within the Study Area.

## **5 Background Studies**

Several background studies were completed in the early stages of this Municipal Class EA to establish a comprehensive inventory of existing conditions; as well as to aid in the identification of traffic needs and recommend suitable transportation improvements to accommodate existing and forecasted traffic (i.e., vehicle, active transportation, and transit) volumes.

### **5.1 Natural Environment Impact Study**

IBI Group (IBI) retained Natural Resource Solutions Inc. (NRSI) in September 2018 to complete an Environmental Impact Study (EIS) to inform the Schedule C Municipal Class EA for Maple Grove Road (Appendix F). The EIS characterized adjacent vegetation communities, completed a Tree Preservation Plan (TPP), provided a screening report for Species at Risk (SAR), included recommendations regarding wildlife crossings, and informed evaluation of alignment alternatives and preliminary design.

The EIS report contains comprehensive findings of field investigations, acknowledges potential impacts associated with alternatives, as summarized in the evaluation of alternative road designs, and documents selection, and detailed design, of the Regional Council-approved preferred alternative for Maple Grove Road which will avoid and/or minimize potential impacts to significant and sensitive natural heritage features. The EIS summarizes background information on natural heritage features, as well as methods and results of a comprehensive field program within the Study Area. Detailed characterization of existing natural features informed analyses of significance and sensitivity of natural features within the Study Area and identified constraints to development. These data formed the bases of evaluation for several Maple Grove Road widening alignment and cross-section alternatives.

### **5.2 Tree Inventory**

A comprehensive inventory and assessment of trees was completed within the Study Area by a Certified Arborist on January 18, April 23, and April 29, 2019 (Appendix G). Tree assessment included: native or non-native species; overall health and significance; and potential for structural failure. Minimizing tree impacts was a key criterion in development and evaluation of this study. Several strategies to minimize tree impacts during construction have been identified and will be implemented.

### **5.3 Drainage and Stormwater Management**

IBI Group prepared a Functional Drainage and Stormwater Management Report (Appendix H) in support of the Schedule C Municipal Class EA for proposed improvements to Maple Grove Road. Stormwater management criteria for this project and adjacent development areas are based on applicable requirements of the Region of Waterloo, City of Cambridge, Grand River Conservation Authority, and Ministry of

Environment, Conservation and Parks (MECP). Stormwater quality control will be required under proposed conditions to treat runoff before it is discharged to each outlet.

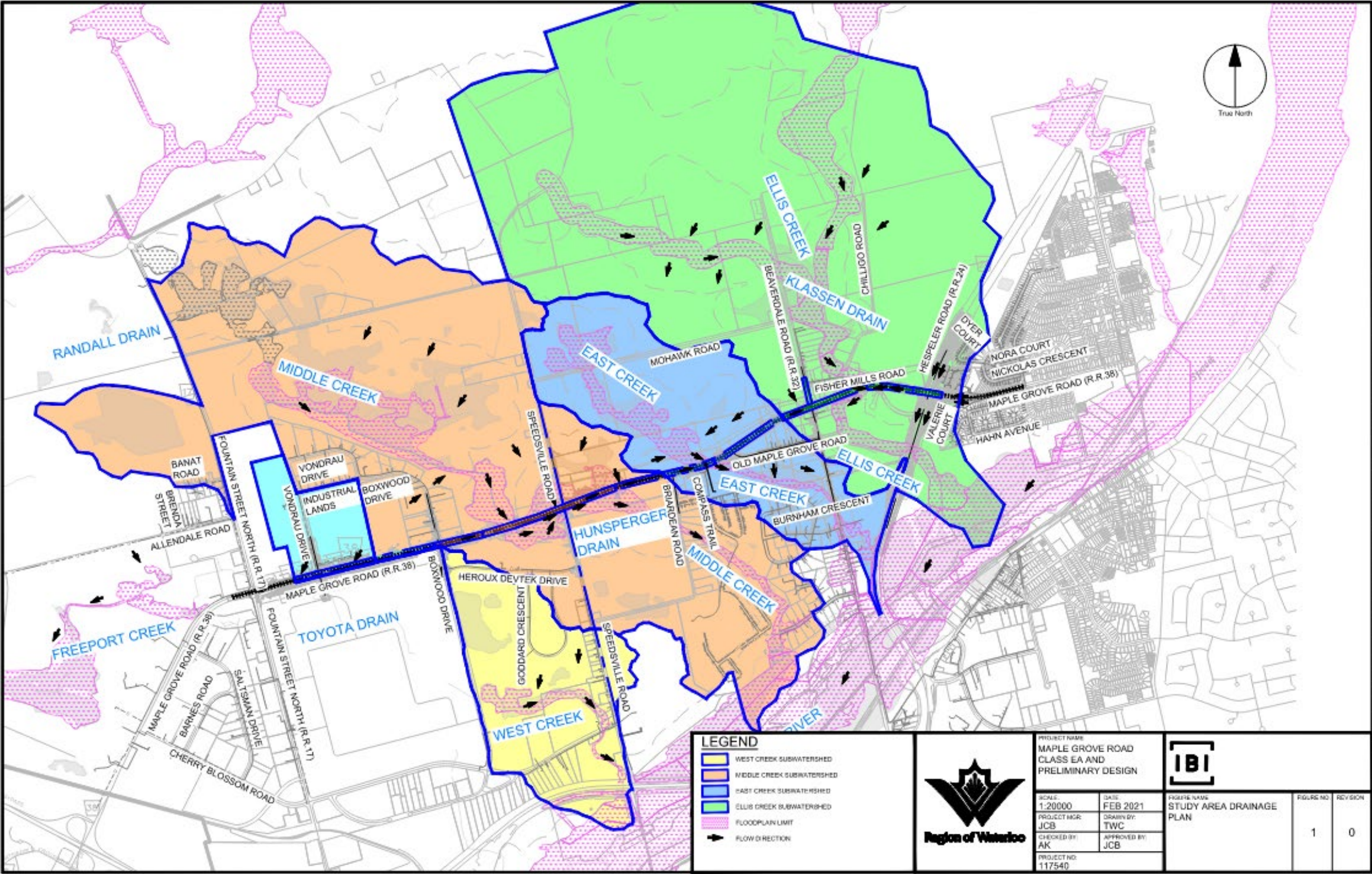
The Functional Drainage and Stormwater Management Report summarizes proposed stormwater management requirements to accommodate construction of a new urban road cross-section. The Study Area right-of-way is 13.473 hectares within the northeast part of the City of Cambridge. There are six (6) drainage outlet locations; the existing Maple Grove Road storm sewer draining west, East Creek, Middle Creek, West Creek, Ellis Creek, and the Hespeler Road ditch drainage system. The existing road corridor areas drain primarily via ditches at the roadsides supplemented by local sewers at intersections and outlet to existing watercourses and existing storm sewers.

Under the proposed conditions, drainage will be collected in a piped underground storm sewer system and via overland flow on the road, and runoff will continue to discharge to each existing outlet location. No new storm outlet locations are proposed for this project. A drainage plan was prepared for the Study Area (Exhibit 5-1). Widening the Maple Grove Road asphalt surface (impervious area) will result in an increase in peak flows in comparison to existing conditions. To address impervious area surface run-off increases, various stormwater management techniques are proposed, including surface and underground storage, and Low Impact Development (LID) features throughout the developing corridor, based on conducive soil for active infiltration and local wellhead protection requirements.

Stormwater attenuation using underground and surface storage for 2- to 100-year storm events will be required to control proposed conditions peak flows to the required existing conditions for receiving drainage outlets. Stormwater quality may be addressed by routing impervious areas through naturalized swales, oil-grit separator (OGS) units, perforated pipes, and/or directing surface runoff to an upgraded pipe system and conveying piped flows to surface detention facilities where adequate volume is available.

Culvert crossings within the Study Area have been assessed and upsized box culverts will be required to convey the 50-year storm event without overtopping the regional roadway.

Exhibit 5-1: Study Area Drainage Plan



## 5.4 Noise

A Preliminary Noise Study (IBI, March 2022) was completed as part of this Municipal Class EA (Appendix I) according to Region of Waterloo noise guidelines. Based on noise modelling results and analyses for preliminary design, noise mitigation is expected to be warranted in several areas adjacent to existing residential areas because of proposed improvements.

With proposed road improvements, existing noise levels may increase. The purpose of the Preliminary Noise Study is to:

- Estimate current noise levels based on existing conditions;
- Estimate future forecasted noise levels based on preliminary design of the Regional Council-approved alternative for Maple Grove Road improvements under future predicted traffic volumes; and
- Assess whether future conditions, based on Region of Waterloo noise guidelines and preliminary design, may warrant noise mitigation.

The Study Area between Vondrau Drive and Hespeler Road is primarily an existing two-lane arterial road; however, one section has been upgraded to a four-lane arterial road, east of Beaverville Road heading easterly toward Hespeler Road. Adjacent land use is primarily commercial, residential, and agricultural. Residential lands are considered potentially sensitive to noise and were the subject of noise assessment. Commercial areas are not considered to be noise sensitive areas. It is expected that new residential developments would have Noise Warning clauses on title, if warranted by Region noise guidelines, which would warn residents and buyers of potential for traffic noise to impact their properties.

The Region of Waterloo has established noise level criteria for development based on MECP Policies (Publication LU-131-Noise Assessment Criteria in Land Use Planning, October 1997), *Implementation Guideline for Noise Policies, Part B: Existing Development Impacted by Proposed Regional Road Undertakings* (Region, 1999).

Guideline Part B recommends that noise mitigation measures are required if either of the following conditions is met:

- Future noise level, after the proposed road work is completed, exceeds 65dBA; or
- The future noise level exceeds 60 dBA, and the difference between the current and future noise levels exceeds 5dBA.

As a result, the following sections are recommended for future noise study based on detailed design:

- Maple Grove Road, from Briardean Road to Hespeler Road

Based on the Region of Waterloo noise guidelines for road improvements and the results of the noise modelling and analyses completed in the Preliminary Noise Study, noise mitigation may be warranted at several residential areas because of the proposed road improvements. It is recommended that during detailed design of road improvements assumptions, analyses, and findings of the preliminary noise study are confirmed to ensure that recommended mitigation satisfies noise guideline requirements. Final design will include details on noise attenuation type, locations, materials, heights, etc., if warranted.

## **5.5 Geology and Physiography**

### **5.5.1 Geotechnical**

Peto MacCallum Ltd. (PML) was retained to complete a Geotechnical Investigation for Maple Grove Road in August 2018. The purpose of the geotechnical investigation was to determine detailed subsurface soil and ground water conditions at the site and provide preliminary recommendations pertaining to road widening, grade separation structures and bridges, underground sewer and watermain installations, and pavement reconstruction.

Specific items addressed in the geotechnical report (Appendix J) include:

- A description of the site and the field investigation procedure;
- A summary of subsurface soil and ground water conditions encountered, including the presence of any topsoil, organics, fill, or other unusual features below grade;
- Log of borehole sheets, a borehole location plan drawing, and geotechnical laboratory test results;
- Foundation design options for a grade separation structure (fly-over) and Ellis Creek trail bridges, including shallow and deep foundation recommendations, bearing resistances, settlement projections, and site class for seismic design;
- Retaining wall design parameters, including lateral earth pressures;
- Excavation recommendations, including safe side slopes and dewatering requirements;

- Pipe bedding, cover and backfill requirements, including material and compaction requirements, suitability of excavated soils for reuse as backfill;
- Soil infiltration rates for consideration of low impact development (LID) measures;
- Pavement design recommendations for rehabilitation/recycling and/or new construction including full AASHTO ESAL pavement design and GBE analysis;
- Asphalt sampling, including consideration of asbestos; and
- Chemical test results and recommendations on potential excess soil.

Geotechnical investigation fieldwork was conducted between December 3, 2018, and February 22, 2019. The investigation program included 109 boreholes between 3.7 and 17.4 metres deep and 99 hand augers between 10 and 890 millimetres deep. The project site is in the physiographic region known as Waterloo Hills. Near surface soils in Waterloo Hills are generally composed of sandy hills, some being ridges of sandy till, while others are kames or kame moraines, with outwash sands occupying intervening hollows.

The current alignment of Maple Grove Road was constructed in the 1980s. The paved surface of Maple Grove Road is generally in fair to poor condition with intermittent to frequent severe transverse cracking, localized moderate to severe map cracking and severe edge alligator cracking. The Fisher Mills Road section east of the Hespeler Road and Maple Grove Road intersection is in very poor condition with extensive and severe transverse cracking and alligator cracking, which is required for roundabout tie-in.

The samples of granular base and subbase materials tested were marginally too silty to meet Region of Waterloo and Ontario Provincial Standard Specifications (OPSS) for Granular A or B. Consequently, any excavated existing granular base and subbase would only be suitable for reuse as select subgrade material below the new pavement structure. Imported new Granular A and Granular B will be required within the new pavements. The pavement structure of the adjacent streets from Vondrau Drive to Hespeler Road, excluding Compass Trail and Old Maple Grove Road, are included in the geotechnical report.

### **5.5.2 Excess Soils**

As of January 1, 2021, new excess soil reuse planning requirements were enacted by the Ministry of the Environment, Conservation and Parks. Ontario Regulation 406/19 “On-Site and Excess Soil Management” provides a framework for the beneficial reuse of excess soils, including completion of an Assessment of Past Uses, development and implementation of a prescribed Sampling and Analysis Plan, Soil Characterization Report, Excess Soil Destination Assessment Report, and implementation of a Tracking System.

Soil sampling and analysis work completed as part of this study may not meet all requirements defined in the new regulation. Accordingly, additional work associated with excess soil management, including reporting and/or sampling, may be required prior to construction. The final requirements for the management of excess soil will be reviewed by a qualified person (QP) prior to planned construction activities to ensure that excess soil management is conducted in compliance with phased-in requirements of O.Reg. 406/19.

### 5.5.3 Hydrogeological

PML was also retained to complete a Hydrogeological Site Assessment (HSA) for Maple Grove Road in August 2018. The objective of the HSA (Appendix K) was to provide a hydrogeological study with comments and recommendations for design and construction of road reconstruction, buried services, and potential structure construction in accordance with the Region of Waterloo and regulating agencies requirements, and is included with this Environmental Study Report.

Based on proposed works and findings of the site assessment, subsurface conditions, results of field work and laboratory analyses, as well as pertinent applicable regulatory requirements, PML's report noted the following:

- In general, the soil profile along Maple Grove Road within the project limits comprises a surficial pavement layer or topsoil, over fill, over sand/gravelly sand/sand and gravel, or silty sand/sandy silt, over sandy silt till/silt till/clayey silt till deposits;
- Hydrostatic ground water levels range from about 1.1 to 7.4 metres below ground surface (bgs) (elevations 295 to 309) along Maple Grove Road;
- Groundwater drawdown during construction dewatering for servicing (sewers) is anticipated to range from 0 to about 2.0 m bgs and for structures about 0 to 8.3 m bgs. As a worst case, structures are assumed to use open excavations without shoring;
- Estimated dewatering zones of influence (DZOI) for required drawdown for servicing range from 0 to 27 m and for potential structures range from 0 to 111 m;
- Estimated dewatering rates for servicing range from minor sump pumping to about 85,000 L/day per 100 m dewatered length. For potential construction of structures, the range is from minor sump pumping to about 220,000 L/day;
- Since currently estimated discharge rates are expected to be greater than 50,000 L/day, but less than 400,000 L/day, registration of the water taking as an EASR is expected;

- Construction dewatering impact (the drawdown of the local ground water table) is expected to be minimal, primarily due to the short DZOI of dewatering over most of the project limits. No contaminant plumes are anticipated to migrate toward the site due to dewatering; however, some watercourses are expected to be intercepted by the DZOI, and if structures are constructed, as assumed, some private water well users may be impacted, and settlement may be experienced at buildings within the DZOI; and
- Ground water samples complied with parameters corresponding to discharge to a sanitary sewer, except for chloride concentration in one water sample. The ground water samples complied with parameters corresponding to discharge to a storm sewer (also requiring compliance with watercourse discharge criteria), with the exception of a number of metals, chlorine, fluoride, chloride, 4AA-phenolics, and sedimentation and/or filtration to comply with Provincial Water Quality Objectives (PWQO) and sanitary and storm sewer standards. Extraction, handling and discharge of ground water during construction (if required) may require pre-treatment before discharge to existing receiving sewers and/or watercourses. This shall be determined during detailed design.

After concluding HSA, PML recommended the following:

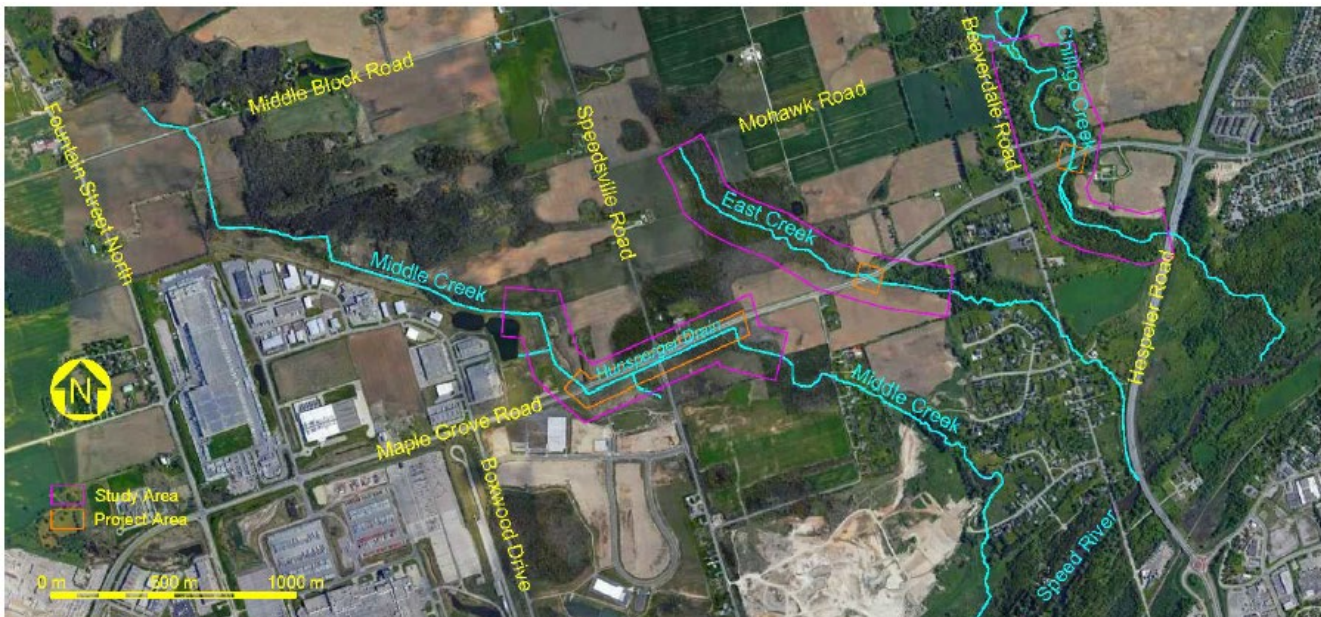
- Long-term ground water level monitoring to identify seasonal high and low ground water levels and time periods;
- Servicing and bridge structure construction methods, including inverts, dimensions, and locations have been assumed. Estimated ground water discharge rates, DZOI, and associated impacts require review upon completion of detailed design. Additional hydrogeological investigation may be required to fill information gaps;
- When design is deemed to be final and dewatering discharge method(s) has/have been determined, if an EASR is still appropriate, a Water Taking Plan and Discharge Plan (includes discharge rates, DZOI, impact assessment, monitoring program, proposed discharge locations, methods of transfer, and erosion control measures) required for EASR registration (MECP water taking permit) for construction dewatering must be prepared by a qualified person;
- Since ground water levels vary, it is best to schedule excavation for expected periods of low levels. Dewatering methods (sumps, wellpoints, etc.) should be no deeper than required to achieve the desired drawdown. Surface water intrusion should be minimized;

- No shoring has been assumed in this analysis. Sheet pile walls, or other founding methods, do not require dewatering such as piles or steel-lined caissons, would reduce the required dewatering;
- Any shoring drawings, dewatering plans, and excavation plans should be reviewed for proper implementation of geotechnical and hydrogeological findings and recommendations presented herein; and
- Compliance monitoring (discharge water quality, ground water levels, and potential settlement) will be performed as set out in the Water Taking Plan, noted above.

## 5.6 Fluvial Geomorphology

GEO Morphix Ltd. was retained to complete a Fluvial Geomorphological Assessment of each watercourse that crosses Maple Grove Road between Vondrau Drive and Hespeler Road (Appendix L). From west to east, these watercourses include Middle Creek, East Creek, and Chilligo Creek (Ellis Creek) (Exhibit 5-2). With respect to Middle Creek, the portion of channel that travels along Maple Grove Road forms part of the Hunsperger (municipal) Drain. Chilligo Creek is also known as Ellis Creek. For the purposes of clarity in this Study, Chilligo Creek will be referred to as Ellis Creek.

### Exhibit 5-2: Creek Crossings at Maple Grove Road within Class EA Study Area



The purpose of fluvial geomorphological assessment was to investigate and consider how existing and proposed crossing structures may affect natural channel form and function along/near Maple Grove Road. Recommendations associated with each creek are as follows:

- If the Middle Creek twin culvert needs replacement, an open-bottom crossing structure should be considered, as this would restore connectivity between the surface water and groundwater. Natural substrate could also then be placed throughout the length of the replacement culvert to enhance conditions for fish passage;
- If a replacement culvert is required for East Creek, the upstream reach is a marsh with a poorly defined channel and the bank full channel dimension through the culvert would need to be approximated based on hydraulic modelling; and
- The Ellis Creek bridge was constructed in 1991 with four lanes and wide shoulders. It is assumed that the bridge would not need to be modified and, consequently, there would be no channel disturbance.

The need for improvements to Maple Grove Road provides an opportunity to enhance and/or restore function, and possibly form, of the watercourses within the road corridor, if there are any anticipated direct impacts. Recommendations with respect to replacement crossing structure types and sizes, and channel modifications and enhancements will be provided during detailed design.

## **5.7 Structural Review**

### **5.7.1 Ellis Creek Bridge**

Orbit Engineering Ltd. was retained to complete a detailed bridge condition survey of the Ellis Creek Bridge over Maple Grove Road (Appendix M).

The bridge was built in 1991 and is a single span rigid frame structure, with an asphalt wearing surface. The structure, on Maple Grove Road, carries two lanes of traffic in each direction over Ellis Creek. The bridge span is 27 metres, and the roadway width is 20 metres (overall width is 21 metres). The structure is an East -West orientation. There are concrete barrier walls on the outer, upper limits of the structure.

The asphalt-covered bridge deck was typically in fair condition, exhibiting evidence of being unsealed. Evidence of a hot rubberized asphalt waterproofing membrane, with protection board, was found to be in good condition. The asphalt wearing surface of the approaches were typically in fair condition, exhibiting evidence of cracking. A core confirmed the existence of concrete approach slabs below the asphalt. No evidence of deck drainage was found on the structure. However, catchbasins were located at the south-east, south-west, and north-east quadrants, outside the structure limits.

Epoxy-coated reinforcing steel was exposed during the coring operation on the deck and was in good condition, with no evidence of surface corrosion or pitting. The bond between the asphalt, waterproofing and concrete was typically good. The concrete in the cores was typically in good condition. The bond between the asphalt, waterproofing, and concrete was typically good. The exposed concrete surfaces were typically in good condition. The deck soffit was typically in fair-good condition exhibiting evidence of spall and wet areas. The soffit exhibited efflorescence coming from the construction joint in the centre where the wet areas are located.

The north and south barrier walls were typically in fair-good condition exhibiting evidence of unstained cracking, spalls, and patch. All galvanized steel guidelines located on each of the quadrants of the structure were typically in fair condition. There was some minor impact damage on the guide rails and the connection to the barrier wall end posts was separating. The east and west abutment and retaining walls were typically in fair-good condition, exhibiting evidence of unstained cracking. The north-east, north-west, and south-west retaining walls exhibited rotational movement of approximately 25 millimetres,

and the slopes and waterways were in fair-good condition. No hazardous material was present in the structure.

## 5.8 Cultural & Built Heritage

Archaeological Services Inc. (ASI) was retained to complete a Cultural Heritage Report (Appendix N). The Cultural Heritage Report presents an inventory of known and potential built heritage resources (BHR) and cultural heritage landscapes (CHL), identifies existing conditions of the Study Area, provides a preliminary impact assessment, and proposes appropriate mitigation measures.

The results of background historical research and a review of secondary source material, including historical mapping, indicate a Study Area with a rural history dating back to the early nineteenth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are nine known BHR within the Study Area. An additional three potential BHR and two potential cultural heritage landscapes CHL were identified during background research and field review.

Based on the assessment, the recommendations are:

- Construction activities and staging should be planned and undertaken to avoid unintended impacts to identified built heritage resources and cultural heritage landscapes;
- Indirect impacts, including encroachment of the right-of-way, grading impacts, and potential tree removals are anticipated to nine known and potential cultural heritage resources. Where feasible, the preferred alternative should be designed to avoid indirect impacts to these potential cultural heritage resources;
- Due to the potential for impacts to landscape features and the significant encroachment of the right-of-way, Heritage Impact Assessments (HIA) should be completed for required properties. Where feasible, the preferred alternative should be designed in a manner that avoids grading and removal of trees and landscape elements in all identified cultural heritage resources. If avoidance of tree removals and grading is infeasible, post-construction landscaping with context sensitive native tree species should be used to mitigate impacts. A qualified arborist or landscape architect should be consulted in this respect; and
- Indirect impacts to structures due to vibrations during construction activities may occur because of their location near the proposed alignment. To ensure that structures on the subject properties are not adversely impacted during construction, a baseline vibration assessment should be undertaken during detailed design. Should advanced assessment conclude that any private structures

will be subject to vibration, a vibration monitoring plan should be prepared and implemented as part of detailed design.

- Should future work require an expansion of the Study Area, a qualified heritage consultant should be contacted to confirm potential impacts of the proposed work on identified heritage resources.

## 5.9 Archaeological Assessment

Archaeological Services Inc. (ASI) was retained by IBI Group to complete a Stage 1 Archaeological Assessment (AA) (Appendix O). The purpose of AA is to discover past and present land use and settlement history, conduct archaeological fieldwork within and in the vicinity of the Study Area, and investigate environmental characteristics (including drainage, soils or surficial geology, and topography, etc.), and current land use and field conditions.

Stage 1 AA determined that 31 previously registered archaeological sites are located within one kilometre of the Study Area, with one property showing further cultural heritage value or interest (CHVI). Property inspection determined that parts of the Study Area exhibit archaeological potential and require Stage 2 assessment, if impacted, prior to any land-disturbing activities.

Historical and archaeological contexts determine the archaeological potential of the Study Area; assessed areas have been mapped (Exhibit 5-3).

Stage 1 AA resulted in the following conclusions and recommendations:

- Some areas within the Study Area exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test pit/pedestrian survey at five metre intervals, where appropriate, if impacted, prior to any land-disturbing activities;
- The Wanner House site (AiHc-193) is within the Study Area and retains cultural heritage value or interest (CHVI). If impacted by Maple Grove Road improvements, the site will require Stage 3 site-specific assessment, to more fully identify the character, extent, and significance of archaeological deposits, prior to any proposed development;
- The Study Area includes part of the Wanner Cemetery. There is potential for unmarked burials in Region lands directly adjacent to the cemetery boundary due to the lack of clarity about its historical limits. A Stage 3 Cemetery Investigation is required around the present cemetery property boundaries, prior to any proposed impacts, to confirm the presence or absence of unmarked graves in this area;

- The remainder of the Study Area does not retain archaeological potential due to deep and extensive land disturbance, low and wet conditions, slopes more than 20 degrees, or being subject to previous archaeological assessment. These lands do not require further archaeological assessment; and
- Should proposed work extend beyond the Study Area, further archaeological assessment should be completed to determine the archaeological potential of the surrounding land.

Exhibit 5-3: Stage 1 Archaeological Assessment – Field Observations



## 6 Transportation

### 6.1 Background and Traffic Analysis Approach

A micro simulation model was developed to test various corridor widening scenarios and intersection configuration operations along Maple Grove Road: *Maple Grove Road Improvements and Corridor Study: VISSIM Technical Report* (Appendix P). The analyses build on previous work undertaken by CIMA+ in an Intersection Control Study (ICS) (Appendix Q). The recommendations detailed in the ICS were modelled, in addition to several modified scenarios, to determine a refined alternative to be carried forward. The model also determined the horizon year in which the interim design should be improved to the ultimate design.

#### 6.1.1 Intersection Control Study (ICS)

The ICS (CIMA+, 2018) analyzed Hespeler Road, Boxwood Drive, Speedsville Road, Old Maple Grove Road, and Beaverdale Road intersections along Maple Grove Road. The study provided recommendations on future intersection configurations in 2025 and 2035 horizon years as interim and ultimate designs, based on operational performance (Synchro and ARCADY), construction and lifecycle cost estimates, and several other qualitative criteria. Recommendations are included with the ICS (Appendix Q, Exhibit 1-3).

### 6.2 VISSIM Model

A VISSIM model (Appendix P) of the existing 2019 condition was created and calibrated from data provided by the Region. Overall, the existing model (Appendix P, Exhibit 3-2) showed good operational performance in the a.m. peak hour and congested conditions in the p.m. peak hour.

The Existing 2019 model was used as a base to create future scenarios for the 2036 and 2041 horizon years. Traffic volumes were provided by the Region for all future horizon years and model geometry was updated to test each design alternative.

Section 4 of the Technical Report (Appendix P) outlines modelled geometry for the alternatives in the 2036 horizon year. Operational performance is also shown for each alternative within this section. Analyses found that Modified Design Alternative #2 performed best of all tested configurations. Notable features of this design are the addition of a northbound left flyover at Hespeler Road, which allows northbound left turning traffic to bypass the roundabout and includes signalization of Speedsville Road with dual northbound left turn lanes.

Section 5 of the Technical Report (Appendix P) shows the 2041 ultimate design configurations and operational performance under future traffic volumes in the 2041 horizon year. Analyses found that Modified Design Alternative #2B performed the best of all tested configurations. Notable features of this design are the northbound left flyover at Hespeler Road and upgrading the roundabout at Beaverdale Road to the ultimate 3x2 lane configuration.

## 6.3 Recommended Operational Improvements

The microsimulation analyses performed (Appendix P, s. 4 and 5) determined several key outcomes. The following is recommended for each study intersection:

### Hespeler Road and Maple Grove Road

- In 2036, a 2x3-lane roundabout, according to the ICS recommendation, is insufficient for the horizon year, and that a northbound left flyover is required. However, it is recommended that in 2036 only a 2x3-lane roundabout be constructed with land acquisition completed for a future flyover, due to cost and because traffic growth projections are likely conservative;
- In 2041, traffic operations at the intersection could be significantly improved if an eastbound right turn bypass lane and a southbound extended acceleration lane is provided. The northbound left turn flyover is recommended by this horizon year; and
- The Roundabout Coordination Committee (RCC) reviewed and approved the design for the roundabout on Hespeler Road for both horizon years.

### Beaverdale Road and Maple Grove Road

- In 2036, a 2-lane roundabout was sufficient through 2041. A 3x2-lane roundabout was tested in 2041, and that design did not perform as well overall as the 2-lane roundabout. The 2-lane roundabout design was approved by the RCC. Therefore, land/road allowance should be protected to allow for an optional expansion to the 3x2-lane design in 2041.

### Old Maple Grove Road and Maple Grove Road

- In 2036, it is recommended to close the intersection due to reported shortcutting and speeding along Old Maple Grove Road. Access will be maintained solely on Beaverdale Road.

### Compass Trail and Maple Grove Road

- Compass Trail is a planned access to a future development of Maple Grove Road. Due to safety concerns regarding high conflicting volumes for the northbound left, it is recommended that the intersection should be converted to left in, right in, and right out in 2036.

#### Speedsville Road and Maple Grove Road

- In 2036, the model shows best performance when the intersection is signalized, and dual northbound left turn lanes are provided. Three through lanes may be provided in the eastbound direction; the justification for adding a third lane is due to high eastbound volumes. This is sufficient up to the 2041 horizon year. Two eastbound lanes may be constructed in the interim, with protection for future third eastbound lane, if warranted.

#### Boxwood Drive and Vondrau Drive Intersections

- In 2036, it is recommended that both Boxwood Drive and Vondrau Drive be signalized. The model indicates that both intersections work well into 2041 when signalized.

Recommended intersection control types and lane configurations for each intersection have been summarized for the 2036 and 2041 design horizon years (Exhibits 6-1 and 6-2 respectively).

## Exhibit 6-1: 2036 Recommended Intersection Configuration

| INTERSECTING STREET | CONTROL TYPE                                  | LANE CONFIGURATION |             |            |            |
|---------------------|-----------------------------------------------|--------------------|-------------|------------|------------|
|                     |                                               | EB                 | WB          | NB         | SB         |
| Hespeler Road       | 2x3-lane RAB w/ flyover & extended EBL bypass | 1TL,1TR,1R         | 1TL,1TR     | 2L,1TL,1TR | 1TL,1T,1TR |
| Beaverdale Road     | 2x3-lane RAB                                  | 1TL,1T,1TR         | 1TL,1T,1TR  | 1TL,1TR    | 1TL,1TR    |
| Old Maple Grove     | Closed                                        | 2T                 | 2T          | cul-de-sac | -          |
| Compass Trail       | LI/RI/RO                                      | 1T,1TR             | 1TL,1T      | 1R         | -          |
| Briardean Road      | Closed                                        | 2T                 | 2T          | cul-de-sac | -          |
| Speedsville Road    | Signalized w/ dual NBL                        | 1L,3T,1R           | 1L, 2T, 1TR | 2L,2T,1R   | 1L,1T,1TR  |
| Boxwood Drive       | Signalized                                    | 1L,2T,1R           | 1L,1T,1TR   | 1L,1TR     | 1TLR       |
| Vondrau Drive       | Signalized                                    | 1L,2T,1R           | 1L,2T,1R    | 1TL,1R     | 1TLR       |

## Exhibit 6-2: 2041 Recommended Intersection Configuration

| INTERSECTING STREET | CONTROL TYPE            | LANE CONFIGURATION |             |            |            |
|---------------------|-------------------------|--------------------|-------------|------------|------------|
|                     |                         | EB                 | WB          | NB         | SB         |
| Hespeler Road       | 2x3-lane RAB w/ flyover | 1TL,1TR,1R         | 1TL,1TR     | 2L,1TL,1TR | 1TL,1T,1TR |
| Beaverdale Road     | 2-lane RAB              | 1TL,1TR            | 1TL,1TR     | 1TL,1TR    | 1TL,1TR    |
| Old Maple Grove     | Closed                  | 2T                 | 2T          | cul-de-sac | -          |
| Compass Trail       | LI/RI/RO                | 1T,1TR             | 1TL,1T      | 1R         | -          |
| Briardean Road      | Closed                  | 2T                 | 2T          | cul-de-sac | -          |
| Speedsville Road    | Signalized w/ dual NBL  | 1L,3T,1R           | 1L, 2T, 1TR | 2L,2T,1R   | 1L,1T,1TR  |
| Boxwood Drive       | Signalized              | 1L,2T,1R           | 1L,1T,1TR   | 1L,1TR     | 1TLR       |
| Vondrau Drive       | Signalized              | 1L,2T,1R           | 1L,2T,1R    | 1TL,1R     | 1TLR       |

## 7 Alternative Solutions

### 7.1 Alternative Solutions Considered

The Project Team reviewed several alternative solutions that would address the need to accommodate increasing traffic and delay on Maple Grove Road. The Project Team considered widening Maple Grove Road to manage existing and future traffic growth and forecasted intersection operational deficiencies, as well as adding active transportation and transit facilities as the Region's primary objectives for the corridor. Solutions identified included potential alternatives or partial alternatives that could be considered in combination:

1. **Do Nothing** – As part of any Class EA, there is always a consideration of the “Do Nothing” alternative to assess what would happen if no action were taken to address the project opportunities beyond restoration. In this case, Do Nothing would involve reconstructing Maple Grove Road in its current two-lane rural cross-section with shoulders and roadside ditches.
2. **Traffic Operations Improvements** – Opportunities may exist along Maple Grove Road to improve existing traffic signal timings to optimize traffic capacity that the existing road can safely handle.
3. **Access Management** – As Maple Grove Road development progresses, additional traffic congestion and safety/operational difficulties could arise due to vehicles attempting to enter and exit side streets and properties, if full movement access is permitted.
4. **Intersection Improvements** – Added auxiliary lanes to accommodate problematic turning movements at intersections would reduce delay times for traffic to move through the intersection and improve flow along Maple Grove Road.
5. **Roundabouts** – The Region uses a standard screening tool to determine where roundabouts will be considered. Roundabouts offer an alternative to expanding signalized intersections and can be more effective in moving traffic and reducing delays. The reduction in severity of collisions at roundabouts as compared to signalized intersections is also a key consideration.
6. **Widening Maple Grove Road** – Widening Maple Grove Road from two to four through lanes between Hespeler Road and Vondrau Drive is considered a necessary component of the overall solution due to existing and planned growth.
7. **Active Transportation Facilities** – Providing facilities for non-motorized (rolling) wheeled vehicles and pedestrian traffic on Maple Grove Road between Hespeler Road and Vondrau Drive is a required improvement to satisfy Regional policies.
8. **Transit Service** – Improvements to the level of service provided by GRT within the corridor may decrease vehicle traffic on Maple Grove Road.
9. **Upgrade Other Routes** – Improvements to other nearby routes may redirect traffic away from Maple Grove Road but is outside the scope of this study.

**10. Build Alternative Routes** – The Regional Transportation Master Plan considers the need for new routes within the Regional transportation network, as well as possible improvements to existing roads. New routes may increase or decrease future traffic within the existing Maple Grove Road corridor but are outside the scope of this study.

## 7.2 Alternative Solutions Evaluation

Alternative Solutions considered were evaluated based on the Region's primary opportunities for improvement along the corridor:

- Address Increase in Traffic and support Local Development;
- Address need for Active Transportation Improvements; and,
- Address need for Public Transit Improvements.

Public input received at PCC #1 was considered as part of the evaluation of the Alternative Solutions.

Based on the evaluation, the following Alternative Solutions were eliminated:

**Do Nothing** – This solution was screened out because it does not satisfy the Region's opportunities for improvement along the corridor.

**Traffic Operations Improvements** – This solution was screened out as a standalone measure because it does not satisfy the Region's opportunities for improvement along the corridor on its own.

**Build Alternative Routes** – The need for alternative routes will be addressed through the Region's Transportation Capital Program but is considered beyond the scope of this Class EA study.

## 7.3 Preferred Solutions

Based on the evaluation (Exhibit 7-1), the following solutions were carried forward to be included in the development of the Alternative Design Concepts:

**Access Management** – Consideration given to consolidating or restricting accesses, raised centre medians, and centre left turn lanes. This solution can only satisfy all Region opportunities for improvement if combined with other solutions.

**Intersection Improvements** – Consideration given to the need for additional traffic signals and/or centre left turn lanes at intersections with local streets. This solution can only satisfy all Region opportunities for improvement if combined with other solutions.

**Roundabouts** – This solution can only satisfy all Region opportunities for improvement if combined with other solutions.

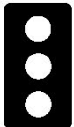
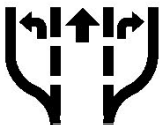
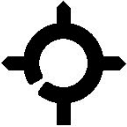
**Widening Maple Grove Road** – Widening Maple Grove Road from two to four through lanes is a requisite component of the overall solution for this corridor in order to address existing and planned growth.

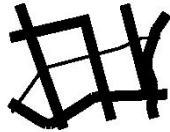
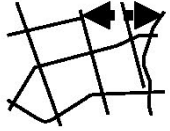
**Active Transportation Facilities** – Providing facilities for rolling and pedestrian traffic on Maple Grove Road between Hespeler Road and Vondrau Drive is corridor required improvement to satisfy Regional policies.

**Transit Service** – New facilities are needed to address proposed route changes to service GRT customers. This solution can only satisfy all Region opportunities for improvement if combined with other solutions.

**Upgrade Other Routes** – These improvements will be addressed through the Region's Transportation Capital Program. This solution can only satisfy all Region opportunities for improvement if combined with other solutions; in addition, it is beyond the scope of this study.

## Exhibit 7-1: Summary of Alternative Solutions

| Alternative                        |                                                                                     | Description                                                                                              | Addresses Increase in Traffic and Local Development | Addresses need for Active Transportation Improvements | Addresses need for Public Transit Improvements | Comment                                                 |
|------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------|------------------------------------------------|---------------------------------------------------------|
| 1. Do Nothing`                     |    | Reconstruct road to match current two (2) lanes rural cross-section, with shoulders and roadside ditches | ✗                                                   | ✗                                                     | ✗                                              | Eliminate – does not address any of Region's Objectives |
| 2. Traffic Operations Improvements |    | Optimize timing of existing traffic signals on Maple Grove Rd                                            | ✓                                                   | ✗                                                     | ✗                                              | Carry forward in combination with other solutions       |
| 3. Access Management               |    | Access management through constructing a raised centre median and/or centre left-turn lanes              | ✓                                                   | ✗                                                     | ✗                                              | Carry forward in combination with other solutions       |
| 4. Intersection Improvements       |   | Additional through lanes and turn lanes at existing intersections                                        | ✓                                                   | ✗                                                     | ✗                                              | Carry forward in combination with other solutions       |
| 5. Roundabouts                     |  | Construct new roundabouts in place of traffic signals without widening Maple Grove Rd                    | ✓                                                   | ✗                                                     | ✗                                              | Carry forward in combination with other solutions       |

| Alternative                         |                                                                                     | Description                                                                                        | Addresses Increase in Traffic and Local Development | Addresses need for Active Transportation Improvements | Addresses need for Public Transit Improvements | Comment                                                        |
|-------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------|
| 6. Widening Maple Grove Road        |    | Widening Maple Grove Rd from two (2) to four (4) lanes between Hespeler Rd and Vondrau Dr          | ✓                                                   | ✓                                                     | ✓                                              | <b>Preferred Solution, in combination with other solutions</b> |
| 7. Active Transportation Facilities |    | Providing facilities for cyclists and pedestrians on Maple Grove Rd from Hespeler Rd to Vondrau Dr | ✗                                                   | ✓                                                     | ✗                                              | Carry forward in combination with other solutions              |
| 8. Transit Service                  |    | Improve GRT service along the corridor to potentially decrease vehicle traffic on Maple Grove Rd   | ✓                                                   | ✗                                                     | ✓                                              | Carry forward in combination with other solutions              |
| 9. Upgrade Other Routes             |   | Improvements to nearby roads potentially reducing traffic on Maple Grove Rd                        | ✓                                                   | ✗                                                     | ✗                                              | Carry forward in combination with other solutions              |
| 10. Build Alternative Routes        |  | Add new or extend existing roads to the road network to reduce traffic on Maple Grove Rd.          | ✓                                                   | ✗                                                     | ✗                                              | Eliminate – does not address any of Region's Objectives        |

## 8 Public Consultation Centre #1

Due to COVID-19 public meeting restrictions, the first Public Consultation Centre (PCC #1) was held online between July 27, 2020, and August 31, 2020, on the Region's EngageWR website. Interested parties could review and comment on an accessible Adobe Acrobat file, including 38 presentation boards, as well as the PCC #1 Information Package.

Participants were encouraged to engage with the Project Team through a variety of means:

- PCC# 1 Survey (focused on their Maple Grove Road experience);
- General Question and Answer (Q&A) page;
- Comment forms/emails; and/or
- By phone.

The purpose of PCC #1 was to obtain public input after reviewing study scope and project materials, including alternative solutions, environmental considerations, and evaluation criteria.

In advance of PCC #1, an Information Package (Appendix B) was prepared by Region and IBI Group staff for Regional Planning and Works Committee, comprised of members of Regional Council, review and acceptance.

### 8.1 Notice of Public Consultation Centre #1

Notification for Public Consultation Centre #1 was provided through:

- Newspaper Advertisements published in The Record and Cambridge Times on August 6, 2020;
- Postings on the Region's EngageWR webpage ([www.engagewr.ca/cambridge-maple-grove-road](http://www.engagewr.ca/cambridge-maple-grove-road)); and
- Mailed notices to over 137 residents within and around the Study Area, and emailed to agency, stakeholder groups, and Indigenous Communities' representatives.

Copies of newspaper advertisements for Public Consultation Centre #1 are included in this Environmental Study Report (Appendix E).

### 8.2 Public Comments Received and Project Team Responses

Region and IBI Group Project Managers' contact information were provided for direct questions, to be added to the mailing list, or to request further information about the study.

During the PCC #1 review period, the EngageWR webpage was visited 159 times. The breakdown of participation, including extent, was compiled (Appendix R).

The Project Team responded to 19 comments received during PCC #1 through EngageWR and by direct email to the Region and IBI Group Project Managers. Project Team responses to each comment received were consolidated and posted to EngageWR and the Region's website (Appendix R).

## 9 Development and Evaluation of Alternative Design Concepts

### 9.1 Assessment and Evaluation Methodology and Criteria

Preliminary design alternatives were assessed using a set of evaluation criteria established by the Project Team, which considered how they address project opportunities for improvement, including transportation needs in consideration of potential environmental impacts. The “Reasoned Argument” methodology was used to evaluate alternatives for this EA. This involved identifying advantages and disadvantages of each alternative against a set of evaluation criteria representing the natural, social, and economic environments. General evaluation criteria were:

**Natural Environment:** What impact does the alternative have on the natural environment features such as trees, wetlands, wildlife, aquatic habitat, and surface drainage?

**Socio-Cultural Environment:** What impact does the alternative have on adjacent communities and properties (access, property), landscapes, archaeological or heritage resources, and traffic noise?

**Traffic Capacity, Operations and Safety:** How well does the alternative manage traffic and network capacity, traffic speed, active transportation needs, and transit access?

**Costs:** How does the alternative compare with anticipated capital and property costs?

The “Reasoned Argument” methodology intends to provide an objective, traceable response to each criterion for each alternative.

Evaluations for this study included consideration of practical cross-sections for the roadway and various widening alternatives based on the existing corridor location and widening to either side, while minimizing overall impacts in the corridor and surrounding area.

Based on evaluation of design cross-sections and widening alignment alternatives using the above noted criteria, cross-section Alternative A – Widen the Road to 4-lanes with a 5.0m wide Raised Centre Median and Add Multi-use Path (MUP) and widening Concept No. 4 – Modified “Hybrid Widening Concept” to Minimize Overall Impacts, are the combined overall preferred alternative by the Project Team, which was presented to the public for input.

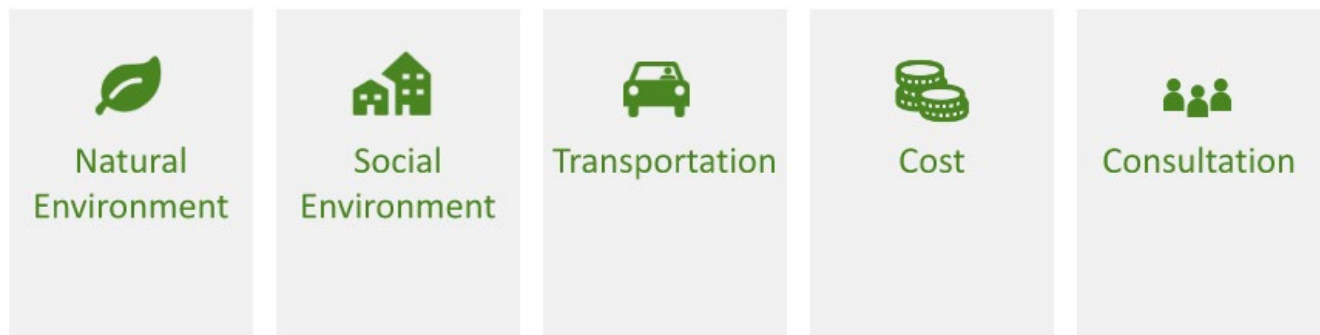
## 9.2 Evaluation Criteria for Alternative Designs

To provide a comprehensive evaluation of alternative designs carried forward, a matrix evaluation approach was used, and the evaluations were completed using a “reasoned argument” approach. Quantitative evaluation was used, with comparison to other alternatives, as opposed to qualitative assessments that might overlook potential impacts on the environment.

**The Preferred Alternative Design is determined by examining:**



The evaluation of alternatives included consideration of the following key factors:



For evaluation of alternative design cross-sections, the Project Team identified criteria for comparative analyses of the alternatives. Evaluation criteria included: Natural Environment; Socio-Economic Environment; Transportation; and Cost. Each evaluation criteria included specific factors and indicators to determine impacts / benefits of each alternative.

## Evaluation Process

The design alternative evaluation criteria included the following:

| Criteria                                                                                                         | Sub-Criteria                    | Least Preferred                                                                                                                                        | Most Preferred                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Natural Environment</b><br>  | Aquatic Species & Habitat       | Significant impact to aquatic species or habitat                                                                                                       | No impact to aquatic species or habitat                                                                                                                 |
|                                                                                                                  | Terrestrial Species & Habitat   | Significant impact to terrestrial species or habitat                                                                                                   | No impact to terrestrial species or habitat                                                                                                             |
|                                                                                                                  | Floodplain                      | Significant expansion or construction into floodplain area                                                                                             | Improvements to floodplain storage                                                                                                                      |
|                                                                                                                  | Wetlands                        | Significant loss of, or impact to wetlands                                                                                                             | No loss of, or impact to, wetlands                                                                                                                      |
|                                                                                                                  | Trees & Landscaping             | Significant loss of existing trees and landscaping                                                                                                     | Improvements to trees and landscaping                                                                                                                   |
|                                                                                                                  | Wildlife                        | Significant impact to Species at Risk                                                                                                                  | Improvements to conditions for Species at Risk                                                                                                          |
|                                                                                                                  | Property Contamination          | Exposure of contaminated materials                                                                                                                     | Avoidance of contaminated materials                                                                                                                     |
|                                                                                                                  | Drainage                        | Detrimental Impact on storm water management and drainage                                                                                              | Maintenance or improvements to existing storm water management and drainage                                                                             |
| <b>Social Environment</b><br> | Cultural Heritage & Archaeology | Significant loss or impact to cultural heritage or archaeological sites                                                                                | No impact to cultural heritage or archaeological sites                                                                                                  |
|                                                                                                                  | Culture & Recreation            | Significant loss or impact to cultural or recreational facilities                                                                                      | No impact to cultural or recreational facilities                                                                                                        |
|                                                                                                                  | Businesses                      | Reduced access to businesses                                                                                                                           | Improved access to businesses                                                                                                                           |
|                                                                                                                  | Construction                    | Lengthy construction duration with traffic delays and/or reduced access                                                                                | Limited construction duration, traffic delays and/or access restrictions                                                                                |
|                                                                                                                  | Streetscaping                   | Reduced opportunity to provide space for improvements to streetscaping elements (e.g. plantings, decorative paving materials, decorative streetlights) | Enhanced opportunity to provide space for improvements to streetscaping elements (e.g. plantings, decorative paving materials, decorative streetlights) |
|                                                                                                                  | Air Quality & Noise             | Increased air and noise emissions                                                                                                                      | Reduced air and noise emissions                                                                                                                         |
|                                                                                                                  | Private Property                | Greater impacts on property and need for land acquisition                                                                                              | Lesser impacts on property and need for land acquisition                                                                                                |

| Criteria                                                                                                   | Sub-Criteria                    | Least Preferred                                                                                            | Most Preferred                                                                                              |
|------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>Transportation</b><br> | Traffic Level-of-Service        | Increased congestion                                                                                       | Reduced congestion                                                                                          |
|                                                                                                            | Safety                          | No improvement to safety for all users                                                                     | Improved safety for all users                                                                               |
|                                                                                                            | Access Management               | Diminished access to driveways and side roads                                                              | Improved access to driveways and side roads                                                                 |
|                                                                                                            | Transit                         | Diminished transit service, reduced access to transit stops, and potential conflicts with other road users | Enhanced transit service and access to transit stops, and reduced potential conflicts with other road users |
|                                                                                                            | Cycling                         | Diminished opportunity for improvement to existing facilities                                              | Enhanced opportunity for improved cycling facilities and pedestrian space                                   |
|                                                                                                            | Pedestrians                     | Reduced potential space and separation of pedestrian facilities from other vehicular uses                  | Increased potential pedestrian space                                                                        |
|                                                                                                            | Emergency Services              | Increase to emergency response time                                                                        | Minimize emergency response time                                                                            |
| <b>Cost</b><br>           | Utility Relocations / Conflicts | Greater need for utility relocations                                                                       | Lesser need for utility relocations                                                                         |
|                                                                                                            | Initial Capital Cost            | Higher construction cost                                                                                   | Lower construction cost                                                                                     |
|                                                                                                            | Life-Cycle Cost                 | Higher maintenance and operation cost                                                                      | Lower maintenance and operating cost                                                                        |
| <b>Consultation</b><br>  | Public Preference               | Lesser public support                                                                                      | Greater public support                                                                                      |

## **9.3 Evaluation of Roadway Design Cross-Section Alternatives**

Following evaluation and short-listing possible solutions presented at Public Consultation Centre #1, the Project Team undertook preparation of several possible road improvements scenarios. Each of the scenarios considered and acknowledged that additional lane capacity is required to support existing and future growth, and as a result, all include widening from two to four through traffic lanes along the entire corridor.

The existing roadway corridor has been well established in previous studies dating back to the 1980s. Significant upgrading and construction of the recommended facilities occurred in the 1990s. As a result, this study recognizes that the corridor is well established and planned for future widening with provisions for doing so included in the earlier study and design development, i.e. required right-of-way / road allowance width.

To address concerns regarding potential property impact, utility relocation and permitting and approvals processes required during detailed design for the improvements, several cross-sections were developed to consider impacts in the existing corridor and include preferred locations for Active Transportation enhancements within the context of the existing cross-section and right-of-way. Overall layouts of possible corridor enhancements were prepared later using the preferred cross-section from the cross-section evaluation and corridor design options were subjected to further detailed evaluation against a set of practical evaluation criteria.

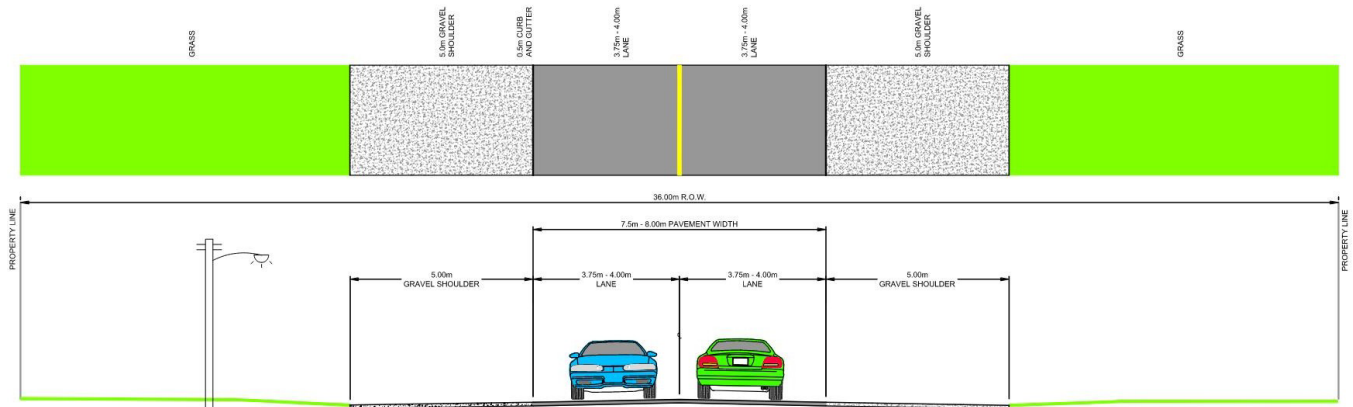
The Transportation Study (s. 6) recommended required intersection operational configurations and those intersections were included in each of the roadway widening scenarios.

### **9.3.1 Roadway Design Cross-section Alternatives**

Roadway design cross-section alternatives, which satisfy study opportunities for improvement, and were evaluated by the Project Team include:

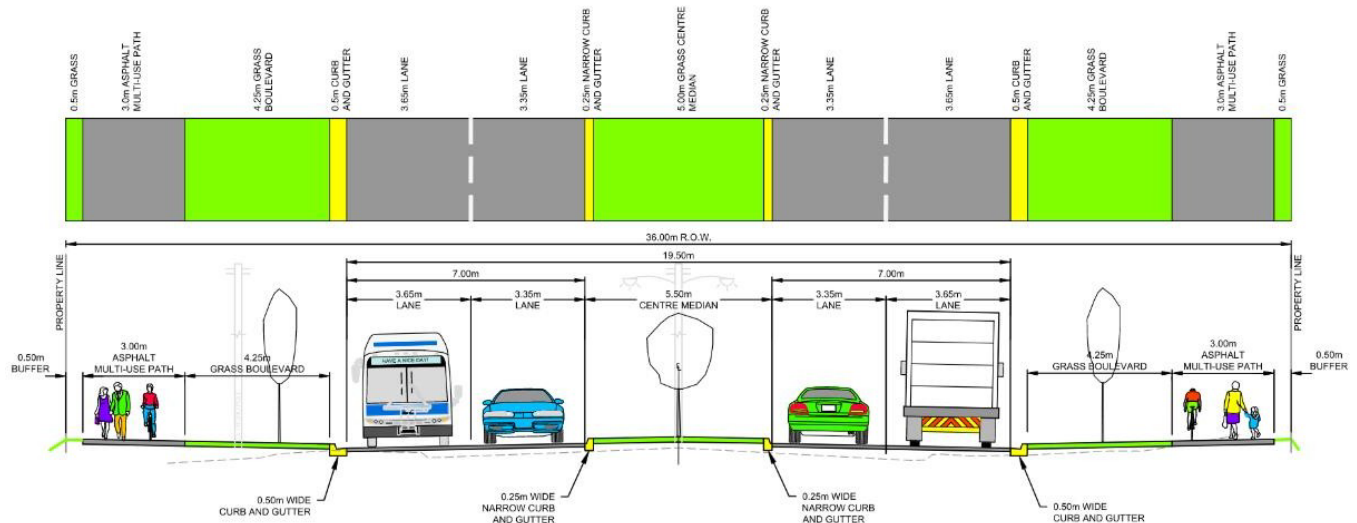
- **Do Nothing Alternative** – this alternative would include reconstructing the road in its current 2-lane rural (ditch drainage) cross-section with no active transportation facilities.

### Do Nothing Alternative (Existing Conditions)



- **Alternative A – Widen the Road to 4-lanes with a 5.0m wide Raised Centre Median and Add Multi-use Path (MUP)** – this alternative would widen this section of Maple Grove Road to 4-lanes (divided) and add the following facilities:
  - 3.0-metre-wide asphalt multi-use path along both sides;
  - Curb and gutter and a storm drainage system; and
  - Additional street lighting.

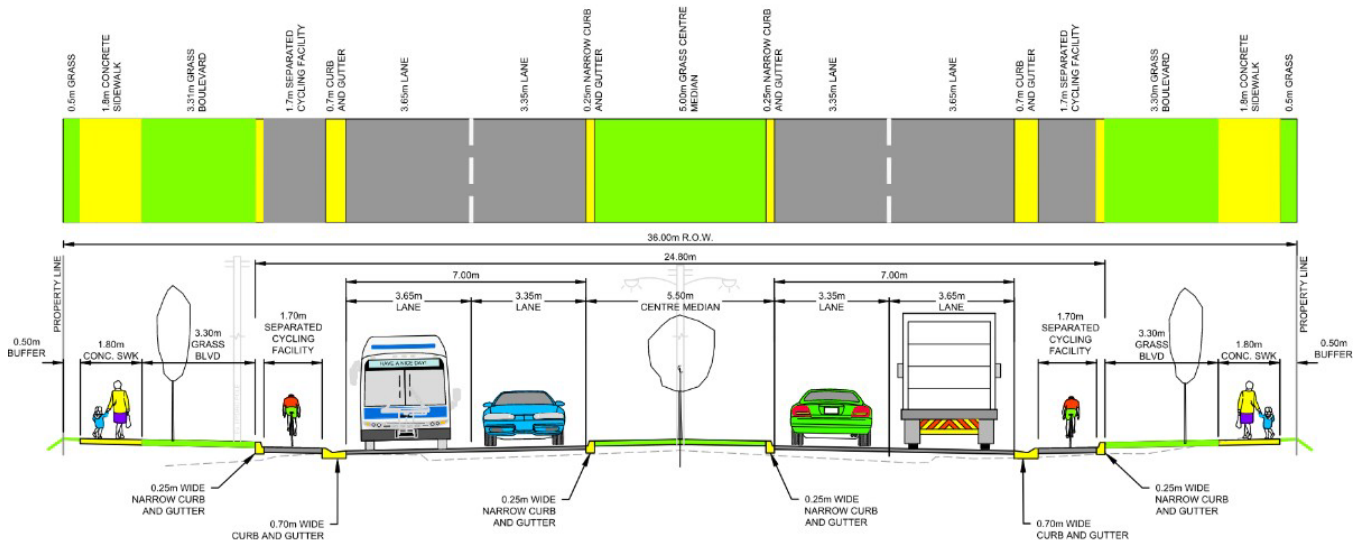
### Design Alternative A - Raised Centre Median with Multi-Use-Path



- **Alternative B – Widen the Road to 4-lanes with a 5.0m wide Raised Centre Median and Add 1.8m wide Sidewalk and 1.7m Separated Cycling Facility** – this alternative would widen this section of Maple Grove Road to 4-lanes (divided) and add the following facilities:

- 1.8-metre-wide concrete sidewalks along both sides;
- 1.7-metre-wide asphalt roadside bike lanes separated with rollover curb;
- Curb and gutter and a storm drainage system; and
- Additional street lighting.

### Design Alternative B - Raised Centre Median with Concrete Sidewalk and a Separated Cycling Facility



Project Team Evaluation of Roadway Design Cross-Section Alternatives is tabulated (Exhibit 9-1).

Exhibit 9-1: Evaluation of Cross-Section Alternatives

| ALTERNATIVE DESIGN CONCEPT                                                                                                           | “Do Nothing” ALTERNATIVE<br><br>Retain Roadway Cross-Section in its Current Configuration                                                                                                                                                                                                                                                                                                                             | ALTERNATIVE A<br><br>Widen the Road to 4-Lanes with Raised Centre Median, and 3.0m Multi-Use Path on both sides                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ALTERNATIVE B<br><br>Widen the Road to 4-Lanes with Raised Centre Median, 1.8m concrete sidewalks, and 1.7m separated roadside bike lanes with rollover curb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                                                                                                                          | Reconstruction of the road in its current 2-lane rural (ditch drainage) cross-section with no active transportation facilities.                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"><li>• 5.0m raised median with concrete barrier curbs and narrow gutter;</li><li>• 0.6m curb and gutter, and a storm drainage system;</li><li>• 3.0m asphalt multi-use path; and,</li><li>• Additional street lighting.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"><li>• 5.0m raised median with concrete barrier curbs and narrow gutter;</li><li>• 0.6m curb and gutter, and a storm drainage system;</li><li>• 1.8m concrete sidewalks;</li><li>• 1.7m separated roadside bike lanes with rollover curb; and,</li><li>• Additional street lighting.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <div>Natural Environment</div> <div>How might the alternative affect existing trees, vegetation, wildlife, watercourses, etc.?</div> | <div><ul style="list-style-type: none"><li>➤ No changes to existing conditions.</li><li>➤ No removal of existing trees required.</li><li>➤ No widening of pavement; therefore, less roadway width for terrestrial wildlife crossing.</li><li>➤ Roadside ditches remain, providing infiltration of stormwater.</li><li>➤ Maintaining existing road capacity will lead to additional delay and queuing.</li></ul></div> | <div><ul style="list-style-type: none"><li>➤ Roadside ditches are filled in, removing benefits of sediment removal from stormwater runoff.</li><li>➤ Increased stormwater runoff can be mitigated with stormwater management techniques.</li><li>➤ Opportunity for tree planting in boulevard.</li><li>➤ Median provides opportunity for installing measures to capture/ infiltrate stormwater.</li><li>➤ Wider roadway increases potential for wildlife mortality.</li><li>➤ Minor encroachment into wetland and municipal drain between Hunsperger Drain crossing east of Boxwood Drive and Middle Creek east of Speedsville Road.</li><li>➤ Least total pavement area for active transportation requiring winter maintenance and de-icing. (6.0m<sup>2</sup>/m of roadway)</li></ul></div> | <div><ul style="list-style-type: none"><li>➤ Roadside ditches are filled in, removing benefits of sediment removal from stormwater runoff.</li><li>➤ Increased stormwater runoff can be mitigated with stormwater management techniques.</li><li>➤ Opportunity for tree planting in boulevard.</li><li>➤ Median provides opportunity for installing measures to capture/ infiltrate stormwater.</li><li>➤ Wider roadway increases potential for wildlife mortality.</li><li>➤ Minor encroachment into wetland and municipal drain between Hunsperger Drain crossing east of Boxwood Drive and Middle Creek east of Speedsville Road.</li></ul><div>Mid-range total pavement area for active transportation requiring winter maintenance and de-icing. (7.0m<sup>2</sup>/m or roadway) 17% more pavement area to maintain in comparison with Multi-use Path alternative.</div></div> |
| RATING                                                                                                                               | EXCELLENT                                                                                                                                                                                                                                                                                                                                                                                                             | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

Exhibit 9-1: Evaluation of Cross-Section Alternatives - Continued

| ALTERNATIVE DESIGN CONCEPT                                                                                                                                                                                                  | “Do Nothing” ALTERNATIVE<br><br>Retain Roadway Cross-Section in its Current Configuration                                                                                                                                                                                                                                                                                                                                                                                           | ALTERNATIVE A<br><br>Widen the Road to 4-Lanes with Raised Centre Median, and 3.0m Multi-Use Path on both sides                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ALTERNATIVE B<br><br>Widen the Road to 4-Lanes with Raised Centre Median, 1.8m concrete sidewalks, and 1.7m separated roadside bike lanes with rollover curb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Socio-Economic Environment</b></p> <p>How might the alternative impact archaeological and cultural heritage resources, properties abutting the road (driveways, access), and streetscaping / landscape potential?</p> | <ul style="list-style-type: none"><li>➤ No anticipated archaeological or cultural heritage impacts.</li><li>➤ No property acquisition required.</li><li>➤ No improvements for pedestrians, cyclists, or other recreational activities.</li><li>➤ Maintains current access to adjacent neighbourhoods, but increasing congestion exacerbates access concerns over time.</li><li>➤ Increasing traffic congestion (delay and queueing) leads to poorer relative air quality.</li></ul> | <ul style="list-style-type: none"><li>➤ No anticipated archaeological or cultural heritage impacts.</li><li>➤ Community benefits from new pedestrian and cycling facilities.</li><li>➤ Multi-use path provides additional comfort level for recreational cyclists and separation from vehicular traffic.</li><li>➤ Relieves traffic congestion facilitating better access to businesses and adjacent neighbourhoods.</li><li>➤ Less traffic congestion leads to better relative air quality.</li><li>➤ Cross-section does not influence property impact, noise, or air quality; widening does.</li><li>➤ Greatest amount of remaining boulevard space available for landscaping and streetscaping.</li></ul> | <ul style="list-style-type: none"><li>➤ No anticipated archaeological or cultural heritage impacts.</li><li>➤ Community benefits from new pedestrian and cycling facilities.</li><li>➤ Separated facilities provide additional comfort level for pedestrians and cyclists.</li><li>➤ Transit vehicles may interfere with cycling activities when patrons are boarding and alighting at the roadside.</li><li>➤ Relieves traffic congestion facilitating better access to businesses and adjacent neighbourhoods.</li><li>➤ Less traffic congestion leads to better relative air quality.</li><li>➤ Cross-section does not influence property impact, noise, or air quality; widening does.</li><li>➤ Very little remaining boulevard space available for landscaping and streetscaping.</li></ul> |
| RATING                                                                                                                                                                                                                      | FAIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

Exhibit 9-1: Evaluation of Cross-Section Alternatives - Continued

| ALTERNATIVE DESIGN CONCEPT                                                                                                     | “Do Nothing” ALTERNATIVE<br><br>Retain Roadway Cross-Section in its Current Configuration                                                                                                                                                                                                                                                                                                                               | ALTERNATIVE A<br><br>Widen the Road to 4-Lanes with Raised Centre Median, and 3.0m Multi-Use Path on both sides                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ALTERNATIVE B<br><br>Widen the Road to 4-Lanes with Raised Centre Median, 1.8m concrete sidewalks, and 1.7m separated roadside bike lanes with rollover curb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Transportation</b><br><br>How might the alternative serve the expected vehicular, transit, pedestrian, and cycling traffic? | <ul style="list-style-type: none"><li>➤ Does not satisfy the Region’s Transportation Master Plan with respect to vehicular, pedestrian, or cycling facilities.</li><li>➤ Does not provide adequate capacity for vehicular traffic.</li><li>➤ Does not improve conditions for Emergency Services, Heavy Trucks, and Transit Vehicles.</li><br/><li>➤ Does not improved conditions for cyclists or pedestrians.</li></ul> | <ul style="list-style-type: none"><li>➤ Addresses the Region’s Transportation Master Plan with respect to vehicular, pedestrian, and cycling facilities.</li><li>➤ Addresses future traffic capacity needs of the corridor.</li><li>➤ Reduces congestion and improves conditions for Emergency Services, Heavy Trucks, and Transit Vehicles.</li><li>➤ Provides separation of pedestrians and cyclists from vehicular traffic.</li><br/><li>➤ Pedestrian and cyclist conflicts may occur.</li><li>➤ Addresses transit’s concerns regarding on road conflicts with cyclist during boarding and alighting activities.</li><li>➤ Raised centre median provides physical separation of bi- directional traffic, reducing collisions.</li><li>➤ Raised centre median provides potential refuge for pedestrians crossing the road mid-block.</li><li>➤ Lowest Transportation Operations/Maintenance requirements.</li></ul> | <ul style="list-style-type: none"><li>➤ Addresses the Region’s Transportation Master Plan with respect to vehicular, pedestrian, and cycling facilities.</li><li>➤ Addresses future traffic capacity needs of the corridor.</li><li>➤ Reduces congestion and improves conditions for Emergency Services, Heavy Trucks, and Transit Vehicles.</li><li>➤ Sidewalk provides separation pedestrians from cyclists and vehicular traffic.</li><li>➤ Some separation is provided for cyclists from vehicular traffic.</li><li>➤ Transit has concerns with conflicts between cyclists and boarding and alighting activities at the roadside.</li><li>➤ Separated bike lane provides some separation from vehicular traffic, but buses stop in these lanes.</li><li>➤ Raised centre median provides physical separation of bi- directional traffic, reducing collisions.</li><li>➤ Raised centre median provides potential refuge for pedestrians crossing the road mid-block.</li><li>➤ 2<sup>nd</sup> Lowest Transportation Operations/Main tenance requirements.</li></ul> |
| How easily could the alternative be operated and maintained, including snow removal?                                           |                                                                                                                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"><li>➤ 3.0m wide pathway can be maintained with pickup truck and plow and allows access for utility vehicles. Can be cleared adequately with single pass and entirely with two-way pass.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"><li>➤ Two facilities require additional maintenance time and expenditure. Curb separated cycle lane has proven challenging to adequately clear for winter use.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| RATING                                                                                                                         | POOR                                                                                                                                                                                                                                                                                                                                                                                                                    | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

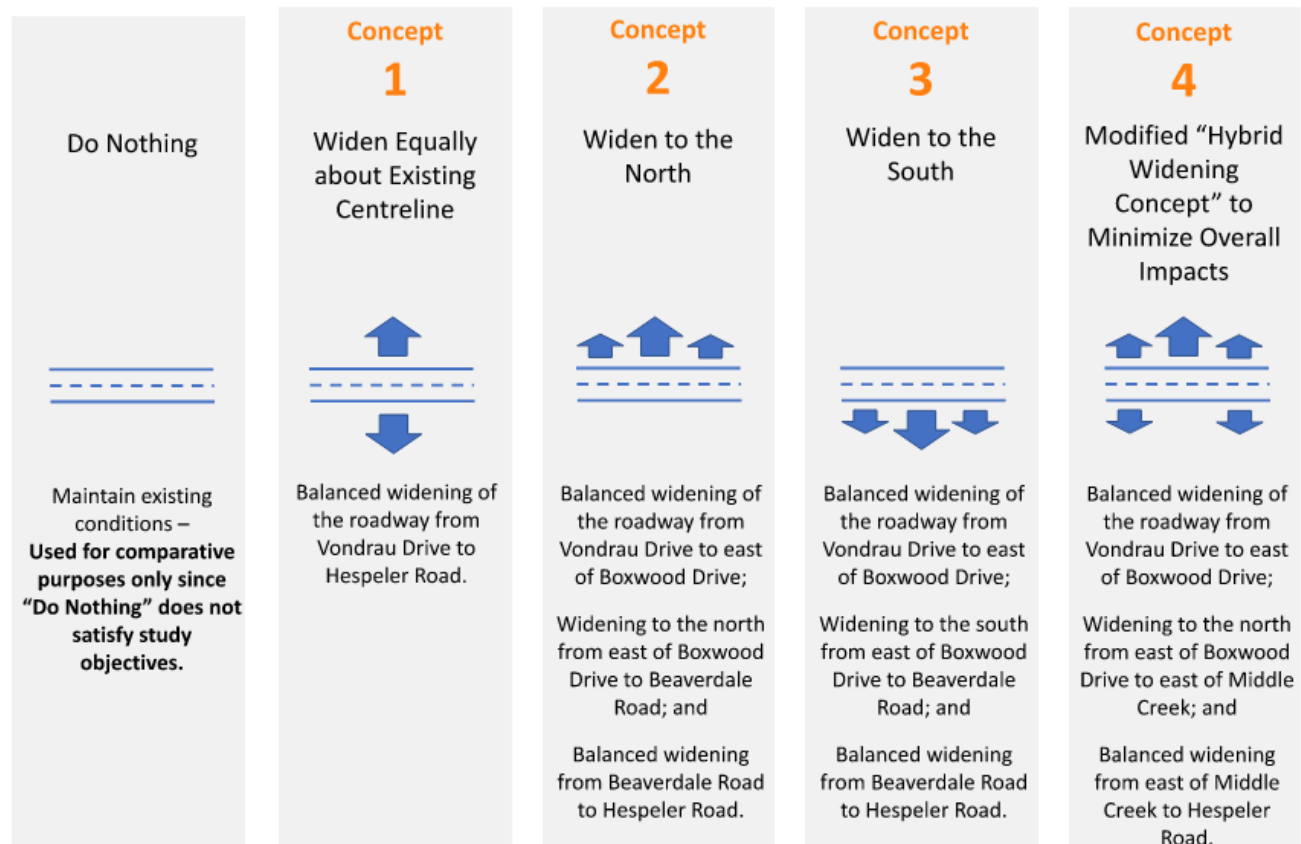
Exhibit 9-1: Evaluation of Cross-Section Alternatives - Continued

| ALTERNATIVE DESIGN CONCEPT                                                                                                                                                                                                     | “Do Nothing” ALTERNATIVE<br>Retain Roadway Cross-Section in its Current Configuration                                                                                                                                                                                                                                                                                                                                                                                                                         | ALTERNATIVE A<br>Widen the Road to 4-Lanes with Raised Centre Median, and 3.0m Multi-Use Path on both sides                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ALTERNATIVE B<br>Widen the Road to 4-Lanes with Raised Centre Median, 1.8m concrete sidewalks, and 1.7m separated roadside bike lanes with rollover curb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cost</b><br><br>What is the expected total cost of the alternative, including the cost for road construction, utility and street lighting relocations, property acquisitions, traffic signal improvements, and landscaping? | <ul style="list-style-type: none"><li>➤ Do Nothing has no direct Capital Cost.</li><li>➤ Increased costs for movement of goods and services as congestion increases.</li><li>➤ No change to maintenance costs for road, pedestrian/ cycling facilities, or landscaping.</li><li>➤ Increased traffic over fewer travel lanes increases frequency of required maintenance.</li><li>➤ Increased traffic volume increases congestion and may lead to increased accident frequency due to gap reduction.</li></ul> | <ul style="list-style-type: none"><li>➤ Cross-section unit cost is \$2,100/m. (excl. utility relocation costs – see widening alternative concept evaluation – Table 1)</li><li>➤ Reduced costs for movement of goods and services as congestion decreases.</li><li>➤ Increased maintenance costs for road, pedestrian/ cycling facilities, and landscaping.</li></ul>                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"><li>➤ Cross-section unit cost is \$2,200/m. (excl. utility relocation costs – see widening alternative concept evaluation – Table 1)</li><li>➤ Reduced costs for movement of goods and services as congestion decreases.</li><li>➤ Increased maintenance costs for road, pedestrian/cycling facilities, and landscaping.</li></ul>                                                                                                                                                                                                                                                                                                               |
| <b>RATING</b>                                                                                                                                                                                                                  | FAIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>OVERALL EVALUATION</b>                                                                                                                                                                                                      | FAIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>OVERALL RANKING</b>                                                                                                                                                                                                         | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>TECHNICALLY PREFERRED DESIGN</b>                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>JUSTIFICATION</b>                                                                                                                                                                                                           | Not Carried Forward<br><br>Does not address Problem/Opportunity Statement                                                                                                                                                                                                                                                                                                                                                                                                                                     | Carried Forward as the preferred cross-section design alternative.<br><br>Greatest potential for Natural Environment, Social Environment, Transportation, and Cost benefits.<br><br>Greatest overall boulevard area available for landscaping, snow storage, and stormwater management.<br><br>Least area requiring winter maintenance and de-icing adjacent to watercourses.<br><br>Least potential conflict between users and transit buses at, or near, transit stops.<br><br>Lowest expected capital (construction) and operating (maintenance) cost of active transportation alternatives.<br><br>Least impact on existing utilities. | Not Carried Forward<br><br>2 <sup>nd</sup> most potential for Natural Environment, Social Environment, Transportation, and Cost benefits.<br><br>2 <sup>nd</sup> most overall boulevard area available for landscaping, snow storage, and stormwater management.<br><br>2 <sup>nd</sup> least area requiring winter maintenance and de-icing adjacent to watercourses.<br><br>Greater potential for conflict between users at, or near, transit vehicle stops than Alternative 1.<br><br>2 <sup>nd</sup> Lowest expected capital (construction) and operating (maintenance) cost of active transportation alternatives.<br><br>2 <sup>nd</sup> least impact on existing utilities. |

## 9.4 Evaluation of Roadway Widening Alignment Alternatives

The Project Team considered several alignment alternatives for widening Maple Grove Road (Exhibit 9-2).

**Exhibit 9-2: Road Widening Alignment Alternatives**



Widening this section of Maple Grove Road from 2 to 4 through lanes is common to all alternatives, except the Do Nothing alternative, and satisfies Regional policies.

The Project Team identified evaluation criteria for comparative analyses of the widening alignment alternatives. Evaluation criteria are: Natural Environment; Socio-Economic Environment; Transportation; and Cost. Each evaluation criteria included specific factors and indicators to determine impacts / benefits of each alternative.

The Do-Nothing alternative was screened out because it does not satisfy Region objectives for the corridor as identified in the Regional Transportation Master Plan (“Moving Forward”) (Region, 2018). Specifically, the need to widen the roadway to accommodate existing and future growth and forecasted intersection operational deficiencies, as well as adding active transportation and transit facilities, are not addressed by the Do Nothing alternative.

The purpose of the Hybrid Widening alternative (Concept 4) was to develop a best-case scenario, which is a combination of the other alternatives to minimize overall potential impacts on the environment. By widening in the direction required to minimize potential overall environmental impacts, the Hybrid Widening alternative meets the intention of the Class EA process.

Project Team Evaluation of Roadway Widening Alignment Alternatives is tabulated (Exhibit 9-3).

Exhibit 9-3: Evaluation of Widening Alternatives

| Alternative Design Concept                                                                           | DO NOTHING<br>“MAINTAIN STATUS QUO”                                                                                                                                                                                                                                                                                                                                                                                                                                                    | CONCEPT NO. 1<br>WIDENING EQUALLY ABOUT EXISTING CENTRELINE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CONCEPT NO. 2<br>WIDENING TO THE NORTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | CONCEPT NO. 3<br>WIDENING TO THE SOUTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CONCEPT NO. 4<br>MODIFIED “HYBRID WIDENING CONCEPT” TO MINIMIZE OVERALL IMPACTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| Description                                                                                          | This alternative is carried forward for comparative purposes only but is pre-screened out for not satisfying the project Problem/Opportunity Statement. “Do Nothing” assumes that no changes of any kind are made within the corridor.                                                                                                                                                                                                                                                 | Balanced widening in the existing corridor from Vondrau Drive to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the north from east of Boxwood Drive (Sta. 4+840) to Beaverdale Road, and a balanced widening from there to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the south from east of Boxwood Drive (Sta. 4+840) to Beaverdale Road, and a balanced widening from there to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the north from east of Boxwood Drive (Sta. 4+840) to east of Middle Creek (Sta. 5+840). From Sta. 5+840, the widening is typically balanced, as it is in Option 1, and remains there to termination at Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Natural Environment<br><br>How might the alternative affect existing trees, vegetation and wildlife? | <ul style="list-style-type: none"><li>➤ No impacts on terrestrial habitat are anticipated.</li><li>➤ No impact on existing watercourses. Culvert widening is not required.</li><li>➤ Existing Provincially Significant Wetland (PSW) is unaffected</li><li>➤ No property is required for SWM facilities.</li><li>➤ Existing flow regime is maintained. Deficiencies would continue.</li><li>➤ Surface water runoff would continue to be untreated. Status quo is maintained.</li></ul> | <ul style="list-style-type: none"><li>➤ 97 Trees and 1,675m2 of woodland vegetation are impacted.</li><li>➤ 2 Regionally significant Black Walnut Trees are directly impacted.</li><li>➤ Floodplain area impacted by transition grading is 51,740m2.</li><li>➤ Grading impacts adjacent to Hunsperger Drain is 12,400m2.</li><li>➤ Approximately 3,330m2 of Provincially Significant Wetland (PSW) is potentially impacted.</li><li>➤ A total of 0.10 ha. of private property is expected to be required for SWM facilities.</li><li>➤ Culvert widening on both sides (or full replacement) would be required at Middle Creek east of Boxwood Drive, at Speedsville Road on the Hunsperger Drain, at Middle Creek east of Speedsville Road, and at East Creek. 107m of existing culvert extensions are anticipated.</li><li>➤ Has the second highest physical impact on the Hunsperger Drain along the south side of Maple Grove Road.</li></ul> | <ul style="list-style-type: none"><li>➤ 92 Trees and 2,670m2 of woodland vegetation are impacted.</li><li>➤ Regionally significant Black Walnut Trees are not directly impacted.</li><li>➤ Floodplain area impacted by transition grading is 52,240m2.</li><li>➤ Grading impacts adjacent to Hunsperger Drain is 11,100m2.</li><li>➤ Approximately 3,990m2 of Provincially Significant Wetland (PSW) is potentially impacted.</li><li>➤ A total of 0.10 ha. of private property is expected to be required for SWM facilities.</li><li>➤ Culvert widening on the north side (or full replacement) would be required at Middle Creek east of Boxwood Drive, at Speedsville Road on the Hunsperger Drain, at Middle Creek east of Speedsville Road, and at East Creek. 115m of existing culvert extensions are anticipated.</li><li>➤ Has the second lowest physical impact on the Hunsperger Drain along the south side of Maple Grove Road.</li></ul> | <ul style="list-style-type: none"><li>➤ 105 Trees and 2,560m2 of woodland vegetation are impacted.</li><li>➤ 2 Regionally significant Black Walnut Trees are directly</li><li>➤ Floodplain area impacted by transition grading is 51,670m2.</li><li>➤ Grading impacts adjacent to Hunsperger Drain is 14,100m2.</li><li>➤ Approximately 3,600m2 of Provincially Significant Wetland (PSW) is potentially impacted.</li><li>➤ A total of 0.10 ha. of private property is expected to be required for SWM facilities.</li><li>➤ Culvert widening on the south side (or full replacement) would be required at Middle Creek east of Boxwood Drive, at Speedsville Road on the Hunsperger Drain, at Middle Creek east of Speedsville Road, and at East Creek. 106m of existing culvert extensions are anticipated.</li><li>➤ Has the greatest impact on the Hunsperger Drain and would require full reconstruction of the municipal drain</li></ul> | <ul style="list-style-type: none"><li>➤ 101 Trees and 2,188m2 of woodland vegetation are impacted.</li><li>➤ Regionally significant Black Walnut Trees are not directly impacted.</li><li>➤ Floodplain area impacted by transition grading is 52,390m2.</li><li>➤ Grading impacts adjacent to Hunsperger Drain is 11,300m2.</li><li>➤ Approximately 3,650m2 of Provincially Significant Wetland (PSW) is potentially impacted.</li><li>➤ A total of 0.10 ha. of private property is expected to be required for SWM facilities.</li><li>➤ Culvert widening on the north side of Maple Grove Road at Middle Creek east of Boxwood Drive, at Speedsville Road on the Hunsperger Drain, and at Middle Creek east of Speedsville Road. 111m of existing culvert extensions are anticipated.</li><li>➤ Has the least physical impact on the Hunsperger Drain along the south side of Maple Grove Road.</li></ul> |
|                                                                                                      | Does not address the Problem/Opportunity Statement                                                                                                                                                                                                                                                                                                                                                                                                                                     | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Exhibit 9-3: Evaluation of Widening Alternatives - Continued

| Alternative Design Concept                                                                                                                                                                                                                                                         | DO NOTHING<br>“MAINTAIN STATUS QUO”                                                                                                                                                                                                                                                                                                                                                                                                                            | CONCEPT NO. 1<br>WIDENING EQUALLY ABOUT EXISTING CENTRELINE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CONCEPT NO. 2<br>WIDENING TO THE NORTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CONCEPT NO. 3<br>WIDENING TO THE SOUTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CONCEPT NO. 4<br>MODIFIED “HYBRID WIDENING CONCEPT” TO MINIMIZE OVERALL IMPACTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| Description                                                                                                                                                                                                                                                                        | This alternative is carried forward for comparative purposes only but is pre-screened out for not satisfying the project Problem/Opportunity Statement. “Do Nothing” assumes that no changes of any kind are made within the corridor.                                                                                                                                                                                                                         | Balanced widening in the existing corridor from Vondrau Drive to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the north from east of Boxwood Drive (Sta. 4+840) to Beaverdale Road, and a balanced widening from there to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the south from east of Boxwood Drive (Sta. 4+840) to Beaverdale Road, and a balanced widening from there to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the north from east of Boxwood Drive (Sta. 4+840) to east of Middle Creek (Sta. 5+840). From Sta. 5+840, the widening is typically balanced, as it is in Option 1, and remains there to termination at Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Socio-Economic Environment</b><br><br>How might the alternative affect the residential and commercial properties abutting the road (driveways, access, property impacts, noise, air quality, streetscaping / beautification potential and archaeological / heritage resources)? | <ul style="list-style-type: none"><li>➤ No direct property impacts. Access challenges would continue to increase as area traffic volumes and delay increase.</li><li>➤ No additional property would be required.</li><li>➤ Traffic congestion and delay would extend the duration of noise impacts as traffic volumes increase.</li><li>➤ No encroachment on areas of Archaeological Potential.</li><li>➤ No opportunity for enhanced streetscaping.</li></ul> | <ul style="list-style-type: none"><li>➤ Widening brings traffic closer to buildings and residences, noise levels would increase and as a result may require mitigation or additional property buyouts where resident concerns cannot be mitigated.</li><li>➤ Portions of 23 Private Properties would need to be purchased.</li><li>➤ 2 properties may require a complete buyout.</li><li>➤ Including potential buyouts, the total of potentially impacted property is 2.49 ha.</li><li>➤ Approximately 860m total of noise attenuation is expected at various locations along the corridor.</li><li>➤ Areas of previously undisturbed right of way or grading encroachment beyond right of way limits must be test pitted or pedestrian surveyed to investigate for archaeological artifacts.</li><li>➤ Lands associated with three (3) Built Heritage Resources may be impacted.</li><li>➤ Opportunities for enhanced streetscaping.</li></ul> | <ul style="list-style-type: none"><li>➤ Widening brings traffic closer to buildings and residences, noise levels would increase and as a result may require mitigation or additional property buyouts where resident concerns cannot be mitigated.</li><li>➤ Portions of 24 Private Properties would need to be purchased.</li><li>➤ 2 properties may require a complete buyout.</li><li>➤ Including potential buyouts, the total of potentially impacted property is 2.39 ha.</li><li>➤ Approximately 860m total of noise attenuation is expected at various locations along the corridor.</li><li>➤ Areas of previously undisturbed right of way or grading encroachment beyond right of way limits must be test pitted or pedestrian surveyed to investigate for archaeological artifacts.</li><li>➤ Lands associated with three (3) Built Heritage Resources may be impacted.</li><li>➤ Opportunities for enhanced streetscaping.</li></ul> | <ul style="list-style-type: none"><li>➤ Widening brings traffic closer to buildings and residences, noise levels would increase and as a result may require mitigation or additional property buyouts where resident concerns cannot be mitigated.</li><li>➤ Portions of 29 Private Properties would need to be purchased.</li><li>➤ 2 properties may require a complete buyout.</li><li>➤ Including potential buyouts, the total of potentially impacted property is 2.76 ha.</li><li>➤ Approximately 860m total of noise attenuation is expected at various locations along the corridor.</li><li>➤ Areas of previously undisturbed right of way or grading encroachment beyond right of way limits must be test pitted or pedestrian surveyed to investigate for archaeological artifacts.</li><li>➤ Lands associated with three (3) Built Heritage Resources may be impacted.</li><li>➤ Opportunities for enhanced streetscaping.</li></ul> | <ul style="list-style-type: none"><li>➤ Widening brings traffic closer to buildings and residences, noise levels would increase and as a result may require mitigation or additional property buyouts where resident concerns cannot be mitigated.</li><li>➤ Portions of 23 Private Properties would need to be purchased.</li><li>➤ 2 properties may require a complete buyout.</li><li>➤ Including potential buyouts, the total of potentially impacted property is 2.38 ha.</li><li>➤ Approximately 860m total of noise attenuation is expected at various locations along the corridor.</li><li>➤ Areas of previously undisturbed right of way or grading encroachment beyond right of way limits must be test pitted or pedestrian surveyed to investigate for archaeological artifacts.</li><li>➤ Lands associated with three (3) Built Heritage Resources may be impacted.</li><li>➤ Opportunities for enhanced streetscaping.</li></ul> |
|                                                                                                                                                                                                                                                                                    | Does not address the Problem/Opportunity Statement                                                                                                                                                                                                                                                                                                                                                                                                             | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | VERY GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

Exhibit 9-3: Evaluation of Widening Alternatives – Continued

| Alternative Design Concept                                                                                                                                                     | DO NOTHING<br>“MAINTAIN STATUS QUO”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CONCEPT NO. 1<br>WIDENING EQUALLY ABOUT EXISTING CENTRELINE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | CONCEPT NO. 2<br>WIDENING TO THE NORTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CONCEPT NO. 3<br>WIDENING TO THE SOUTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CONCEPT NO. 4<br>MODIFIED “HYBRID WIDENING CONCEPT” TO MINIMIZE OVERALL IMPACTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| Description                                                                                                                                                                    | This alternative is carried forward for comparative purposes only but is pre-screened out for not satisfying the project Problem/Opportunity Statement. “Do Nothing” assumes that no changes of any kind are made within the corridor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Balanced widening in the existing corridor from Vondrau Drive to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the north from east of Boxwood Drive (Sta. 4+840) to Beaverdale Road, and a balanced widening from there to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the south from east of Boxwood Drive (Sta. 4+840) to Beaverdale Road, and a balanced widening from there to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the north from east of Boxwood Drive (Sta. 4+840) to east of Middle Creek (Sta. 5+840). From Sta. 5+840, the widening is typically balanced, as it is in Option 1, and remains there to termination at Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Transportation<br><br>How might the alternative serve the expected vehicular, transit, pedestrian, and cycling traffic in terms of travel delay, safety, and emergency access? | <ul style="list-style-type: none"><li>➤ The existing Maple Grove Road configuration does not satisfy the requirements for existing and forecasted traffic volumes. Active Transportation facilities are not fully supported by the current roadway.</li><li>➤ Existing through lanes with turn lanes at intersections would not handle forecasted traffic volumes to 2036 and 2041.</li><li>➤ Existing roadway capacity creates delay to transit service.</li><li>➤ The existing roadway configuration would impact response times due to existing and forecasted congestion and delay.</li><li>➤ Do Nothing Alternative excludes changes to pedestrian facilities and excludes additional cycling provisions.</li></ul> | <ul style="list-style-type: none"><li>➤ A widened Maple Grove Road including active transportation facilities on both sides would serve the current vehicle, pedestrian, and cycling needs and would agree with the Region of Waterloo Active Transportation Master Plan (ATMP).</li><li>➤ Four (4) through traffic lanes, two in each direction, plus turn lanes at intersections would accommodate forecasted traffic volumes to 2036 and 2041.</li><li>➤ Additional through traffic lane capacity, as well as potential bus stop enhancements may promote greater transit service efficiency within and through the corridor.</li><li>➤ Emergency response times are expected to improve due to overall reductions in delay and congestion because of improved traffic flow and capacity.</li><li>➤ Continuous AODA-compliant active transportation facilities on both sides can be accommodated by all concepts, except the “Do Nothing” alternative.</li></ul> | <ul style="list-style-type: none"><li>➤ A widened Maple Grove Road including active transportation facilities on both sides would serve the current vehicle, pedestrian, and cycling needs and would agree with the Region of Waterloo Active Transportation Master Plan (ATMP).</li><li>➤ Four (4) through traffic lanes, two in each direction, plus turn lanes at intersections would accommodate forecasted traffic volumes to 2036 and 2041.</li><li>➤ Additional through traffic lane capacity, as well as potential bus stop enhancements may promote greater transit service efficiency within and through the corridor.</li><li>➤ Emergency response times are expected to improve due to overall reductions in delay and congestion because of improved traffic flow and capacity.</li><li>➤ Continuous AODA-compliant active transportation facilities on both sides can be accommodated by all concepts, except the “Do Nothing” alternative.</li></ul> | <ul style="list-style-type: none"><li>➤ A widened Maple Grove Road including active transportation facilities on both sides would serve the current vehicle, pedestrian, and cycling needs and would agree with the Region of Waterloo Active Transportation Master Plan (ATMP).</li><li>➤ Four (4) through traffic lanes, two in each direction, plus turn lanes at intersections would accommodate forecasted traffic volumes to 2036 and 2041.</li><li>➤ Additional through traffic lane capacity, as well as potential bus stop enhancements may promote greater transit service efficiency within and through the corridor.</li><li>➤ Emergency response times are expected to improve due to overall reductions in delay and congestion because of improved traffic flow and capacity.</li><li>➤ Continuous AODA-compliant active transportation facilities on both sides can be accommodated by all concepts, except the “Do Nothing” alternative.</li></ul> | <ul style="list-style-type: none"><li>➤ A widened Maple Grove Road including active transportation facilities on both sides would serve the current vehicle, pedestrian, and cycling needs and would agree with the Region of Waterloo Active Transportation Master Plan (ATMP).</li><li>➤ Four (4) through traffic lanes, two in each direction, plus turn lanes at intersections would accommodate forecasted traffic volumes to 2036 and 2041.</li><li>➤ Additional through traffic lane capacity, as well as potential bus stop enhancements may promote greater transit service efficiency within and through the corridor.</li><li>➤ Emergency response times are expected to improve due to overall reductions in delay and congestion because of improved traffic flow and capacity.</li><li>➤ Continuous AODA-compliant active transportation facilities on both sides can be accommodated by all concepts, except the “Do Nothing” alternative.</li></ul> |
|                                                                                                                                                                                | Does not address the Problem/Opportunity Statement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | EXCELLENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EXCELLENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EXCELLENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EXCELLENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

Exhibit 9-3: Evaluation of Widening Alternatives – Continued

| Alternative Design Concept                                                                                                                                                                                                      | DO NOTHING<br>“MAINTAIN STATUS QUO”                                                                                                                                                                                                    | CONCEPT NO. 1<br>WIDENING EQUALLY ABOUT<br>EXISTING CENTRELINE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CONCEPT NO. 2<br>WIDENING TO THE NORTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | CONCEPT NO. 3<br>WIDENING TO THE SOUTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | CONCEPT NO. 4<br>MODIFIED “HYBRID WIDENING<br>CONCEPT” TO MINIMIZE OVERALL<br>IMPACTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| Description                                                                                                                                                                                                                     | This alternative is carried forward for comparative purposes only but is pre-screened out for not satisfying the project Problem/Opportunity Statement. “Do Nothing” assumes that no changes of any kind are made within the corridor. | Balanced widening in the existing corridor from Vondrau Drive to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the north from east of Boxwood Drive (Sta. 4+840) to Beaverdale Road, and a balanced widening from there to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the south from east of Boxwood Drive (Sta. 4+840) to Beaverdale Road, and a balanced widening from there to Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Balanced widening from Vondrau Drive to east of Boxwood Drive, then shifting widening to the north from east of Boxwood Drive (Sta. 4+840) to east of Middle Creek (Sta. 5+840). From Sta. 5+840, the widening is typically balanced, as it is in Option 1, and remains there to termination at Hespeler Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Cost<br><br>What is the total cost of the alternative, including the cost for road construction, utility and street-lighting relocations, property acquisitions, traffic signal and intersection improvements, and landscaping? | ➤ Existing Utilities are unaffected by the “Do Nothing” Alternative.                                                                                                                                                                   | <div>➤ No significant impacts to existing underground gas lines, watermains, sewers, or communications cables, anticipated other than minor relocations / adjustments.</div> <div>➤ 47 Hydro poles, 26 Traffic Signal poles and 8 Street Light poles would have to be relocated, for a total estimated cost of <b>\$1.84M</b> for utility relocations.</div> <div>➤ Preliminary Total Cost Estimate, including the following:<div>○ Property acquisition</div><div>○ Road and Drainage Works</div><div>○ Signals/Illumination</div><div>○ Roadside Protection and Line Markings</div><div>○ Bridges &amp; Culvert Extensions and Replacement</div><div>○ Active transportation Facilities and Landscaping</div><div>○ Engineering</div><div>➤ <b>TOTAL (Excl. HST) = \$52.7M</b> (Including Utility Impacts)</div></div> | <div>➤ No significant impacts to existing underground gas lines, watermains, sewers, or communications cables, anticipated other than minor relocations / adjustments.</div> <div>➤ 61 Hydro poles, 26 Traffic Signal poles and 10 Street Light poles would have to be relocated, for a total estimated cost of <b>\$2.15M</b> for utility relocations.</div> <div>➤ Preliminary Total Cost Estimate, including the following:<div>○ Property acquisition</div><div>○ Road and Drainage Works</div><div>○ Signals/Illumination</div><div>○ Roadside Protection and Line Markings</div><div>○ Bridges &amp; Culvert Extensions and Replacement</div><div>○ Active transportation Facilities and Landscaping</div><div>○ Engineering</div><div>➤ <b>TOTAL (Excl. HST) = \$52.6M</b> (Including Utility Impacts)</div></div> | <div>➤ No significant impacts to existing underground gas lines, watermains, sewers, or communications cables, anticipated other than minor relocations / adjustments.</div> <div>➤ 60 Hydro poles, 26 Traffic Signal poles and 17 Street Light poles would have to be relocated, for a total estimated cost of <b>\$2.23M</b> for utility relocations.</div> <div>➤ Preliminary Total Cost Estimate, including the following:<div>○ Property acquisition</div><div>○ Road and Drainage Works</div><div>○ Signals/Illumination</div><div>○ Roadside Protection and Line Markings</div><div>○ Bridges &amp; Culvert Extensions and Replacement</div><div>○ Active transportation Facilities and Landscaping</div><div>○ Engineering</div><div>➤ <b>TOTAL (Excl. HST) = \$53.7M</b> (Including Utility Impacts)</div></div> | <div>➤ No significant impacts to existing underground gas lines, watermains, sewers, or communications cables, anticipated other than minor relocations / adjustments.</div> <div>➤ 46 Hydro poles, 26 Traffic Signal poles and 10 Street Light poles would have to be relocated, for a total estimated cost of <b>\$1.85M</b> for utility relocations.</div> <div>➤ Preliminary Total Cost Estimate, including the following:<div>○ Property acquisition</div><div>○ Road and Drainage Works</div><div>○ Signals/Illumination</div><div>○ Roadside Protection and Line Markings</div><div>○ Bridges &amp; Culvert Extensions and Replacement</div><div>○ Active transportation Facilities and Landscaping</div><div>○ Engineering</div><div>➤ <b>TOTAL (Excl. HST) = \$52.2M</b> (Including Utility Impacts)</div></div> |
|                                                                                                                                                                                                                                 | Does not address the Problem/Opportunity Statement                                                                                                                                                                                     | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | GOOD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| OVERALL EVALUATION                                                                                                                                                                                                              |                                                                                                                                                                                                                                        | GOOD – VERY GOOD<br>(Not Carried Forward)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | GOOD – VERY GOOD<br>(Not Carried Forward)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | GOOD – VERY GOOD<br>(Not Carried Forward)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | VERY GOOD<br>(Carried Forward as Preferred Alternative Widening Concept)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## 9.5 Evaluation Outcome

Based on detailed evaluation of alternatives, (Cross-section) Alternative A – Widen the Road to 4-lanes with a 5.0m wide Raised Centre Median and Add Multi-use Path (MUP) in combination with (Alignment) Concept No. 4 – Modified “Hybrid Widening Concept” to Minimize Overall Impacts is the Project Team’s Recommended Design Alternative.

A detailed summary of the overall evaluation of design alternatives for Maple Grove Road was presented to the public at Public Consultation Centre #2. The Project Team’s Recommended Design Alternative was presented to the public with details of the evaluation approach and outcomes. Following receipt of public input from Public Consultation Centre #2, the Project Team carried that alternative forward as the recommended alternative.

Based on selection of the recommended road widening alignment alternative and cross-section, recommended mitigation measures have been proposed to offset potential environmental impacts. Feasible enhancements or compensation measures will be further evaluated through detailed design and permitting.

## 9.6 Recommended Preliminary Design

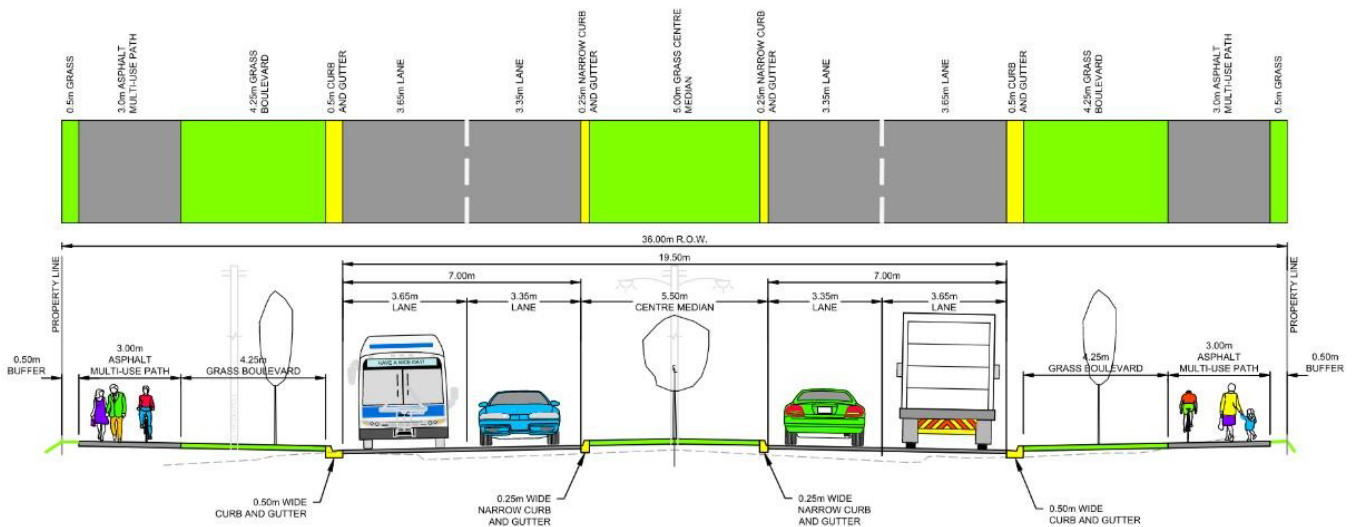
Preliminary design is complete for cross-section Alternative A – Widen the Road to 4-lanes with a 5.0m wide Raised Centre Median and Add Multi-use Path (MUP) and widening Concept No. 4 – Modified “Hybrid Widening Concept” to Minimize Overall Impacts (Appendix S). Key features of the design are:

### 9.6.1 Cross-section

The proposed design section is Alternative A - Widen the Road to 4-Lanes with Raised Centre Median, and 3.0m Multi-Use Path on both sides, which includes new:

- 5.0m raised median with 0.25m concrete barrier curbs and narrow gutter;
- 0.5m curb and gutter, and a piped underground storm drainage system;
- 3.0m asphalt multi-use path;
- Additional street lighting; and
- Grassed boulevard.

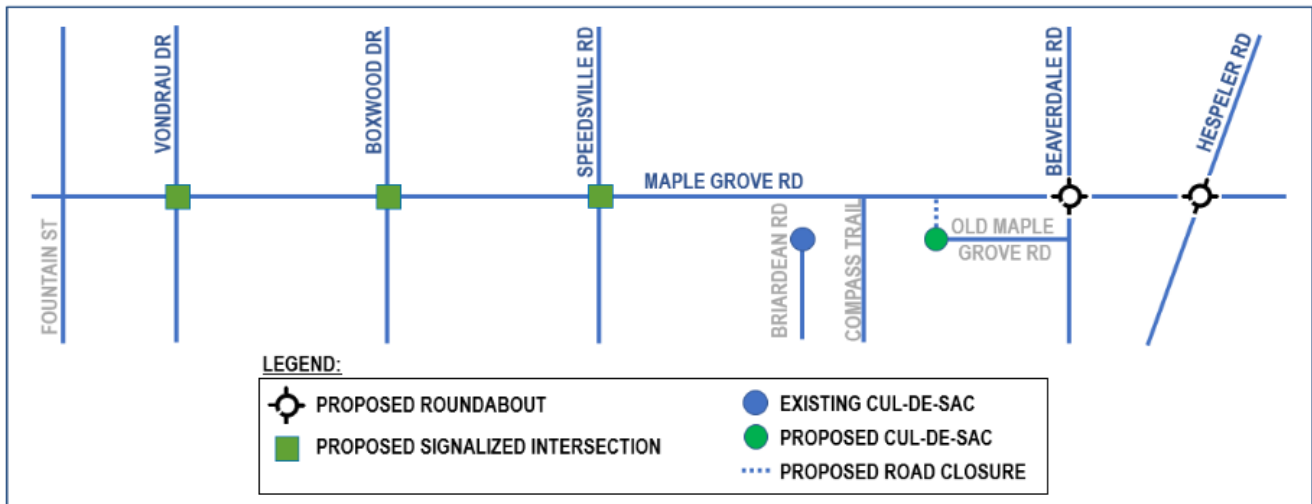
## Design Alternative A - Raised Centre Median with Multi-Use-Path



### 9.6.2 Intersections

The recommended preliminary design includes signalized intersection improvements at the intersections of Vondrau Drive and Speedsville Road, as well as new signals at Boxwood Drive. At Speedsville Road, a double left turn is proposed for the northbound to westbound left turning movement. The intersection of Old Maple Grove Road and Maple Grove Road is proposed to be eliminated with a cul-de-sac at the west end of Old Maple Grove Road. The intersection at Beaverdale Road is proposed as a 2 x 3-lane roundabout and the intersection at Hespeler Road is proposed as a 3 x 2-lane roundabout with provision for a channelized eastbound to southbound right turn lane and a future flyover bridge to accommodate northbound to westbound left turning traffic. A graphic representation of proposed intersection types is included herein (Exhibit 9-4).

## Exhibit 9-4: Proposed Intersection Types along Maple Grove Road



### 9.6.3 Roadway Corridor

Proposed roadway corridor width will be variable with localized widening to accommodate additional travelled lane space and active transportation facilities, transit stops, roadside amenities, noise attenuation barriers, and utility infrastructure, including streetlight and traffic signal poles, roadside traffic signs, and related appurtenances. A minimum corridor width of 36.0m is recommended to accommodate the preferred cross-section alternative.

### 9.6.4 Storm Drainage and Stormwater Management

Drainage in the updated corridor will be accommodated by existing watercourses, new underground piped storm sewers with outlets to existing locations and including stormwater management quality and quantity enhancement measures and controls as established for East Creek, Middle Creek, Ellis Creek, and the Hunsperger Municipal Drain (within the project limits).

Upgrading existing culverts, swales, and ditches to be retained will be included, as well consideration of potential environmental enhancements, including stormwater management facilities, in pipe storage, oil-grit separators, and enhanced LID swales with and without recharge function where the regulations associated with the local well head protection areas will allow, all as part of the overall replacement/upgrading strategy to be finalized during detailed design.

The study drainage report demonstrates that stormwater attenuation using underground and surface storage for the 2- to 100-year storm events will be required to control proposed conditions peak flows to required existing conditions levels for the receiving drainage outlets. Stormwater quality may be addressed by routing impervious areas through enhanced grass swales, OGS units, perforated pipes, as well as directing surface

runoff to an upgraded underground pipe system and conveying piped flows to surface detention facilities where adequate space is available.

Assessment of culvert crossings within the project limits indicates that upsized box culverts will be required to convey the 50-year storm event without overtopping the regional roadway.

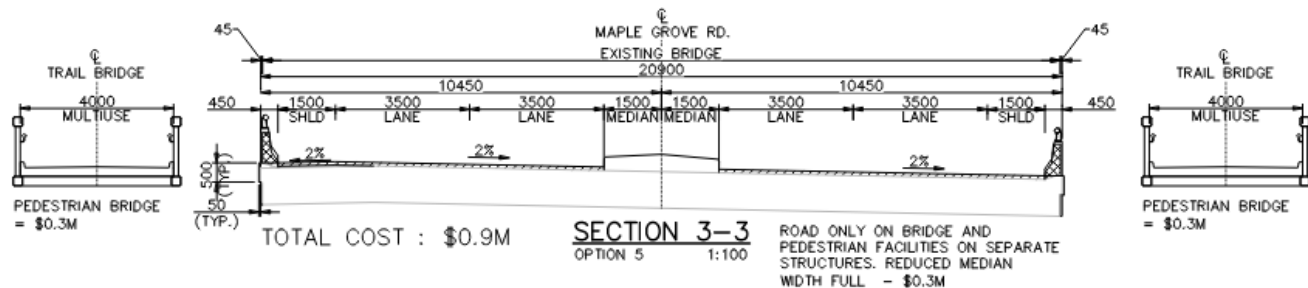
Storm drainage recommendations for consideration during detailed design include:

| IMPROVEMENT                                                              | LOCATION                                     | AREA           | CAPACITY                                                                            | COMMENTS                                                                                                                                               |
|--------------------------------------------------------------------------|----------------------------------------------|----------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stormwater quantity and quality control                                  | Outlet A – Maple Grove Road Catchment A1     | 0.985 hectares | 89 m <sup>3</sup> storage volume required for 100-year storm peak flow attenuation  | Underground storage for quantity control, OGS for quality control, area within wellhead protection area                                                |
| Stormwater quantity and quality control                                  | Outlet B – West Creek Catchment B2, B3       | 2.043 hectares | 220 m <sup>3</sup> storage volume required for 100-year storm peak flow attenuation | Underground storage for quantity control, OGS for quality control, area within wellhead protection area                                                |
| Stormwater quantity and quality control                                  | Outlet C – Middle Creek Catchment C4, C5     | 3.111 hectares | 334 m <sup>3</sup> storage volume required for 100-year storm peak flow attenuation | Underground storage for quantity control, LID measures and/or OGS for quality control                                                                  |
| Stormwater quantity and quality control, realignment of Hunsperger Drain | Outlet C – Middle Creek Catchment C6, C7, C8 | 5.463 hectares | 553 m <sup>3</sup> storage volume required for 100-year storm peak flow attenuation | Underground storage for quantity control, LID measures and/or OGS for quality control, maintain conveyance for Hunsperger Drain                        |
| Stormwater quantity and quality control                                  | Outlet D – East Creek Catchment D9, D10      | 3.498 hectares | 237 m <sup>3</sup> storage volume required for 100-year storm peak flow attenuation | Underground storage for quantity control, LID measures and/or OGS for quality control, potential for surface storage to the north of the road corridor |
| Stormwater quantity and quality control                                  | Outlet E – Ellis Creek Catchment E11         | 2.007 hectares | 167 m <sup>3</sup> storage volume required for 100-year storm peak flow attenuation | Underground storage for quantity control, LID measures and/or OGS for quality control                                                                  |
| Stormwater quantity and quality control                                  | Outlet E – Ellis Creek Catchment E12, E13    | 2.777 hectares | 137 m <sup>3</sup> storage volume required for 100-year storm peak flow attenuation | Underground storage for quantity control, LID measures and/or OGS for quality control                                                                  |
| Stormwater quality control                                               | Outlet F – Hespeler Road drainage system     | 3.545 hectares | Peak flow attenuation not required                                                  | No increase in impervious area, quantity control not required, LID measures and/or OGS for quality control                                             |

### 9.6.5 Ellis Creek Bridge

Alternative cross-sections were developed and evaluated for enhancement to the existing Ellis Creek Bridge to accommodate proposed roadway improvements. The preferred cross-section alternative (Section 3-3) includes a raised median on the existing bridge section with new parapet barrier walls and handrails on both sides. In addition to bridge

enhancements, dedicated separate pedestrian trail bridges are proposed on either side of the corridor to accommodate the multi-use path system proposed along the entire corridor.



During detailed design, and construction, consultation with the Grand River Conservation Authority and Department of Fisheries and Oceans will be required to satisfy environmental protection.

### 9.6.6 Pedestrian Trail Bridges

Preliminary design proposes separate pedestrian trail bridges to carry the proposed multi-use path system over Ellis Creek. There are several examples of these bridges in the Region with examples along Homer Watson Boulevard between Old Carriage Drive and Conestoga College Boulevard. Details of the bridges will be refined during detailed design.

### 9.6.7 Possible Future Flyover Bridge Structure

2041 traffic predictions will exceed traffic volume (lane) capacity at the proposed 3-lane roundabout at Hespeler Road. As such, it is recommended that the Region secure the land necessary to protect for future construction of a grade-separated flyover for northbound to westbound left turns at Hespeler Road and Maple Grove Road. Traffic growth projections should be updated periodically to determine when the flyover structure is required. Significant lead time is expected for design and approvals required for the flyover. As such, starting in 2031 funding the flyover should be considered by the Region during its annual capital forecast process.

### 9.6.8 Noise Mitigation

The Region has a Noise Policy used to determine when noise attenuation, such as noise berms or walls, are required. For this study, Part B of the Region's Noise Policy applies since it is recommended that Maple Grove Road is widened from two to four through lanes.

Based on the preliminary noise study results, and assuming a 4-lane road with forecasted traffic volumes in 2036 and 2041, noise attenuation may be required at the following locations:

- Approximately 75 metres at No. 1825 Beaverville Road;

- Approximately 110 metres at No. 1840 Beaverdale Road;
- Approximately 25 metres at No. 1900 Beaverdale Road;
- Approximately 75 metres at No. 1905 Beaverdale Road;
- Approximately 50 metres at No. 915 Briardean Road;
- Approximately 35 metres at No. 2120 Maple Grove Road;
- Approximately 35 metres at No. 2140 Maple Grove Road;
- Approximately 175 metres at No. 2220 Maple Grove Road;
- Approximately 95 metres at No. 566 Fisher Mills Road;
- Approximately 65 metres at No. 600 Fisher Mills Road;
- Approximately 30 metres at No. 610 Fisher Mills Road; and
- Approximately 30 metres at No. 616 Fisher Mills Road.

Part C of the Region's Noise Policy could be applied in those areas where noise barriers are not currently recommended under Part B. Under Part C, noise attenuation may be considered under certain circumstances, if property owners are willing to share in the cost of noise attenuation.

Parts B and C of the Region's Noise Policy have been summarized (Appendix I).

#### **9.6.9 Utility Impacts**

Various utility agencies have existing plant and facilities within the Study Area. In some cases, the presence of utility infrastructure is limited to road crossings at intersections: in others, the plant includes a running line either above or under ground along the corridor. Each of the following sub-sections represent utility plant which may be affected by the recommended alternative and will need to be further investigated during detailed design.

##### **9.6.9.1 GrandBridge Energy (formerly Energy+)**

GrandBridge Energy hydro lines are present along the north side of Maple Grove Road from the west limit at Vondrau Drive to the east limit at Hespeler Road.

Hydro lines are also present on all existing intersecting streets within the Study Area.

##### **9.6.9.2 Enbridge Gas**

Enbridge Gas Inc. has a gas main running line on the north side of Maple Grove Road. This line is generally parallel to the hydro line offset about 2.4m and extending from Fountain Street to approximately 170m east of Vondrau Drive, where it then crosses to the south side of Maple Grove Road and continues until it ends at Compass Trail.

Enbridge gas lines can be found on the west side of Vondrau Drive, but only north of Maple Grove Road; on Boxwood Drive and Beaverdale Road the gas lines run on the

east side. Enbridge Gas Inc. also has a running line on the north side of Old Maple Grove Road, which is fed from Beaverdale Road. There are no gas lines present on Speedsville Road or Hespeler Road within the Study Area. Direct impacts on Enbridge Gas infrastructure will be investigated during detailed design.

#### **9.6.9.3 Roger Cable TV**

Rogers has confirmed an existing fiber optic cable on the north side of Maple Grove Road from Boxwood Drive to Hespeler Road. There is also an existing fiber optic cable on the south side of Maple Grove Road between Boxwood Drive and Compass Trail.

Fiber optic cables are also present on Boxwood Drive (north of Maple Grove Road), on Speedsville Road (south of Maple Grove Road), and on Compass Trail. There is an existing fiber optic cable crossing Maple Grove Road east of Speedsville Road.

Direct impacts on Rogers Cable TV infrastructure will be investigated during detailed design.

#### **9.6.9.4 Telus Networks**

Telus has confirmed there is no existing underground infrastructure within the Study Area.

#### **9.6.9.5 Bell Canada**

Bell Canada has confirmed the following existing plant on the:

- North and south sides of Maple Grove Road from Vondrau Drive to Boxwood Drive;
- North side of Maple Grove Road from the Hunsperger Drain to Speedsville Road;
- South side of Maple Grove Road from Briardean Road to Old Maple Grove Road;
- North side of Maple Grove Road from Old Fisher Mills Road to east of Hespeler Road;
- East side of Vondrau Drive;
- West side of Boxwood Drive;
- West and east sides of Speedsville Road;
- West side of Beaverdale Road; and
- Crossings of Maple Grove Road at Vondrau Drive, Boxwood Drive, Speedsville Road, west of Compass Trail, Beaverdale Road, and Old Fisher Mills Road.

Direct impacts on Bell Canada infrastructure will be investigated during detailed design.

#### **9.6.9.6 Hydro One Networks Inc.**

Hydro One Networks Inc. (HONI) has not indicated the presence of any Hydro One infrastructure within the Study Area.

#### **9.6.9.7 Zayo**

Zayo has confirmed the following existing plant on the:

- South side of Maple Grove Road from Boxwood Drive to 400m west of Boxwood Drive;
- North side of Maple Grove Road from Boxwood Drive to 100m west of Boxwood drive;
- Both sides of Boxwood drive north of Maple Grove Road; and
- West side of Boxwood Drive south of Maple Grove Road.

Direct impacts on Zayo infrastructure will be investigated during detailed design.

#### **9.6.9.8 City of Cambridge Water**

The City of Cambridge has confirmed the following water distribution main on the:

- South side of Maple Grove Road from Vondrau Drive to Beaverdale Road, and
- North side of Maple Grove Drive from Beaverdale Road to Hespeler Road.

Existing watermains are also present on Vondrau Drive, Boxwood Drive (north and south of Maple Grove Road), Speedsville Road (south of Maple Grove Road), Compass Trail, and Beaverdale Road (south of Maple Grove Road).

Direct impacts on City of Cambridge water infrastructure will be investigated during detailed design.

#### **9.6.9.9 City of Cambridge Sanitary Sewer**

The City of Cambridge has confirmed sanitary sewer plant along the north side of Maple Grove Road from Vondrau Drive to Boxwood Drive, as well as on Vondrau Drive and Boxwood Drive (north of Maple Grove Road).

Direct impacts on City of Cambridge Sanitary Sewer infrastructure will be investigated during detailed design.

### 9.6.10 Property

An initial review of existing road allowance indicates that there are some areas along Maple Grove Road where the existing road right-of-way will need to be widened to accommodate required improvements (Appendices T and S; *Preliminary Design* and *Property Impact Plans* respectively). Also, there are locations at intersections where an expanded traffic control signalized intersection or roundabout will require additional property.

The Region may need to obtain temporary access easements at some locations adjacent the existing right-of-way for construction grading activities; to be confirmed through detailed design. In areas where property acquisition (Appendix T) or temporary access (easement) is required, the Region of Waterloo's Land Purchasing Officer contacts the affected owner. Fair market compensation is provided, as required.

### 9.6.11 Geometric Design Criteria

A geometric design criteria summary is included with this report for all streets within the project study limits (Appendix U).

The Maple Grove Road summary, per current Region of Waterloo and Ontario Provincial Standards:

- Design Speed: 80 km/h (Maximum Posted Speed 70 km/h);
- Curb Lanes: 3.65 m (to accommodate transit);
- Median lanes: 3.35 m;
- Turn lanes: 3.25 m;
- Horizontal Curve: 1,680 m radius (assuming 2% cross-fall);
- Vertical Curve: Crest curve K = 16 min, sag curve K = 10;
- Intersection Curb: 6-9 m radius minor streets and 12-15 m for arterial roads;
- Multi-use trail: 3 m;
- Median islands: 1.5 m minimum, Raised Grassed Median, 5.5 m; and
- Grass Boulevard: 4.25 m proposed, 2.5 m desired minimum.

## 10 Public Consultation Centre #2

Consultation is a key requirement of the Class EA process. The Region and IBI Group hosted two Public Consultation Centres (PCCs) as part of this study. Due to COVID-19 public meeting restrictions, the second Public Consultation Centre (PCC #2) was held online (EngageWR website) between June 28, 2021 and July 30, 2021. PCC #2 information was provided as an accessible Adobe Acrobat file, where interested parties could read and review presentation slides, Display Boards, and an Information Package.

Participants were encouraged to engage with the Project Team through:

- PCC# 2 Public Survey (focused on their Maple Grove Road experience);
- Question and Answer (Q&A) page;
- Comment forms/emails; and/or
- By phone.



The purpose of PCC #2 was to provide an opportunity for the public to provide input on needs and opportunities for improvements along Maple Grove Road, design alternatives considered by the Project Team, criteria used to evaluate design alternatives, and provide input/feedback on the Project Team's Recommended Design Alternative.

In advance of PCC #2, a PCC #2 information package (Appendix B) was prepared by Region and IBI Group staff for Regional Planning and Works Committee, comprised of members of Regional Council, review and acceptance.

### 10.1 Notice of Public Consultation Centre #2

Public notification for PCC #2 included:

- Newspaper Advertisements published in The Record and Cambridge Times on June 1, 2021 (Appendix E);
- Four (4) Roadside / Notification Sign Boards (1.2 x 2.4m) placed along Maple Grove Road;
- Posting on the Study's EngageWR webpage ([www.engagewr.ca/cambridge-maple-grove-road](http://www.engagewr.ca/cambridge-maple-grove-road)) on June 25, 2021; and

September 2023

- Notices were also mailed to over 384 residents within and around the Study Area, as well as emailed to agency, stakeholders, and Indigenous Community representatives.

## **10.2 Public Comments Received and Project Team Responses**

Region and IBI Group Project Manager contact information was provided for questions, comments, to be added to the project mailing list, and/or to request further information about the study.

During the review and comment period of PCC #2, the EngageWR webpage was visited 283 times. A detailed breakdown of public engagement during the review and comment period is included herein (Appendix V).

The Project Team responded to over 62 comments received during PCC #2 through the EngageWR website and email to the Region and IBI Group project managers. Responses (Appendix V) were posted on the EngageWR website.

## **11 Recommended Preliminary Design Concept**

### **11.1 Summary of Recommended Design**

Based on evaluation of widening alignment and cross-section alternatives, as well as public input, various inventories and identified constraints, the Project Team's Recommended Design Alternative includes:

- Widening Alignment Alternative – Concept 4 – Hybrid widening concept to minimize overall potential environmental impacts.
- Cross-Section Alternative A – Widen the road to four (4) lanes, with raised centre median, and 3.0m multi-use path on both sides.

Preliminary design of the Recommended Alternative is complete (Appendix S).

### **11.2 Additional Recommended Improvements**

Proposed widening of Maple Grove Road to four through traffic lanes includes enhancements to:

- the existing Ellis Creek bridge; including median separation and upgraded parapet barrier walls; and two pedestrian trail bridge creek crossings;
- improvements to existing signalized intersections at Vondrau Drive and Speedsville Road;
- a new signalized intersection at Boxwood Drive;
- closure of the intersection at Old Maple Grove Road, including a new cul-de-sac on Old Maple Grove Road;
- roundabout intersections at Beaverdale Road and Hespeler Road; and
- a potential future flyover bridge structure at Hespeler Road to accommodate existing high volumes of left turning traffic from northbound Hespeler Road to westbound Maple Grove Road.

Drainage will be conveyed to outlets via piped underground storm sewer and upgrading pipe capacity at watercourse crossings; as well as potential LID features in boulevard areas, roadside swales, piped underground storage, and surface storage, where available space permits.

### 11.3 Satisfaction of Study Objectives

This study sought to achieve the following:

- Support the direction of the Moving Forward 2018 Transportation Master Plan;
- Improve transportation needs for all users, including pedestrians, rollers, transit users, and drivers;
- Minimize potential impacts to the natural environment, cultural heritage (built and landscape), socio-economic activity, and existing infrastructure;
- Improve intersection operations and provide safe and efficient facilities for all users;
- Consider adjacent land uses and community growth to develop effective and sustainable recommendations for improvement; and
- Engage with the public to receive input on potential impacts to ensure that appropriate criteria inform selection of the preferred alternative solution.

Through consideration of impacts and evaluation of various design alternatives, each of the study objectives are satisfied by the proposed improvements. Further, presentation of proposed improvements to the public provided sufficient information to understand the proposed works and adequate time to comment on study findings and recommendations.

### 11.4 Estimated Project Costs

The cost of this project will depend on required infrastructure relocations and replacements, utility relocations, and property acquisitions. The estimated cost for the recommended design alternative is \$53.2M (Appendix W), excluding the potential future grade-separated flyover structure with an estimated (standalone) cost of \$12M. These estimates are based on 2021 public sector reconstruction project unit costs and may be subject to cost increases considering recent inflation, as well as supply and demand challenges. Approximately \$44.5M in funding for Maple Grove Road improvements was included in the Region's 2022 Transportation Capital Program, which includes approximately \$1M for active transportation facilities (i.e., multi-use path).

## Exhibit 11-1: Estimated Project Cost

| ITEM DESCRIPTION                                                                                                        | ESTIMATED VALUE        |
|-------------------------------------------------------------------------------------------------------------------------|------------------------|
| General Requirements                                                                                                    | \$ 1,274,600.00        |
| Removals                                                                                                                | \$ 7,199,597.00        |
| Storm Sewer & Appurtenances                                                                                             | \$ 4,834,465.00        |
| Roadworks                                                                                                               | \$14,239,145.00        |
| Streetlighting                                                                                                          | \$ 2,946,000.00        |
| Traffic Signals (Temporary and Permanent)                                                                               | \$ 1,275,000.00        |
| Miscellaneous/Provisional Items                                                                                         | \$ 783,900.00          |
| <b>Sub-total – Construction*</b>                                                                                        | <b>\$32,552,707.00</b> |
| Contingency Allowance (20%)                                                                                             | \$ 6,510,541.00        |
| <b>Total Including Contingency</b>                                                                                      | <b>\$39,063,248.00</b> |
| Property Acquisition                                                                                                    | \$ 3,919,176.00        |
| Utility Relocations                                                                                                     | \$ 1,850,000.00        |
| Landscaping (Post Construction)                                                                                         | \$ 651,000.00          |
| <b>Sub-total Project Cost (excl. HST)</b>                                                                               | <b>\$45,483,424.00</b> |
| Engineering (15%)                                                                                                       | \$ 6,822,514.00        |
| <b>Total Including Engineering and Contingencies</b>                                                                    | <b>\$52,305,938.00</b> |
| Non-refundable HST (1.76%)                                                                                              | \$920,585.00           |
| <b>Total Project Cost (incl. non-ref. HST)</b>                                                                          | <b>\$53,26,523.00</b>  |
| * Excludes flyover structure and future watermain or sanitary sewer costs associated with future development servicing. |                        |

## 12 Environmental Impacts, Mitigation, and Commitments

### 12.1 Natural Environment

A summary of potential impacts of the preferred alternative on the natural environment, including mitigation measures, are included herein (Exhibit 12-1).

**Exhibit 12-1: Summary of Potential Impacts / Mitigation on Natural Features within the Study Area**

| Potential Impacts    | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Extent of Affected Habitat <sup>1</sup>                                                                                                                                                          |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Direct Impact</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                  |
| Vegetation           | <ul style="list-style-type: none"> <li>• Delineate and survey woodland driplines and wetland boundaries that fall within 50 m of the construction footprint;</li> <li>• Complete a detailed tree inventory for woodland areas proposed for removal to inform the TIPP;</li> <li>• Limit unnecessary vegetation removal and degradation by clearly demarcating the boundaries of construction zones;</li> <li>• Install tree protection fencing following the recommendations outlined in the TIPP; and</li> <li>• Offset potential impacts of vegetation removal through identifying appropriate opportunities for creating, restoring and/or enhancing vegetation communities and wildlife habitats within the Study Area.</li> </ul> | <ul style="list-style-type: none"> <li>• 1.25 ha of cultural vegetation communities</li> <li>• 0.15 ha of agricultural row crops</li> <li>• 0.99 ha of natural vegetation communities</li> </ul> |

| Potential Impacts            | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Extent of Affected Habitat <sup>1</sup>                                                                                                                                                                                                                                                                                                                                             |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Significant Wildlife Habitat | <ul style="list-style-type: none"> <li>• Delineate and survey Seeps and Springs SWH boundaries that fall within 50 m of the construction footprint;</li> <li>• Consult with hydrogeologist to determine the need to complete a feature-based hydrogeological study to ensure confirmed Seeps and Springs SWH and candidate Amphibian Breeding (Woodland) SWH are protected from any potential adverse impacts resulting from the proposed road improvements;</li> <li>• Vegetation removal should avoid the nesting period for migratory birds (April 1 – August 31);</li> <li>• Construction activities should not occur within 10 m of any confirmed nests during the nesting period;</li> <li>• All tree removals from within treed vegetation communities (e.g., forest, swamp) should occur outside of the bat active period (April 1 – September 30);</li> </ul> <p>Where possible, ground disturbance should be avoided, or the extent of ground disturbance minimized, during the snake hibernation period (October 15 – April 15);</p> <ul style="list-style-type: none"> <li>• Timing of construction activities should avoid the peak amphibian breeding season (April 1 – June 30); and</li> </ul> | <ul style="list-style-type: none"> <li>• 0.01 ha confirmed Seeps and Springs SWH</li> <li>• 0.29 ha confirmed Special Concern and Rare Wildlife Species SWH (Eastern Wood-pewee)</li> <li>• 0.10 ha candidate Bat Maternity Colony SWH</li> <li>• 0.19 ha candidate Amphibian Breeding (Woodland) SWH for salamanders</li> <li>• 2.24 ha candidate Snake Hibernacula SWH</li> </ul> |

| Potential Impacts                            | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Extent of Affected Habitat <sup>1</sup>                                                                                                                                                                                                                                                     |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              | <ul style="list-style-type: none"> <li>Install wildlife exclusion fencing around construction footprint and complete wildlife salvage prior to any construction activities</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                             |
| Habitat of Endangered and Threatened Species | <ul style="list-style-type: none"> <li>Consultation with MECP is recommended to determine appropriate mitigation and ESA compliance with regards to Eastern Meadowlark prior to the initiation of any construction activities;</li> <li>Activities that may damage or destroy Eastern Meadowlark breeding habitat must not occur between May 1 and July 31;</li> <li>MECP consultation is recommended to determine the need for any further field surveys or permitting that may be required for Blanding's Turtle prior to initiating construction activities within regulated Category 3 habitat;</li> <li>Install exclusion fencing around construction footprint to exclude Blanding's Turtle from the construction zone and complete wildlife salvage prior to any construction activities;</li> </ul> | <ul style="list-style-type: none"> <li>0.18 ha Category 2 Eastern Meadowlark breeding habitat</li> <li>3.22 ha Category 3 Blanding's Turtle movement/travel corridor habitat</li> <li>0.10 ha candidate Little Brown Myotis, Northern Myotis and Tri-colored Bat general habitat</li> </ul> |
|                                              | <ul style="list-style-type: none"> <li>Maintain Ellis Creek riparian corridor and associated potential Blanding's Turtle movement corridor during construction; design exclusion fencing to funnel Blanding's Turtle individuals to Ellis Creek riparian corridor;</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                             |

| Potential Impacts           | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Extent of Affected Habitat <sup>1</sup>                                                                                         |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                 |
|                             | <ul style="list-style-type: none"> <li>MECP consultation is recommended to determine appropriate mitigation and ESA compliance for Little Brown Myotis, Northern Myotis and Tri-colored Bat prior to tree removal activities; and</li> <li>Tree removals should occur outside of the bat active period (April 1 – September 30)</li> </ul>                                                                                                                                                                                                                                                                             |                                                                                                                                 |
| Fish Habitat                | <ul style="list-style-type: none"> <li>The project will require review by the DFO's Fish and Fish Habitat Protection Program due to the proposed temporary and permanent removal and realignment of direct fish habitat along the Maple Grove Road corridor;</li> <li>DFO review of the project is recommended to be initiated as early as possible due to the lengthy review process and the potential for an Authorization to be required;</li> <li>Fish salvages are recommended to be completed by a qualified biologist prior to activities that may damage, destroy and/or isolate fish habitats; and</li> </ul> | <ul style="list-style-type: none"> <li>2,634 m Direct Fish Habitat</li> </ul>                                                   |
|                             | <ul style="list-style-type: none"> <li>Activities that may result in harmful alteration, damage or destruction of fish habitat should avoid the timing window for spring-spawning warmwater species (March 15 – July15).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                 |
| Wildlife Movement Corridors | <ul style="list-style-type: none"> <li>Install exclusion fencing around construction footprint to exclude small wildlife species from the construction zone and complete wildlife salvage prior to any construction activities; and</li> </ul>                                                                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>2,634 m of wildlife movement corridors associated with the West Creek, Middle</li> </ul> |

| Potential Impacts                                     | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Extent of Affected Habitat <sup>1</sup>                                                                              |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
|                                                       | <ul style="list-style-type: none"> <li>Exclusion fencing should remain in place throughout the active construction period and be regularly inspected to ensure that it is functioning properly. Any gaps in the</li> <li>fencing should be immediately repaired or replaced.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Creek/Hunsperger Drain, East Creek and Ellis Creek watercourse crossings of the Maple Grove Road corridor.           |
| <b>Indirect Impacts</b>                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                      |
| Disturbance to Adjacent Natural Features and Wildlife | <ul style="list-style-type: none"> <li>Limit unnecessary vegetation removal and degradation by clearly demarcating the boundaries of the construction zone;</li> <li>Detailed design of the proposed road improvements should consider maximizing the physical separation between the expanded road corridor and adjacent natural features;</li> <li>Tree protection fencing should be installed in accordance with recommendations outlined in the TIPP prior to the initiation of construction activities;</li> <li>Designated areas for parking, storage, stockpiling, etc., should be located outside retained natural features;</li> <li>Wildlife exclusion fencing should be installed and maintained throughout the construction period. A wildlife salvage should be completed prior to the initiation of any construction activities;</li> <li>Construction activities should be limited to occur during daylight hours between 07:00 hrs</li> </ul> | <ul style="list-style-type: none"> <li>All natural features within and adjacent to construction footprint</li> </ul> |

| Potential Impacts                    | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Extent of Affected Habitat <sup>1</sup>                                                                                                         |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | <p>and 19:00 hrs; and</p> <ul style="list-style-type: none"> <li>The use of artificial lighting should be avoided, but in areas where it is necessary, it should be turned off or directed away from natural features each evening during construction.</li> </ul>                                                                                                                                                                                                                                              |                                                                                                                                                 |
| Sedimentation and Erosion            | <ul style="list-style-type: none"> <li>An Erosion and Sediment Control (ESC) Plan must be developed prior to initiation of any construction activities;</li> <li>The ESC plan must incorporate measures to avoid sedimentation in adjacent natural features;</li> <li>ESC measures must be regularly inspected and repaired or replaced in a timely manner; and</li> <li>Seeding of graded areas not subject to active construction within 30 days with a suitable native seed mix.</li> </ul>                  | <ul style="list-style-type: none"> <li>All natural features and watercourses within and adjacent to construction footprint</li> <li></li> </ul> |
| Drainage and Surface Water Resources | <ul style="list-style-type: none"> <li>Engineering designs for the proposed road alignment should strive to maintain existing drainage patterns, flow rates and volumes relative to existing conditions; and</li> <li>Consult with hydrogeologist to determine the need to complete a feature-based hydrogeological study to ensure significant wetland features, including the SWM4-1 wetland community, are protected from any potential adverse</li> <li>impacts resulting from the proposed road</li> </ul> | <ul style="list-style-type: none"> <li>All wetland features and watercourses within and adjacent to construction footprint</li> </ul>           |

| Potential Impacts   | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Extent of Affected Habitat <sup>1</sup>                                                                                              |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
|                     | improvements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                      |
| Water Quality       | <ul style="list-style-type: none"> <li>Water quality mitigation measures, including road salt controls, are to be determined based on the outcome of detailed design;</li> <li>Machinery must be well maintained and refueled, washed and serviced a minimum of 30 m from watercourse and wetland features; and</li> <li>A Spill Response Plan (SRP) must be developed prior to commencement of construction.</li> </ul>                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>All wetland and watercourse features within and adjacent to construction footprint</li> </ul> |
| Induced Impacts     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                      |
| Habitat Degradation | <ul style="list-style-type: none"> <li>Garbage, leaf litter, and other debris should not be deposited within adjacent natural features and buffer areas; Installation of “No Dumping” and “No Littering” signage can mitigate this potential induced impact;</li> <li>The use of lawn or garden chemical should be avoided in natural feature buffers and reduced or eliminated within any proposed grass boulevards;</li> <li>Any landscape plantings should use native species to avoid the proliferation of non-native species within adjacent natural features;</li> <li>No vegetation clearing should occur within adjacent natural features or buffer areas except for non-native species removal; and</li> <li>All recommended buffers to adjacent natural</li> </ul> | <ul style="list-style-type: none"> <li>All natural features adjacent to construction footprint</li> </ul>                            |

| Potential Impacts | Mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Extent of Affected Habitat <sup>1</sup>                                                                                                                                                                                                                                                                                                           |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | features should be maintained in a natural state.                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                   |
| Road Mortality    | <ul style="list-style-type: none"> <li>Wildlife eco-passages should be incorporated into the design of all proposed improvements/alterations to watercourse crossings;</li> <li>Wildlife eco-passages should be incorporated into the design of any culverts to be installed for maintaining water balance along the Maple Grove Road corridor; and</li> <li>The use of wildlife fencing and/or funneling techniques should be considered where eco-passages are installed.</li> </ul> | <ul style="list-style-type: none"> <li>All wildlife movement corridors associated with the West Creek, Middle Creek/Hunsperger Drain, East Creek and Ellis Creek watercourse crossings of the Maple Grove Road corridor.</li> <li>All areas of the road corridor where natural features are present to the north and south of the road</li> </ul> |

1. Approximated from Aerial Imagery.

Proposed road improvements provide an opportunity to support overall ecological integrity, connectivity, and long-term sustainability of the natural environment system through the restoration and/or enhancement of features and habitat present within and adjacent to Maple Grove Road (Exhibit 12-2).

#### Exhibit 12-2: Recommended Restoration and Enhancement Activities

| Recommended Restoration and/or Enhancement | Location(S)                                                        | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Purpose                                                                                                                                                                           |
|--------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fish Habitat Enhancement                   | <ul style="list-style-type: none"> <li>Hunsperger Drain</li> </ul> | <ul style="list-style-type: none"> <li>Restoration of aquatic habitats should be completed immediately following completion of construction activities.</li> <li>The incorporation of natural channel design concepts is recommended to be considered in consultation with MNRF and DFO at detailed design for the proposed realignment and restoration of the Drain. This can include planting of native aquatic vegetation, placement of suitable substrates, restoration of pool/riffle habitats, placement of shoreline woody debris, and restoration and/or enhancement of bank stability.</li> </ul> | <ul style="list-style-type: none"> <li>To improve existing fish habitat conditions and support the long-term sustainability of fish communities within the Study Area.</li> </ul> |

| Recommended Restoration and/or Enhancement | Location(S)                                                                                                                                                                           | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wildlife Corridor Enhancement              | <ul style="list-style-type: none"> <li>• Middle Creek/ Hunsperger Drain Wildlife Corridor</li> <li>• East Creek Wildlife Corridor</li> <li>• Ellis Creek Wildlife Corridor</li> </ul> | <ul style="list-style-type: none"> <li>• Enhancement and provision of wildlife corridors between existing natural features of the Maple Grove Road PSW Complex, Ellis Creek PSW Complex and the Speed River PSW complex.</li> <li>• The extent to which corridors are used by animals is influenced by several interrelated factors including the width, length, vegetation type, suitability of habitat in the area surrounding the corridor, impacts of edge effects such as windthrow, and species- specific preferences (Wilkinson 2001).</li> <li>• The restoration and enhancement of wildlife corridors should therefore consider such factors in the design of any corridors.</li> </ul> | <ul style="list-style-type: none"> <li>• To improve the function of existing wildlife corridors through providing wildlife access to a wide range of habitats throughout the Study Area, facilitating seasonal migrations, providing security to species which are sensitive to human activities, and by maintaining genetic diversity of wildlife populations. The enhancement of the corridor will also support the maintenance of the diversity of plant species in the area.</li> </ul> |

| Recommended Restoration and/or Enhancement             | Location(S)                                                                                                                          | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Purpose                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Natural Feature and Buffer Restoration and Enhancement | <ul style="list-style-type: none"> <li>All identified natural feature buffers within the temporary construction footprint</li> </ul> | <ul style="list-style-type: none"> <li>All disturbed natural features and buffers within the temporary construction footprint should be restored immediately following the completion of construction activities to minimize establishment of non-native, invasive species.</li> <li>Restoration and enhancement of natural features and buffers should include the seeding and/or planting of locally sourced, native species. Following the establishment of vegetated buffers, no vegetation clearing, or maintenance activities should occur within buffers with the exception of non-native species removal. All buffers should be maintained in a natural state.</li> </ul> | <ul style="list-style-type: none"> <li>To restore areas of natural features that were removed during the construction phase of the project.</li> <li>To provide long-term protection to the form and function of retained natural features and sensitive wildlife habitats from potential induced impacts such as the proliferation of non-native species within sensitive natural features.</li> </ul> |

### 12.1.1 Terrestrial Habitat

There are potential direct and indirect impacts due to proposed widening and grading; however, mitigation measures are also proposed (Exhibit 12-3).

#### Exhibit 12-3: Terrestrial Habitat Impacts and Mitigation

| IMPACT                                                                              | MITIGATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vegetation removal impacts on birds (e.g., nesting)                                 | <ul style="list-style-type: none"> <li>• Avoid vegetation removal during the core nesting period, April 1 and August 31 (as per the <i>Migratory Birds Convention Act</i>, 1994).</li> <li>• If removals are required during the core nesting period, consultation must occur with the Canadian Wildlife Service. May require nest surveys to be conducted by a qualified biologist within 48 hours of removal to ensure nesting birds are not present.</li> </ul>                                                                                                                                                                                                                                                                    |
| Damage to trees during construction                                                 | <ul style="list-style-type: none"> <li>• Ensure Best Management Practices during excavation, which may include root pruning and an on-site Certified Arborist.</li> <li>• In the event a privately owned tree is damaged (e.g., health or structural integrity) the Region shall consult with the affected property owner.</li> <li>• In areas where trees are to be retained, machinery should be maintained at a designated location away from these areas. No contaminants are to be dumped or flushed within the areas where feeder roots of tree exist.</li> <li>• If any of the trees are damaged or die because of construction activities, the Region's Arborist shall be consulted to determine a plan of action.</li> </ul> |
| Removal/ maintenance of trees on private property during construction               | <ul style="list-style-type: none"> <li>• Region will consult with the property owner prior to removal of trees.</li> <li>• Region will provide property owners with guidance and recommendations on how to implement a proper maintenance program for privately owned trees.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Construction impacts on candidate Wetland Amphibian Breeding Habitat and amphibians | <ul style="list-style-type: none"> <li>• Heavy-duty ESC fencing should be erected along the limits of the project where wetlands exist and be maintained by the Contractor throughout the entirety of construction activities and reestablishment of surfaces.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

### **12.1.2 Aquatic Habitat**

If in-water works are required, construction should adhere to MNRF and DFO in-water works timing restrictions, to be determined in consultation with MNRF, DFO, and GRCA. All in-water works are preferred during the dry, low flow season and not during or after a significant precipitation event. The shortest possible duration in-water works are preferred.

Completion of in-water works should be in isolation from the main flow of creeks, and a fish salvage should be completed during any worksite isolation and dewatering.

Completion of a Fisheries Act Self-Assessment is required for the proposed works within the existing watercourse culverts at Middle Creek, East Creek, and Ellis Creek, as well as the Hunsperger Municipal Drain, as part of detailed design to determine if a full DFO review and Fisheries Act Authorization is required.

Proposed works must strive to avoid causing significant impacts to fish and should not contravene any Species at Risk Act (SARA) prohibitions with respect to aquatic species. Per the DFO Fisheries Protection Policy Statement, best practices and appropriate mitigation techniques are required throughout the project following DFO's *Measures to Avoid Causing Harm to Fish and Fish Habitat*. Application of these measures will avoid causing significant impacts to fish, thereby maintaining compliance with the federal Fisheries Act.

## **12.2 Archaeology and Cultural Heritage**

### **12.2.1 Archaeology**

Parts of the Study Area possess archaeological potential. These lands require Stage 2 archaeological assessment by test-pit survey at five metre intervals, prior to any proposed impacts to the property. Should proposed work extend beyond the current Study Area, then additional Stage 1 archaeological assessment is required to determine archaeological potential of those lands.

If areas in proximity to Wanner Cemetery on Beaverdale Road are impacted, a Stage 3 archaeological assessment shall be undertaken, including the use of ground penetrating radar (GPR) or an approved alternative technology, to confirm the specific location of existing graves and their potential encroachment within Region right-of-way.

Detailed road design geometry shall acknowledge grave locations and the need to avoid disturbance or disruption to all graves.

### **12.2.2 Built Heritage and Cultural Heritage Landscapes**

Planning staging and construction activities to avoid impacts to identified cultural heritage resources is preferred. Should future work require an expansion of the Study Area, then a qualified heritage consultant is required to confirm the impacts of the proposed work on potential heritage resources.

### **12.2.3 First Nations Input and Responses**

Notices were sent to each of the Haudenosaunee, Mississaugas of the Credit First Nation, and Six Nations of the Grand River at all project milestones. Distribution of Stage 1 Archaeological Assessment report occurred on January 26, 2022, via email. There remain no outstanding comments or questions from the First Nations with respect to the Stage 1 Archaeological Assessment report. First Nations will be contacted to coordinate Stage 2 fieldwork, and subsequently report review, following Ministry of Heritage, Sport, Tourism and Culture Industries' (now Ministry of Citizenship and Multiculturalism) entering the Stage 1 report into the Register.

## **12.3 Active Transportation**

The Project Team Recommended Design Alternative was presented to the Region's Active Transportation Advisory Committee (ATAC) on March 15, 2022. The Committee unanimously supported the Project Team Recommended Design Alternative, while offering the following requests:

- Mid-block crossings at Grand River Transit Facilities and at the Maple Grove Dog Park (1000 Maple Grove Road);
- Tree planting in boulevard areas and medians, where possible; and
- Active Transportation connections at both the east and west limit of the Study Area.

Detailed design will include review of these requests.

## **12.4 Noise Attenuation**

Preliminary study indicates that noise attenuation may be required on some sections of Maple Grove Road. Detailed design will include noise attenuation, as required. During detailed design, assumptions, analyses, and findings of the preliminary noise study will be verified to ensure this study reflects final design of the road. The design of any noise attenuation should minimize impacts to adjacent properties and entrance features, subject to Regional guidelines.

## 12.5 Air Quality

Construction-related air emissions are expected. Two major types of emissions are likely, dust from various material handling operations, and combustion emissions from construction equipment, which is typically powered by diesel engines. Emissions will be temporary, and the impact is not predicted to result in a significant impact along, and adjacent to, Maple Grove Road.

## 12.6 Drinking Water Source Protection

As part of the Hydrogeological Site Assessment undertaken by PML (Appendix K), a review of MECP water well records indicated that there is an existing municipal well located at 1084 Fountain Street North (about 380 metres south of its intersection with Maple Grove Road). The well head protection areas (WHPAs) for this municipal well extend into the project area. Portions of the Maple Grove Road project area fall within the WHPA-C and WHPA-D radius zones of the municipal well. The WHPAs of the municipal well are depicted in the GRCA figures included in Appendix K. It is expected that construction dewatering for the Maple Grove Road project will not have an impact on municipal ground water levels since the municipal well lies far outside the dewatering zone of influence (DZOI) and will be within a near-surface aquifer not expected to be connected to the deeper aquifer from which municipal water is typically collected.

Salt-laden runoff can have impacts on the natural environment. The nature and extent of these impacts is site specific and may be temporary or can persist for long periods of time. The most significant potential long-term impact of salt-laden runoff is impairment of drinking water sources, including the integrated water supply for the cities of Cambridge, Kitchener, Waterloo, Elmira, New Hamburg, and 16 smaller rural communities. In some areas, the concentration of chloride in the groundwater and streams may reach levels sufficient to impair the quality of groundwater or alter aquatic habitat. The suitability of groundwater for potable use and irrigation can be significantly impaired by the infiltration of salt captured by roadway runoff.

Due to expected use of road salt during snow clearing and de-icing operations, roadway design, to the extent possible, will follow the Region's *Salt Management Design Guidelines* to minimize the need for salt use.

It is possible that storage and handling of fuel may pose a drinking water threat. Mitigation measures include:

- Do not to re-fuel close to water bodies; and
- Clean up fuel spills immediately.

The proponent must also consult with the Risk Management Official of the Region of Waterloo during detailed design to ensure protection of drinking water.

## 12.7 Supply Wells

There are twenty-two (22) recorded private water wells in the Study Area surrounding Maple Grove Road and intersecting streets. Hydrogeological investigation for this project contains maps illustrating subject water wells and provides recommendations for protection of water resources associated with these wells.

The risk that road reconstruction and relatively shallow underground services installation would impact a private well (quality or quantity) is very low, in particular, the wells that are deeper drilled wells. The risk would increase somewhat if there were dewatering planned near a shallower well. The MECP database is not sufficiently detailed to confirm with certainty whether all are active wells, nor the type and depth of each well. As a result, it is recommended that a qualified professional complete several items before or during construction:

- A baseline inventory of each well, including contact with each owner and possible collection of a static water level and water quality sample, where appropriate and permissible;
- Water level monitoring of any shallow wells identified to be at risk of interference during adjacent construction work and arrange for a temporary supply, where appropriate and permissible;
- Collection of a static water level and water quality sample after construction is complete at each well, where appropriate and permissible;
- Long-term ground water level monitoring should be conducted to identify the seasonal high and low ground water levels and time periods;
- Servicing and bridge construction methods, inverts, dimensions, and locations are assumed. Estimated ground water discharge rates, DZOI, and associated impacts may require revision once design and construction methods are complete. Additional hydrogeological investigation may be prudent to fill in information gaps;
- When design is final and dewatering discharge method considerations have been made, if an EASR is still appropriate, a Water-taking Plan and Discharge Plan (includes discharge rates, DZOI, impact assessment, monitoring program, proposed discharge locations, methods of transfer, and erosion control measures) required for the EASR registration (MECP water-taking permit) for construction dewatering must be prepared by a qualified person based on the report;

- Since ground water levels vary over time, it is best to schedule excavation for periods of low ground water levels. Dewatering methods (sumps, wellpoints) should be no deeper than required to achieve the desired drawdown. Surface water intrusion should be minimized;
- No shoring was assumed for the study related analyses. Sheet pile walls or founding methods that do not require dewatering, such as piles or steel-lined caissons, will reduce required dewatering;
- Any shoring drawings, dewatering plans, and excavation plans should be reviewed by a qualified geotechnical engineer for proper implementation of geotechnical and hydrogeological findings and recommendations presented in the hydrogeological report, as well as the geotechnical report; and
- All compliance monitoring (discharge water quality, ground water levels, and potential settlement) should be performed as set out in the Water-taking Plan, as above.

## **12.8 Erosion and Sediment Control Plan**

Erosion and sediment control practices will guide design and implementation of the Erosion and Sediment Control Plan, prior to start of construction:

- Limit size of disturbed area;
- Limit duration of soil exposure;
- Retain existing vegetation, where feasible;
- Limit slope, length, and gradient of disturbed areas;
- Preserve overland sheet flow and micro-drainage (avoid concentrated channel flow);
- Break and redirect flows to lower gradients;
- Design and implement staged stripping;
- Prevent disturbance of previously stripped and stabilized parcels; and
- Stabilize stripped parcels with temporary vegetative controls.

In addition, temporary/permanent erosion control measures should be considered in design and implementation of the Erosion and Sedimentation Control Plan:

- Hydro-seeding/Seed and Bonded Fibre Matrix - One step application of seed and hydraulic slurry with adhesive binder (provides permanent stabilization for moderate to steep slopes);
- Seed and Straw Mulch - Alternative two step application that will be applied to provide permanent/temporary vegetative stabilization of disturbed areas;
- Mulch (straw, wood, etc.) - Used to provide temporary erosion protection of exposed slopes during over-wintering and for disturbed areas inactive for greater than 45 days;
- Sod - Utilized to provide quick permanent stabilization of disturbed areas. Applications include lateral ditches with gradients <5% and slopes with steep to moderate grades (i.e. 3% to 5%);
- Erosion Control Blanket - Applied as temporary/permanent erosion protection for slopes greater than 2:1 or as a ditch liner. For permanent applications, seed will be applied prior to installation; and
- Aggregate Stone - Appropriate material, such as riprap, will be used to provide immediate permanent erosion protection of lateral ditches >5% gradient; and along chute/spillways. Geotextile fabric will be applied prior to placement of any aggregate material.

### **12.8.1 Sediment Control**

The following elements will be included in the sediment control plan:

- Provision of a series of temporary interceptor/conveyor ditches to direct runoff to the siltation/watercourses;
- Provision of rock or flow checks within drainage swales/ditches; and
- Placement of silt control fencing for the interception of sheet flow drainage.

Sediment control measures should not be removed until final stabilization of the site. In addition, accumulated sediment should be removed, as part of a maintenance program, from all control measures when accumulation reaches 50% of the height or volume of the control structure.

Environmental inspections of the construction site should be conducted to assess the performance of erosion and sedimentation control measures and identify any required maintenance. Frequent inspections will permit identification of localized erosion and sediment control issues that require site-specific attention.

A 200 m standby supply of prefabricated silt fence barrier, in addition to silt fence requirements, should be maintained at the construction site, prior to commencement of grading operations, and throughout the duration of the contract.

Where interceptor ditches and/or subsurface drains are required, construction should occur prior to commencement of any related cut or fill activities.

Cut and fill earth slopes and ditches, shall be treated with the specified cover material (seed and mulch, seed and erosion control blanket, seed and sod, rip rap, etc.) within 45 days from commencement of cut, fill, or ditching operation.

Run-off from the site and stockpiles will be controlled to the extent possible to minimize sediment entry to the adjacent watercourse.

Where dewatering is required, effluent shall be discharged in a manner that prevents entry of sediment to watercourses and/or scouring and erosion at the outlet.

All erosion and sediment control measures will be stated in contract drawings and documents.

## **12.9 Contamination of Surface Water from Other Sources/Best Management Practices**

There is potential for contamination of surface water from sources other than sediment (e.g. spills or other materials/equipment). Best management/construction practices and control of all construction operations will be implemented during construction to reduce potential for spills or other materials/equipment from entering watercourses within the Study Area. The following measures will be used:

- Storage, stockpiling, and staging areas will be delineated prior to construction and inspected;
- Construction material, excess material, construction debris, and empty containers will be stored away from watercourses. Equipment refueling, maintenance, and washing activities will be conducted at a pre-determined site located at an adequate distance (minimum 30 m) from watercourses to prevent entry of petroleum, oil, or lubricants (POL) or other deleterious substances (including any debris, waste, rubble, or concrete material), or their release to the environment. Any material which inadvertently enters the watercourses will be removed by the Contractor in a manner satisfactory to the Contract Administrator; and
- All spills that could potentially cause damage to the environment must be reported to the Spills Action Centre of the Ministry of the Environment, Conservation and

Parks (MECP) and to Fisheries and Oceans Canada (DFO). In the event of a spill, containment and clean-up will be completed quickly and effectively.

These environmental protection measures will greatly reduce potential for surface water contamination from spills of POL and from other materials/equipment from entering the watercourses within the Study Area and will provide contingency in the event of an unforeseen event.

## **12.10 Climate Change**

In 2017, the MECP released a document entitled “Considering Climate Change in the Environmental Assessment Process” (2017) that provides guidance relating to the ministry’s expectations for considering climate change during the environmental assessment process.

There are two key approaches to address climate change, including reducing a project’s impact on climate change (climate change mitigation) and increasing the local ecosystem’s resilience to climate change (climate change adaptation).

### **12.10.1 Potential for Project to Impact Climate Change**

The Maple Grove Road improvements project is a transportation project and impacts to climate change can be considered in terms of vehicular greenhouse gas emissions. Reconstruction and widening of Maple Grove Road will improve the level of service along the corridor. With added lanes through widening, it is anticipated that traffic delays and idling will be reduced upon completion of the project and that the emission of greenhouse gases may be reduced compared to existing conditions. Roundabout intersections at Hespeler Road and Beavertown Road will also reduce vehicle delay and related emissions while idling. The recommended design alternative also includes infrastructure improvements for all modes of transportation, including active transportation. The provision of a continuous multi-use path and cycling network will encourage more sustainable modes of transportation within the corridor, contributing to a reduction in vehicular greenhouse gas emissions.

Another way to reduce greenhouse gas levels is through carbon sequestration. Carbon sequestration is the process of capturing, securing, and storing carbon dioxide from the atmosphere. The idea is to stabilize carbon in solid and dissolved forms (trees, for example) so that it doesn’t cause the atmosphere to warm. On average, forests store twice as much carbon as they emit, while an estimated 25% of global carbon emissions are sequestered alongside forests in other vegetative forms, such as grasslands or rangelands (fields, prairies, shrublands, etc.). This process shows tremendous promise for reducing the human carbon footprint.

The recommended widening alternative (Concept 4 – Modified “hybrid widening concept” to minimize overall impacts) provides the highest level of carbon sequestration, as Concept 4 is the least disruptive widening alternative in terms of impacts to existing areas of forestry and established vegetation, when compared to other alternatives.

The recommended alternative design cross-section (Alternative A) includes 4.25m wide grass boulevards, which provide ample space for planting new street trees along the corridor. Planting of new street trees would assist in this regard and will improve existing conditions. The extent of street tree planting will be confirmed during detailed design.

### **12.10.2 Potential for Climate Change to Impact this Project**

Climate change has the potential to result in increased storm events that can lead to flooding. The existing and aging stormwater infrastructure will be upgraded and replaced / enhanced as part of this project. Low Impact Development (LID) measures for increased quantity and quality control will be considered during detailed design which would assist in reducing impacts. This undertaking is expected to make the area less vulnerable to climate change.

## **12.11 Traffic Management and Control**

Traffic impacts and neighbourhood disruption will be minimized during construction. A detailed traffic management plan that provides work zones, road lane closure extents, and times must be prepared. The traffic management plan will be reviewed by Region and City staff to ensure that all traffic disruptions are minimized.

## **12.12 Other Construction Commitments**

### **12.12.1 Construction Noise**

The Contractor will be required to ensure that factory recommended mufflers are maintained on all construction equipment. Sound emissions from all construction equipment should comply with MECP Guideline NPC-115 *Sound Levels from Construction Equipment*. An exemption should be obtained from the City of Cambridge if nighttime work or work on Sunday is required.

### **12.12.2 Monitoring**

Recommended monitoring for this project includes monitoring to ensure compliance with permit conditions, and effectiveness monitoring to evaluate the performance of mitigation measures. Monitoring will also include:

- Monitoring success and growth of new plantings and trees planted as part of road construction;

- Construction monitoring by an independent environmental monitor to determine if any wildlife has been inadvertently trapped or are found within construction areas during construction;
- Construction monitoring by an independent environmental monitor to ensure implementation and adherence to permit conditions;
- Monitoring effectiveness of sediment and erosion control; and
- Monitoring re-establishment of salvaged plantings that have been relocated during construction.

### **12.12.3 Air Quality**

To limit construction impacts on air quality, mitigation measures are proposed:

- Watering to limit dust emissions from surfaces;
- Covering of excavated materials or fill materials stored on site; and
- Street cleaning to limit tracking of materials.

To minimize potential impacts from diesel-powered construction equipment, mitigation measures are proposed:

- Locating truck staging zones away from potential receptors; and
- Minimizing idling time for all diesel-powered equipment operating on site.

Other measures can be applied by the contractors and site inspectors to ensure that impacts of combustion source exhaust and fugitive dust emissions are controlled during construction. For combustion related emissions and impacts, measures can be considered:

- Selecting construction equipment to be used on site based upon low emission factors and high energy efficiency;
- Ensuring that all construction equipment is tuned and maintained in accordance with manufacturer's specifications;
- Using only ultra-low sulphur fuel for diesel engines and ensuring that equipment is equipped with diesel particulate matter traps to reduce particulate matter emissions;

- Utilizing electric or diesel-powered equipment, in lieu of gasoline-powered engines, where feasible;
- Ensuring that construction plans include a statement that work crews will shut off equipment when it is not in use;
- During smog alerts (May through October), measures should be taken to ensure that diesel equipment use is optimized to reduce the emissions of smog forming substances;
- Whenever possible, time construction activities to avoid peak hour traffic and minimize obstruction of through traffic lanes adjacent to the site. If necessary, a flag person should be retained to maintain safety adjacent to existing roadways; and
- Support and encourage ride sharing and transit use for the construction crew.

Additional measures can be employed to reduce the amount of fugitive dust released from construction activities. Generally, the objective should be to employ the best available control measures to ensure that dust does not remain visible in the atmosphere beyond the property line of the emission source. Measures include dust suppression techniques such as:

- Water active sites daily;
- All trucks hauling dirt, sand, soil, or other loose materials should be covered;
- All adjacent streets should be cleaned by the contractor if visible soil materials are present due to the project's operations; and
- Install wheel washers where vehicles enter and exit the work site onto public roads.

Potential air quality mitigation measures will be confirmed during detail design.

#### **12.12.4 Natural Environment**

Any development proposed within GRCA-regulated area requires permission from the GRCA, in the form of a permit pursuant to O.Reg. 150/06. For permit application, final plans showing extent of development (including grading) and any proposed profile changes within the floodplain are required. If significant grading is required, a grading plan showing existing and proposed grades is beneficial. Plans should also clearly identify the extent of encroachment into natural areas and wetlands and should include proposed restoration plans, if applicable.

## 13 Implementation Schedule

After consideration of all technical information completed and public input received the Project team endorsed the preferred alternative as the Project Team Recommended Alternative and Region Staff presented a recommendation to Regional Council on May 25, 2022, for approval of the study and its recommendations. Council approved the study for filing in accordance with the Class Environmental Assessment and MECP requirements and this ESR was completed for that purpose.

Detailed design, and utility relocations are funded in the 2022 Regional Transportation (10-Year) Capital Program to be completed in 2022 and 2023, with primary construction to occur between 2023 and 2026.

## **14 Study Completion**

### **14.1 Region of Waterloo Council Approval**

The Region's Planning and Works Committee considered staff Report TES-DCS-22-16 for the approval of the Recommended Design Alternative for Maple Grove Road at the May 10, 2022, meeting. The staff report and Minutes of the Region's Planning and Works Committee meeting on May 10, 2022, as well as final Council approval of the Recommended Design Alternative at the May 25, 2022, meeting, are included herein (Appendix X).

### **14.2 Notice of Study Completion**

A Notice of Study Completion was published on September 26<sup>th</sup>, 2023 in the Waterloo Region Record and on September 28<sup>th</sup>, 2023 in the Cambridge Times. A copy of the Notice was also sent to the public, agencies, and stakeholders, including Indigenous Communities, the week of September 25<sup>th</sup>, 2023. Public notices, including the Notice of Study Completion, are included herein (Appendix E); the study contact list is also included (Appendix C).