Strasburg Road Extension
From North of Stauffer Drive
To New Dundee Road

Class Environmental Assessment

ENVIRONMENTAL STUDY REPORT

October 2013
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To New Dundee Road
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October 2013

Prepared for:
City of Kitchener
200 King Street West
Kitchener, ON N2G 4G7
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APPENDIX E STRASBURG ROAD EXTENSION DESIGN PLATES
GLOSSARY OF TERMS AND ACRONYMS

Following are definitions of the common terms and acronyms referred to when discussing the Strasburg Road Extension.

AAQC – Ambient Air Quality Criteria

ANSI – Area of Natural and Scientific Interest

BHR – Built Heritage Resource

CEAA – Canadian Environmental Assessment Act

CHL – Cultural Heritage Landscape

Class EA - Municipal Engineers Association Class Environmental Assessment

A planning process that must be applied to all municipal infrastructure projects. It is an evaluation of all environmental implications of a project and involves extensive public consultation to identify and mitigate any adverse impacts.

COS – Contaminated Overview Study

COSEWIC – Committee on the Status of Endangered Wildlife in Canada

COSSARO – Committee on the Status of Species at Risk in Ontario

dBA – A-weighted decibels

DFO – Department of Fisheries and Oceans

EA – Environmental Assessment

An Environmental Assessment (EA) is a process used in Ontario to determine the possible impacts that proposed infrastructure projects may have on the environment so that the best possible decisions can be made on if, where, when and how to construct such projects.

ELC – Ecological Land Classification

ESA – Endangered Species Act, 2007

ESCP – Erosion and Sediment Control Plan

ESR – Environmental Study Report

GRCA – Grand River Conservation Authority

HADD – Harmful alteration, disruption or destruction of fish habitat, as defined in the federal Fisheries Act

MBCA – Migratory Birds Convention Act

MOE – Ontario Ministry of the Environment
MNR – Ontario Ministry of Natural Resources

MTCS – Ontario Ministry of Tourism, Culture and Sport (formerly Ministry of Tourism and Culture (MTC))

NAPS – National Ambient Pollution Surveillance

OPSS – Ontario Provincial Standard Specification

POR – Point of Reception (in the context of noise sensitive receptors)

PTTW – Permit to Take Water

ROW – Right-of-way

RTMP – Regional Transportation Master Plan

SAR – Species at Risk

SARA – Species at Risk Act

SARO – Species at Risk in Ontario

TPA – Technically Preferred Alignment

WWR – Water Well Records
EXECUTIVE SUMMARY

ES.1 Introduction

In April 2010, the City of Kitchener initiated a Class Environmental Assessment (EA) study for the extension of Strasburg Road in the southwest section of the City, from approximately 500 m north of Stauffer Drive southerly to New Dundee Road, and retained SNC-Lavalin Inc. (SLI) to lead the study. The study process and results are documented in this Environmental Study Report (ESR).

The City deems the segment of the proposed Strasburg Road Extension from Rush Meadow Street to north of Stauffer Drive to be an established corridor, by virtue of approvals secured under the Planning Act, and has acquired lands to accommodate the extension over a portion of the corridor. This segment of the road extension is referred to as the North Section, and the City initiated Detail Design for the North Section at the same time as initiating the Class EA study. The Class EA study area is referred to as the South Section of the road extension. Figure ES.1 shows the conceptual alignment of the established Strasburg Road corridor, for which Detail Design is in progress (North Section), and the initial limits of the Strasburg Road Extension Class EA Study (South Section), in relation to the adjacent Huron, Brigadoon and Doon South communities. The City has presented details of the North Section design on its project website (www.kitchener.ca/en/businessinkitchener/Environmental_assessments.asp).

Figure ES.1: Strasburg Road Extension Project Area - Community Context and Scope

It is important to note that the initial South Section (Class EA) study area was modified in order to provide additional flexibility to develop the alignment alternatives from north of Stauffer Drive to New Dundee Road. Please refer to Section ES.4 and Section 4.3 in this regard.
ES.2 Project Need and Study Purpose

The approved alignment of Strasburg Road Extension from Rush Meadow Street to 500 m north of Stauffer Drive has been developed based on the recommendations from a number of community and transportation network planning studies that were completed between 1981 and 2008. The principal studies that established the alignment and form the basis for this environmental study are the 1982 Huron Industrial Development Transportation Planning and Engineering Study and the 1994 Doon South – Brigadoon Transportation Network and Corridor Study, which are summarized in the body of this ESR, are on file with the City of Kitchener and have been made available for public review on the City’s environmental assessment project website (www.kitchener.ca/en/businessinkitchener/_Environmental_assessments.asp) during the course of this EA study.

The Doon South - Brigadoon Transportation Network and Corridor Study provided the need and justification for future transportation improvements in a study area bounded by Conestoga Parkway, Highway 8, Highway 401 and Trussler Road. The study concluded that the existing road network would not be able to support the increased traffic demand associated with projected growth without a number of network improvements, including the extension of Strasburg Road from Battler Road to New Dundee Road.

Additional need and justification for the project has been documented in the Regional Transportation Master Plan (RTMP) prepared by the Region of Waterloo, which states that the extension of Strasburg Road from Rush Meadow Street to New Dundee Road is required to relieve future demand on Homer Watson Boulevard, Huron Road and Fischer Hallman Road, as well as to support the future growth and approved development in the area at Doon South and other areas in southwest Kitchener. The RTMP indicates that the Strasburg Road Extension (Huron Road to New Dundee Road) has been recognized as an integral part of the Region’s strategic road network improvement approach, with implementation required within 5-10 years (second highest level of priority).

The purpose of this EA study is to determine the most appropriate alignment for Strasburg Road from north of Stauffer Drive to New Dundee Road, and to identify potential future collector road intersection(s), in compliance with the planning and design process set out in the Municipal Engineers Association Municipal Class Environmental Assessment.

ES.3 Project Approach

This study was conducted as a Schedule C undertaking in accordance with the Municipal Engineers Association Municipal Class Environmental Assessment (October 2000, as amended in 2007 and 2011) (“Municipal Class EA”). Schedule ‘C’ undertakings are projects that may have significant environmental effects on the environment and must proceed under the full planning and documentation procedures outlined in the Municipal Class EA Document, including preparation of an Environmental Study Report and filing of the ESR in the public record for public review.

The Class Environmental Assessment study included a comprehensive set of integrated environmental and engineering investigations (inventories; impact assessment; mitigation recommendations) conducted by specialist consultants, using established/approved methods and protocols, as well as consultation with technical staff of regulatory agencies and other stakeholders with knowledge of the study area. The City of Kitchener established a Project Team to provide technical input and direction on the project. The multi-agency, multi-disciplinary Project Team, representing a broad range of mandates and interests, included staff from the following groups:
In addition to providing technical input and direction, the Project Team was responsible for selection of the Technically Preferred Alignment (TPA) for the Strasburg Road Extension.

A comprehensive communications program was conducted by the City for engaging and consulting with known stakeholders and potentially interested parties at both mandatory and discretionary points in the environmental assessment process (refer to Section 2.2 and Appendices A and B). Table ES.1 identifies the communication/consultation mechanisms employed in the study.

### Table ES.1: Consultation Activities and Mechanisms Summary

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<td>Online Consultation</td>
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The principal mechanism for gauging public interest and related questions and concerns was Public Information Centres (PIC). PIC dates and major comments received in relation to the alternative alignments study are summarized in Table ES.2. A detailed summary of comments received and responses provided is presented in the Consultation Record in Appendix A of this ESR.

**Table ES.2: Summary of Public Information Centre Dates and Comments**

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<th>Public Information Centre</th>
<th>Major Comments Received</th>
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| **Public Information Centre No. 1 - Introduction and Background (June 10, 2010)** | • Scope of the Environmental Assessment investigations.  
• Length of the study time frame.  
• Effects on property values.  
• Environmental impacts of noise, pollution and traffic on wildlife, wetlands, groundwater recharge areas, designated Environmentally Sensitive Policy Areas and the community. |
| **Public Information Centre No. 2 Short-Listed Alignment Alternatives (June 1, 2011)** | • Retain Countryside and select an East alternative; there should be an option east of Reidel Drive.  
• Preference for “No Road” option or W1.  
• Recognized service/cost advantages of East Series, but concern over potential impacts to natural and cultural heritage features; noise impacts to existing residents.  
• C1 and C2 represent best balance between East and West Series.  
• Safety (lack of sight distance) concern over existing Reidel Drive-Cameron |
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<th>Public Information Centre</th>
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<td>Road/New Dundee intersection and potential traffic impacts on Cameron Road.</td>
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<td>• Protection of Stauffer Drive as a walking trail.</td>
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Public Information Centre No. 3 Technically Preferred Alignment (October 26, 2011)

|                           | There were expressions of interest in seeing the project proceed to construction as soon as possible. |
|                           | • About half of the comment sheets specified a preference for Alignment W1 either as the best option, or the best option, understanding that they prefer the road not be built at all. |
|                           | • There were a number of comments focusing on impacts to the property at 500 Stauffer Drive and protection of the farm pond and preservation of the bed and breakfast business on the property. |
|                           | • There were continued concerns expressed about the safety (lack of sight distance) concern over existing Reidel Drive-Cameron Road/New Dundee intersection and potential traffic impacts on Cameron Road. |

Public Information Centre No. 4 New Technically Preferred Alignment (April 24, 2013)

|                           | Support for the project, and expression of a desire to move quickly to alleviate traffic on surrounding roads and to reduce the costs associated with the EA process. |
|                           | • Stated preference for Alignment W1 due to the least environmental impacts, avoidance of sensitive areas (forested areas and wetlands) and protecting to the bed and breakfast operation at 500 Stauffer in terms of economic impacts. |
|                           | • General overall concern that the full extent of the Strasburg Road Extension will have an impact on natural heritage features (forests and wetlands) in the area. |

Based on contacts on file with the City, and the information provided by government agencies with mandates related to constitutionally protected Aboriginal or treaty rights, the City also contacted selected First Nations communities/groups, but has received limited response to date.
ES.4 Modified Class EA Study Area and Existing Conditions

It is important to note that the Project Team agreed to modify the initial Class EA study area in order to provide additional flexibility to develop the alignment alternatives from north of Stauffer Drive to New Dundee Road. This involved pulling the north limit of the study area northerly (refer to Figures ES.2a and ES.2b). For additional details, please refer to Section 4.3 of this ESR.

The study area is situated on in the southwest corner of the City of Kitchener, on the periphery of the urban envelope, and extending into the rural and agricultural lands designated by the City, and the Countryside area designated by the Region of Waterloo (including protected countryside, prime agricultural land and rural designations).

The majority of the lands in the study area are owned by development interests and are used for agricultural purposes. There are three residences in the immediate study area.

The study area is bisected by the Upper Blair Creek corridor (headwater area), which includes deciduous forests, cultural communities and areas designated as Provincially Significant Wetland as part of the Roseville Swamp – Cedar Creek complex, but which has limited sensitivity from a fisheries perspective. Other vegetation communities within the general study area are characteristic of areas in southern Ontario that have been heavily influenced by historical clearing for agriculture and residential development. The study area is also located in an upland area associated with the Waterloo Moraine Complex, an important groundwater recharge source. An overarching constraint to the project in the study area is the regulated habitat for Jefferson Salamander, which is listed as endangered under Ontario Regulation 230/08. The species receives individual species protection and regulated habitat protection pursuant to Sections 9 (1) and 10 (1) of the *Endangered Species Act*.

From a cultural heritage perspective, the study area contains seven (7) cultural heritage landscapes, including the historic roadscape along Stauffer Drive and Reidel Drive and two (2) farmscapes (500 Stauffer Drive (designated under the *Ontario Heritage Act*); and 271 Reidel Drive). The study area also exhibits potential for the identification of both Aboriginal and Euro-Canadian archaeological sites.

The existing road network in the study area is limited to New Dundee Road (a Region of Waterloo arterial roadway and the boundary road between the City of Kitchener and the Township of North Dumfries), and Reidel Drive and Stauffer Drive, which are local roads under the jurisdiction of the City of Kitchener. There are currently no municipal services within the study area, and existing residents are serviced by private wells and septic systems on their lands. Utilities within the study area include Kitchener-Wilmot Hydro poles along the Reidel Drive/Cameron Road corridor, and along New Dundee Road. With respect to future municipal services in the area, it should be noted that lands east of Reidel Drive and north of New Dundee Road have received draft approval for development.
Figure ES.2a: Modified Strasburg Road Extension Study Area – Community Context

NORTH SECTION
Detail Design - Strasburg Road Extension (Rush Meadow Street to north of Stauffer Drive). Includes design and construction of municipal services (gravity trunk sanitary sewer; watermain; stormwater management)

SOUTH SECTION
Class EA - Complete Phases 1-4 of MEA Schedule C process for Strasburg Road Extension (500 m north of Stauffer Drive to New Dundee Road)

Road Network Source: Schedule “B” Amendment to the City of Kitchener Municipal Plan – Map 4: Transportation
Figure ES.2b: Strasburg Road Extension Study Area – Project Area Context
ES.5 Development and Evaluation of Alignment Alternatives

The development of the alignment alternatives was based on the designation of the Strasburg Road Extension as a 4-lane Secondary Arterial road with an urban (curb and gutter) cross-section and 30 m right-of-way platform.

Nine (9) alignment alternatives (referred to as the long list of alignment alternatives) were initially developed and were categorized under three series, based on the geographical location, as described below.

**East Alignments (E1, E2, E3, E4)**

These alignments are based on the Strasburg Road Extension designated in the Kitchener Municipal Plan (which was retained as an option – Alignment E1). They reduce impacts to the bed and breakfast/agricultural operation to the east side of property (compared to the Municipal Plan alignment), avoid the Stauffer Woods ESPA; retain the Reidel Drive scenic-heritage route; and/or relocate the existing Reidel Drive-Cameron Road/New Dundee Road intersection to a location that may provide better sight distance.

**Central Alignments (C1, C2)**

These alignments limit impacts to the bed and breakfast/agricultural operation to west side of the property; and/or relocate the existing Reidel Drive-Cameron Road/New Dundee Road intersection to a location that may provide better sight distance.

**West Alignments (W1, W2, W3)**

These alignments minimize or avoid impacts to the B&B operation, most sensitive groundwater recharge area; the Roseville Swamp - Cedar Creek PSW and the large woodlot at the west end of the stream corridor; and/or relocate the existing Reidel Drive-Cameron Road/New Dundee Road intersection to a location that may provide better sight distance.

It is important to note that there are two designated future east-west collector roads (Robert Ferrie Drive and Blair Creek Drive) that will intersect with the Strasburg Road Extension alignment and were accounted for in the development and assessment of the alignment alternatives.

In June 2013, Council decided that the alignment for the future extension of Robert Ferrie Drive west of its current terminus will be determined through an Official Plan Amendment process and the design of the road will be developed as part of a Plan of Subdivision process. Therefore, the future Robert Ferrie Drive alignment west of the Countryside Line assessed during the Strasburg Road Extension environmental assessment should be considered as a “possible” alignment (based on the alignment currently shown in the City's Municipal Plan).

At the same time, Council also decided that the alignment for the extension of Blair Creek Drive west of Reidel Drive will be determined through the Municipal Class Environmental Assessment process. Therefore, the future Blair Creek Drive alignment assessed during the Strasburg Road Extension environmental assessment should also be considered as a “possible” alignment (based on the alignment currently shown in the draft approved plans of subdivision for Doon South Phase 2).

It should also be noted that the technical comparative assessment of the alignment alternatives involved two (2) major stages, the first ending in September 2011 and second ending in March 2013. The sections below describe the comparative assessment and evaluation work completed in Stage 1 and Stage 2. The Stage 1 long list and short list of alignment alternatives are shown in Figure ES.3. The short-listed options are highlighted in yellow.
Figure ES.3: Long List and Short-Listed Alignment Alternatives
Stage 1 Comparative Assessment (September 2010 – September 2011)

The long list of alignment alternatives was evaluated against the following project objectives and a related set of evaluation criteria to arrive at the short-listed alignment alternatives:

**Primary Objective**
- Provide for approved development and future growth (Doon South and other areas in southwest Kitchener), including traffic service and municipal services.

**Secondary Objectives**
- Relieve future demand on Homer Watson Boulevard, Huron Road and Fischer Hallman Road.
- Achieve compatibility with City and Regional policies for future growth and development, and the location of any related road intersections.
- Minimize impacts to natural heritage features and other important environmental resources.

The following short-listed alignment alternatives were presented at PIC No. 2 as the options the Project Team recommended for more detailed assessment (refer to Figure ES.3):
- Alignment E2
- Alignment E3
- Alignment E4
- Alignment C2
- Alignment W1

In September 2011, following a detailed assessment of the short-listed alignment alternatives, the Project Team concluded that a combination of Alignments E3 and E4 (Alignment E4 Modified – refer to Figure ES.4) represented an acceptable balance of advantages and disadvantages across the spectrum of evaluation criteria and should be adopted as the Technically Preferred Alignment.

The summary rationale for selection of Alignment E4 Modified during the Stage 1 comparative assessment is as follows:
- It is adequate for meeting traffic operations, transit, and servicing requirements.
- It represents the shortest crossing of the Blair Creek corridor, minimizing impacts to natural heritage features, including wetlands, streams and fish habitat, groundwater resources, and wildlife.
- It exhibits relatively high overall conformance with Region of Waterloo and City of Kitchener planning policies, including an acceptable level of intrusion on the Protected Countryside; and impacts to agricultural resources/operations.
- It results in an acceptable balance of impacts to and preservation of cultural heritage resources and provides opportunity to enhance the scenic heritage road and trail network in the Doon South Community.
- It has the second lowest capital cost and private property requirements.
Figure ES.4: Stage 1 Technically Preferred Alignment (E4 Modified)
After Stage 1 of the comparative assessment, a Draft Environmental Study Report was prepared, at which time the City initiated an extended public and agency consultation process (referred to hereinafter as the Additional Consultation Stage) to ensure that it had a comprehensive set of comments upon which to base its decision related to the proposed Technically Preferred Alignment. The Draft ESR was filed in the public record (May 7, 2012), with provision for receipt of stakeholder comments until September 26, 2012. Based on the comments received, and other information that came to light, during the Additional Consultation Stage (see below), City of Kitchener Council determined that additional work was required to complete the Environmental Study Report.

There were five significant influences on the comparative assessment process after the Draft ESR was released in May 2012:

1. Council heard, first hand, significant public support for the owner of 500 Stauffer Drive.

2. In December 2012, City Council passed a Notice of Intention to designate 500 Stauffer Drive under the Ontario Heritage Act and subsequently (March 2013) passed By-Law 2013-026 designating the property under Part IV of the Act (refer to Appendix B).

3. An additional alignment alternative (referred to as Alignment W2 Modified) was introduced for consideration by landowners in the study area (Developers’ Group Alignment) (refer to Section 4.4.2.1).

4. The Ministry of Natural Resources clarified its position on crossing Jefferson Salamander regulated area (suggesting that there will be significant challenges for the City in meeting the legal tests that provide the authority for the Minister to issue a permit under the Endangered Species Act 2007, with respect to mitigating impacts and providing overall benefit for the species) (refer to August 30, 2012 MNR correspondence in Appendix B).

5. The Regional Municipality of Waterloo expressed concerns regarding timing for the proposed regional trunk watermain in the Strasburg Road allowance and its connectivity to existing watermains in Doon South; and identified the need to investigate an alternative route into Doon South to serve imminent development and to implement changes being recommended in the Region’s Water Distribution Master Plan.

These changes resulted in the need to revisit the previous alignment assessment, including conducting a review of the Evaluation Criteria used in the assessment.

Stage 2 Comparative Assessment (December 2012 – March 2013)

The Strasburg Road Extension alignments retained for comparative assessment in Stage 2 are shown in Figure ES.5 and included the five short-listed alternatives from Stage 1 (Alignments E1, E2, E3, E4, C2 and W1), the Technically Preferred Alignment from Stage 1 (Alignment E4 Modified), and the Developers’ Group Alignment (W2 Modified).

The Evaluation Criteria were revised based on the foregoing influences and a review by both Council and the Project Team.

A comparative assessment was then completed by the Project Team for the seven (7) alignments, using the revised Evaluation Criteria. A Project Team workshop was held on March 27, 2013, wherein the Consultant Team’s detailed comparative assessment and scoring of the alternatives was presented to the Project Team, and a consensus-building discussion ensued to select the New Technically Preferred Alignment. Alignment W1 received the highest scores from the Project Team and was identified as the New TPA. Table ES.3 presents the final scoring summary for the alignment alternatives.
Figure ES.5: Alignments Retained for Stage 2 Comparative Assessment
<table>
<thead>
<tr>
<th>Table ES.3: Final Scoring and Ranking of Alignment Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. NATURAL ENVIRONMENT</strong></td>
</tr>
<tr>
<td><strong>1A. Terrestrial Ecosystems</strong></td>
</tr>
<tr>
<td><strong>1B. Aquatic Ecosystems</strong></td>
</tr>
<tr>
<td><strong>1C. Groundwater Resources</strong></td>
</tr>
<tr>
<td><strong>1D. Surface Drainage</strong></td>
</tr>
<tr>
<td>E2: 8  E3: 9  E4: 9  E4 Mod: 9  C2: 8  W1: 10  W2: 7</td>
</tr>
<tr>
<td><strong>1E. Species at Risk Permits</strong></td>
</tr>
<tr>
<td>E2: 2  E3: 2  E4: 2  E4 Mod: 2  C2: 1  W1: 10  W2: 2</td>
</tr>
<tr>
<td>Natural Environment Score: 5.20  5.80  5.80  6.60  4.00  10.00  6.20</td>
</tr>
<tr>
<td><strong>2. SOCIO–ECONOMIC ENVIRONMENT</strong></td>
</tr>
<tr>
<td><strong>2A. Land Use Policy</strong></td>
</tr>
<tr>
<td>E2: 10  E3: 6  E4: 9  E4 Mod: 9  C2: 5  W1: 1  W2: 3</td>
</tr>
<tr>
<td><strong>2B. Existing and Approved Land Use</strong></td>
</tr>
<tr>
<td><strong>2C. Communities</strong></td>
</tr>
<tr>
<td>E2: 9  E3: 8  E4: 10  E4 Mod: 10  C2: 6  W1: 4  W2: 8</td>
</tr>
<tr>
<td><strong>2D. Noise</strong></td>
</tr>
<tr>
<td>E2: 2  E3: 4  E4: 3  E4 Mod: 3  C2: 5  W1: 10  W2: 8</td>
</tr>
<tr>
<td>Socio-Economic Environment Score: 6.75  5.75  7.00  7.00  6.50  5.50  6.50</td>
</tr>
<tr>
<td><strong>3. CULTURAL ENVIRONMENT</strong></td>
</tr>
<tr>
<td><strong>3A. Archaeological Resources</strong></td>
</tr>
<tr>
<td><strong>3B. Built Heritage</strong></td>
</tr>
<tr>
<td><strong>2C. Cultural Heritage Landscapes</strong></td>
</tr>
<tr>
<td>E2: 2  E3: 5  E4: 3  E4 Mod: 4  C2: 6  W1: 10  W2: 9</td>
</tr>
<tr>
<td>Cultural Environment Score: 2.67  4.33  3.00  4.00  5.00  10.00  7.33</td>
</tr>
<tr>
<td><strong>4. TRANSPORTATION/MUNICIPAL SERVICES AND UTILITIES</strong></td>
</tr>
<tr>
<td><strong>4A. Transportation Network/Infrastructure</strong></td>
</tr>
<tr>
<td><strong>4B. Municipal Services and Utilities</strong></td>
</tr>
<tr>
<td>Transportation/Municipal Services &amp; Utilities Score: 10.00  6.50  9.00  8.50  8.00  4.50  5.50</td>
</tr>
<tr>
<td><strong>5. FINANCIAL/TECHNICAL</strong></td>
</tr>
<tr>
<td><strong>5A. Financial</strong></td>
</tr>
<tr>
<td>E2: 5  E3: 7  E4: 9  E4 Mod: 10  C2: 6  W1: 4  W2: 3</td>
</tr>
<tr>
<td><strong>5B. Technical</strong></td>
</tr>
<tr>
<td>E2: 5  E3: 7  E4: 7  E4 Mod: 8  C2: 6  W1: 10  W2: 7</td>
</tr>
<tr>
<td>Financial/Technical Score: 5.00  7.00  8.00  9.00  6.00  7.00  5.00</td>
</tr>
<tr>
<td>TOTAL SCORE: 29.62  29.38  32.80  35.10  29.50  37.00  30.53</td>
</tr>
<tr>
<td>RANK: 5  7  3  2  6  1  4</td>
</tr>
<tr>
<td>% BEHIND FIRST RANKED ALIGNMENT: 20  21  11  5  20  17</td>
</tr>
</tbody>
</table>
Following is the principal rationale for selection of Alignment W1 as the Technically Preferred Alignment:

- Avoids natural heritage features, including wetlands, forests, streams and fish habitat, wildlife passage areas, groundwater recharge areas, regulated floodplain
- Avoids regulated SAR habitat and significant challenges associated with obtaining an Endangered Species Act permit
- Results in the least significant impacts to owner-occupied residence and bed and breakfast business at 500 Stauffer Drive
- Results in the lowest noise impacts
- Avoids cultural heritage features (roadscapes); limited impacts to other cultural heritage features (farm complexes)
- Provides the desired spacing between the new intersection on New Dundee Road and the existing Reidel Drive-Cameron Road intersection
- Is physically the easiest option to construct

The Technically Preferred Alignment selected by the Project Team during Stage 2 of the comparative assessment was presented to and approved by the City’s Planning and Strategic Initiatives Committee at a special meeting on May 22, 2013 and was subsequently ratified by Council at its regular meeting on June 10, 2013.

Figure ES.6 shows the New Technically Preferred Alignment (Alignment W1), as selected by the Project Team, in isolation from the other alignment alternatives (in green). The Technically Preferred Alignment was subsequently refined, based on discussions with the directly affected landowners, in consideration of the need to: maximize the use of the existing city-owned property at the north limit; reduce overlap of the design over multiple properties; and provide greater distance to (buffer) natural heritage features in the Blair Creek corridor, including the Jefferson Salamander regulated habitat. Figure ES.6 shows the basic right-of-way for the refined TPA carried forward to Preliminary Design (in red).
Figure ES.6: Stage 2 New Technically Preferred Alignment (Alignment W1) and Refined TPA Carried Forward for Preliminary Design
ES.6 Environmental Impacts Associated with Proposed Alignment, Proposed Mitigation Measures and Other Requirements

The Technically Preferred Alignment has been refined, based on discussions with the directly affected landowners, and developed to the Preliminary Design (30%) level of design. Preliminary Design drawings are presented in Appendix E of this ESR.

The proposed design has the potential to result in environmental condition changes within the project area and will require the implementation of mitigation treatments and additional environmental and engineering investigations. General commitments in these regards are described in Section 5.2 and summarized in Table 5.6 of this ESR. The principal mitigation treatments incorporated in the Preliminary Design scheme at this time include:

- Incorporation of measures to avoid or minimize indirect impacts to wetlands, woodlots and hydrologic attributes that constitute Jefferson Salamander functional habitat (i.e., those features in the regulated area east of Alignment W1). Needs in this regard will be confirmed/investigated further during the Detail Design phase in consultation with MNR.
- Maintenance of natural surface drainage and groundwater flow across the road corridor to retain downstream baseflow contributions in Blair Creek.
- Collection of roadway runoff by storm sewers and direction of runoff to stormwater treatment facilities (3 stormwater management ponds; oil/grit separators; and enhanced/grassed swales) prior to discharge to receiving watercourses.
- Conducting strategic pre-construction baseline surveys of potable water wells; implementing a construction phase Complaint Protocol in response to water well quantity/quality concerns; and engaging in appropriate post-construction environmental groundwater effects monitoring.
- Protection of vegetation communities not scheduled for removal; and ecological restoration of disturbed areas using compatible vegetation species.
- Maintenance of access to affected residential accesses (500 Stauffer Drive; 271 Reidel Drive), and existing agricultural operations by maintaining the travelled thoroughfare on Reidel Drive from the south and introducing new agricultural field entrances.
- Introduction of landscaping for aesthetic purposes (reduction of headlight glare) adjacent to residential property. This may include both earth berms and vegetative plantings (trees and shrubs).
- Construction phase environmental compliance monitoring (inspection).

The estimated capital cost of implementing the project is $12.8 Million. The City’s current plans envisage implementation of the project within the next 6 years, contingent upon available Development Charge funding.

Significant modifications to the project proposals or changes in the environmental setting that occur after the filing of the ESR will require preparation of an addendum to the ESR. A review of the project and changes to the project proposals may also be required if there is a significant lapse of time between the filing of the ESR and the start of construction (10 years). Where an ESR Addendum is issued, only the project elements in the Addendum (the proposed changes to the recommended undertaking) are open for review.
1.0 INTRODUCTION

1.1 Background and Context

In April 2010, the City of Kitchener initiated a Class Environmental Assessment (EA) study for the extension of Strasburg Road from approximately 500 m north of Stauffer Drive southerly to New Dundee Road, and retained SNC-Lavalin Inc. (SLI) to lead the study.

The preferred alignment of Strasburg Road from its current terminus just west of Rush Meadow Street to a point north of Stauffer Drive was originally recommended through the Transportation Planning and Engineering Study for the Huron Industrial Development in 1982. This study identified and established the transportation infrastructure requirements for the Huron Industrial Development with a focus on the development of a secondary arterial road network and the provision of rail and public transit service to the area. The associated Huron Business Park Secondary Plan (1983) established the new Strasburg Road as a Secondary Arterial Road, and confirmed the preferred alignment to a point approximately 500m north of Stauffer Drive. Subsequent studies identified an alignment for the Strasburg Road Extension that is currently shown in a conceptual manner on Map 4 (Transportation) of the City’s Municipal Plan. Figure 1.1 is an extract from Map 4 and shows the Strasburg Road Extension area currently under consideration by the City in relation to other existing and proposed roads in the southwest section of the City. Additional historical context of the road extension is provided in Section 1.2.1.

Figure 1.1: Strasburg Road Extension Project Area (North and South Sections)
The City deems the segment of the proposed Strasburg Road Extension from Rush Meadow Street to north of Stauffer Drive to be an established corridor, by virtue of approvals secured under the *Planning Act*, and has acquired lands to accommodate the extension over a portion of the corridor. This segment of the road extension is referred to as the North Section, and the City initiated Detail Design for it at the same time as initiating the Class EA study. The Class EA study area is referred to as the South Section of the road extension.

Figure 1.2 shows the conceptual alignment of the established Strasburg Road corridor, for which Detail Design is in progress (North Section), and the initial limits of the Strasburg Road Extension Class EA Study (South Section) in relation to the adjacent Huron, Brigadoon and Doon South communities.

It is important to note that the Project Team agreed to modify the initial South Section (Class EA) study area in order to provide additional flexibility to develop the alignment alternatives from north of Stauffer Drive to New Dundee Road. Please refer to Sections 3.1 and 4.3 in this regard.

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1 The Ministry of Environment’s Environmental Assessment Branch (Environmental Assessment Services) has also advised the City that it is satisfied that the City’s planning process for the North Section of Strasburg Road under the *Planning Act* has met the intent of the *Municipal Class Environmental Assessment* with respect to consideration of potential environmental impacts of the project, assessed a reasonable range of alternatives through a public and transparent process, and involved various agencies and stakeholders. This acceptance is contingent upon the use of current best management practices to mitigate the potential environmental effects of the project, which the City has been incorporating in the Detail Design investigations.
1.2 Environmental Study Report

Municipal road projects in Ontario are subject to Ontario’s Environmental Assessment Act (EA Act). The Municipal Engineers Association’s Municipal Class Environmental Assessment (Municipal Class EA) process for planning, design and construction of municipal infrastructure was developed in accordance with the EA Act and is described in more detail in Section 2.1 of this document. This Environmental Study Report (ESR) documents the planning process conducted in accordance with the Municipal Class EA for the South Section of the Strasburg Road Extension (from north of Stauffer Drive to New Dundee Road).

The ESR is organized as follows:

Section 1 introduces the study, including background and the context with other projects, and presents the rationale for the project and related study objectives.

Section 2 summarizes the Municipal Class EA process and the overall approach to carrying out the study.

Section 3 describes the existing conditions and planned development/projects in the study area within a multi-disciplinary framework to establish the baseline conditions against which project alternatives have been assessed.

Section 4 presents the development and assessment of alternative planning and design solutions, including identification of the Technically Preferred Alignment for the Strasburg Road Extension.

Section 5 describes the recommended design for the Technically Preferred Alignment in some detail, including how the alignment was refined to limit environmental impacts, the potential impacts, proposed mitigation measures, and commitments to additional environmental investigations and monitoring.

Section 6 outlines the staging/timing of future phases of the project and the approvals required to implement the project.

The ESR Appendices provide supplementary and more detailed information on the Consultation Record, documentation of study decisions, the proposed design of the roadway, and supporting technical investigations.

1.3 Purpose of the Project

1.3.1 Historical Development of the Strasburg Road Extension

The approved alignment of Strasburg Road Extension from Rush Meadow Street to 500 m north of Stauffer Drive has been developed based on the recommendations from a number of community and transportation network planning studies that were completed between 1981 and 2008. The chronological summary is presented in Table 1.1.
Table 1.1: Chronological Summary of Strasburg Road Extension

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1981</td>
<td>Based on <em>Transportation Planning and Engineering Study – Huron Industrial Development</em> and related public consultation during January 1981, City Council resolved that the future extension of Strasburg Road should be subject to further study to determine an exact alignment through the transportation planning and Secondary Plan process.</td>
</tr>
<tr>
<td>June 1982</td>
<td>The “New” Strasburg Road alignment from Huron Road to a point approximately 1.6 km south, was established in the City’s Official Plan Amendment (OPA) No. 8 and the findings of the <em>Transportation Planning and Engineering Study – Huron Industrial Development</em> were subsequently approved by the Region of Waterloo.</td>
</tr>
<tr>
<td>December 1982</td>
<td>City Planning Committee approved the Huron Business Park Secondary Plan and related transportation engineering studies for Huron Road and Strasburg Road reconfirming the alignment of Strasburg Road from Huron Road, southerly to approximately 500 m north of Stauffer Drive.</td>
</tr>
<tr>
<td>February 1983</td>
<td>City Council approved the alignment of Strasburg Road, from Huron Road southerly to approximately 500 m north of Reidel Drive. Strasburg Road was classified as a ‘Secondary Arterial’ with a right-of-way width of 26 m.</td>
</tr>
<tr>
<td>September 1983</td>
<td>Regional Council approved the alignment of Strasburg Road alignment, from Huron Road, southerly to approximately 500 m north of Stauffer Drive including its classification and proposed right-of-way.</td>
</tr>
<tr>
<td>September 1989</td>
<td><em>Brigadoon Community Plan</em> (adopted through City OPA 98), established the collector road arrangement within the Brigadoon Community and reconfirmed the Strasburg Road Extension following the previously approved alignment, southerly to 500 m north of Stauffer Drive.</td>
</tr>
<tr>
<td>1992 - 1994</td>
<td><em>Doon South – Brigadoon Transportation Network and Corridor Study</em> confirmed the need for the new Strasburg Road corridor south of Huron Road in a process consistent with Phases 1 and 2 of the MEA Class EA, including government agency and public consultation. An addendum to the report recommended that Strasburg Road be extended within its planned alignment as a 4-lane roadway from south of Huron Road to New Dundee Road.</td>
</tr>
<tr>
<td>1999</td>
<td>Region of Waterloo <em>Transportation Master Plan</em> included the proposed alignment of the Strasburg Road Extension from Huron Road to north of Stauffer Drive.</td>
</tr>
<tr>
<td>January 2003</td>
<td><em>Doon South Community Plan</em> reconfirmed the proposed extension of Strasburg Road as a Secondary Arterial Road south of Huron Road to north of Stauffer Drive.</td>
</tr>
<tr>
<td>2004 - 2005</td>
<td>City Council approved the 2004 <em>Development Charges</em> study and the <em>Brigadoon Community Plan</em>, which reconfirmed the Strasburg Road alignment from Huron Road to approximately 500 m north of Stauffer Road.</td>
</tr>
<tr>
<td>2009-2010</td>
<td>Several parcels in Doon South Community - Phase 2 were subject to an Ontario Municipal Board hearing in 2009. Subsequent Plan of Subdivision</td>
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</tbody>
</table>
Draft Approval for these parcels included the condition that Strasburg Road must be extended from its current terminus at Rush Meadow Street to New Dundee Road and Robert Ferrie Drive must be extended from its current terminus at Tilt Drive to Strasburg Road prior to registration of development plans.

City of Kitchener information package to MOE Environmental Assessment and Approvals Branch (EAAB) on chronology of North Section of Strasburg Road Extension, and subsequent determination by EAAB that the City complied with the intent of the Municipal Engineers Association Municipal Class Environmental Assessment in establishing the North Section alignment through decisions made under the Planning Act.

The principal studies that established the alignment and form the basis for this environmental study are the 1982 Huron Industrial Development Transportation Planning and Engineering Study and the 1994 Doon South – Brigadoon Transportation Network and Corridor Study, which are summarized below. These studies are on file with the City of Kitchener and have been made available for public review on the City’s environmental assessment project website (www.kitchener.ca/en/businessinkitchener/Environmental_assessments.asp) during the course of this EA study.

Huron Industrial Development Transportation Planning and Engineering Study (1981)

On June 22, 1981, the City of Kitchener, in accordance with the provision of Sections 13 and 17 of the Planning Act, adopted the official plan amendments for the Huron Industrial Park (Amendment No 8.). The primary purpose of Amendment No. 8 was to expand the boundaries of the Plan for Land Use to incorporate the lands for future development.

As part of the official plan amendments, it was clearly identified that the City would develop a secondary plan for this area. The main components of the secondary plan were the servicing strategy and related staging plan; drainage policies; a comprehensive transportation planning study; identification and protection of residential, significant historic and archaeological features; wooded and floodplain areas; open space system; subwatershed studies, and a detailed land use plan. Further, as part of the official plan amendments, it was recognized that the location of Strasburg Road was general in nature, pending the determination of the exact alignment through the transportation study and secondary plan.

The Official Plan Amendment process included standard notification and meeting mechanisms to obtain public input. No parties appealed to the Ontario Municipal Board (OMB) at the time and the plan was approved.

During the official plan amendment process, it was recognized that certain works, such as construction and/or widening of roads in the area may be subject to the requirements of the provincial Environmental Assessment Act. This included identification of which elements will be subject to the requirements of the EA Act and which works will be exempt as part of the transportation planning study referred to above.

Pursuant to the Official Plan Amendment recommendations, the City initiated a Secondary Plan for the Huron Industrial Development, and the Transportation Planning and Engineering Study for Huron Road and the extension of Strasburg Road. The Transportation Planning and Engineering Study developed and analyzed seven (7) alternative alignments for the Strasburg Road Extension. These alternative alignments were inventoried for major environmental and other study area sensitivities and evaluated through various criteria that included impacts to
environmental features, existing residential areas and potential development areas, as well as the potential for providing traffic and transit service, and potential road geometric design challenges.

From the detailed environmental screening and other analyses and input, including public and agency consultation, the City selected a preferred alignment for the Strasburg Road Extension and developed a preliminary design. In 1982 and 1983, City Council approved the Strasburg Road Extension alignment from Huron Road southerly to approximately 500 m north of Reidel Drive. These studies, Official Plan Amendments, or Secondary Plans, were not appealed to the OMB under the Planning Act. As such, the City and other government agencies accepted this as the final alignment and approved the subdivisions and zoning change applications. Further, subsequent development (including the Brigadoon Community and Huron Community) and road network improvements have proceeded on the basis of this Strasburg Road Extension alignment.

**Doon South – Brigadoon Transportation Network and Corridor Study (1994)**

In 1994, the City initiated the Doon South - Brigadoon Transportation Network and Corridor Study that is consistent with Phase 1 and Phase 2 of the Municipal Class EA process and provided the need and justification for, as well as the general location of a recommended transportation corridor network. Included in the report addendum is the recommendation that Strasburg Road be extended within its planned alignment as a 4-lane arterial roadway from Battler Road to New Dundee Road.

The main study objectives included:

- Assessment of the need for additional east-west access, including the feasibility of extending Doon South Drive from its current terminus to (former) Westmount Road;
- Assessment of the need for additional access to the study area from Highway 401;
- Assessment of the opportunity for realigning Strasburg Road south of Stauffer Drive so that Reidel Drive may be designated as a “Scenic Road”.

Other objectives that emerged during the study included:

- Minimize traffic impacts on the existing communities of Upper Doon, Doon South, Pioneer, Caryndale and Brigadoon;
- Minimizing impacts on identified significant environmental resource areas;
- Recognize the City’s desire to promote more compact urban development and accommodate changing travel characteristics (provide greater opportunities for non-vehicular travel);
- Recognize the City’s desire to develop a scenic/heritage road network within the study area
- Minimize the impacts on heritage areas; and
- Provide a cost-effective transportation network that allows traffic and transit planning flexibility, as well as staging potential.

The Doon South – Brigadoon Transportation Network and Corridor Study developed various road network alternatives, including the Do Nothing scenario, and assessed them under the following criteria:

- Natural Environment
Each of the above-noted factors was further refined to develop detailed criteria to assess the alternative alignments to identify the preferred alignment. The Do Nothing option was discarded because it “is not a viable alternative due to the fact that the road network within the study area cannot accommodate additional development related traffic without further improvements”.

There were two public information centres for this project to present the various alternatives and the preferred alternative. The final report was posted in the City’s website.

On June 20, 1994, the City adopted the Doon-South – Brigadoon Transportation Network and Corridor Study. Through this study, the alignment of Strasburg Road from its terminus south of Trillium Drive (at Battler Road) to a point just north of Stauffer Drive was reconfirmed in accordance with the following:

- Approved Huron Industrial Development Transportation Planning and Engineering Study;
- Approved Secondary Plan for Huron Business Park; and
- Approved Brigadoon Community Plan

With the approval by City Council of the 2004/2005 Development Charge Background Study and the Brigadoon Community Plan, the proposed alignment of the Strasburg Road Extension between Rush Meadow Street and 500 m north of Stauffer Drive was reconfirmed.

Approval of the Doon South Community Plan – Phase II in 2009 reconfirmed the alignment of the Strasburg Road Extension between Rush Meadow Street and Stauffer Drive.

Approval of the Regional Transportation Master Plan by the Region of Waterloo has confirmed the need for and prioritization of the extension of Strasburg Road from Rush Meadow Street to New Dundee Road. In 2009, the City’s Development Charges Background Study also reconfirmed the need for the extension of Strasburg Road.

**Doon South Ontario Municipal Board Hearing (2009)**

In 2009, several parcels within the Doon South Community – Phase 2 were subject to an Ontario Municipal Board hearing, which resulted in additional community planning efforts by the City, and Draft Approvals of subdivision plans. The conditions of Draft Approval include the stipulation that Strasburg Road be extended from its current terminus at Rush Meadow Street to New Dundee Road, and Robert Ferrie Drive be extended from its current terminus at Tilt Drive to Strasburg Road prior to registration of Stage 2, 3 and 4 development plans. In addition, prior to the final approval, the subdivider must dedicate to the City of Kitchener any required lands for the new Strasburg Road right-of-way in accordance with the Strasburg Road Environmental Assessment to be undertaken to establish the alignment of Strasburg Road from a point north of Stauffer Drive to New Dundee Road.

The purpose of this EA study is to determine the most appropriate alignment for Strasburg Road from north of Stauffer Drive to New Dundee Road, and to identify potential future collector road
intersection(s), in compliance with the planning and design process set out in the Municipal Engineers Association Municipal Class Environmental Assessment.

1.3.2 Project Rationale

The Doon South - Brigadoon Transportation Network and Corridor Study cited in Section 1.2.1 provided the need and justification for future transportation improvements in a study area bounded by Conestoga Parkway, Highway 8, Highway 401 and Trussler Road. The study was based on analyses using the Region of Waterloo’s Travel Demand Forecasting Model for a horizon year of 2011 and projections of 83,600 persons and 51,700 jobs. The forecast travel demand scenario suggested that a significant number of residents would continue to be employed outside the study area and would need additional road network capacity and connections to travel to and from work in order to avoid undue deterioration in traffic operation levels of service. The study concluded that the existing road network would not be able to support the increased traffic demand associated with projected growth without a number of network improvements, including the extension of Strasburg Road from Battler Road to New Dundee Road.

According to the Regional Transportation Master Plan\(^2\) (RTMP) prepared by the Region of Waterloo, the extension of Strasburg Road from Rush Meadow Street to New Dundee Road is required to relieve future demand on Homer Watson Boulevard, Huron Road and Fischer Hallman Road, as well as to support the future growth and approved development in the area at Doon South and other areas in southwest Kitchener. The RTMP indicates that the Strasburg Road Extension (Huron Road to New Dundee Road) has been recognized as an integral part of the Region’s strategic road network improvement approach, with implementation required within 5-10 years (second highest level of priority). The RTMP is available for review on the Region’s website: (http://www.regionofwaterloo.ca/en/regionalGovernment/resources/RTMP_FINAL_REPORT_PDF.pdf).

The Doon South and Broader Study Area – Traffic Impact Study\(^3\) report was assumed to reflect the latest development scenario in and around the Strasburg Road study area and indicated that the Regional transportation model forecasted a modest traffic diversion from the existing road network upon completion of the Strasburg Road Extension (i.e., diversion of traffic from Huron Road – Homer Watson Boulevard onto extended Strasburg Road). Thus, the existing traffic congestion/delays at intersections on Huron Road and Homer Watson Boulevard during the daily peak travel demand periods will be relieved upon the completion of the Strasburg Road Extension.

Several other traffic impact studies for the proposed developments in the Brigadoon and Doon South communities, and other developments within the vicinity of the Class EA study area, also indicated the need for the Strasburg Road Extension to support future growth and development in the area. The Doon South Community Road Network Review\(^4\) report, prepared by iTTRANS, indicated construction of approximately 7,000 houses in the Brigadoon and Doon South communities. For the current Class EA study, this development forecast was adjusted to reflect

\(^2\) Region of Waterloo Regional Transportation Master Plan: Moving Forward 2031. Regional Municipality of Waterloo, January 2011.

\(^3\) Doon South and Broader Study Area – Traffic Impact Study. Paradigm Transportation Solutions Inc. for Hallman/Activa, November 2008.

\(^4\) Doon South Community Road Network Review. iTTRANS for the Region of Waterloo. November 2008.
current development plans (September 2010), including the potential future developments, as provided by the City of Kitchener. Based on the latest information provided by the City's Planning Division, approximately 8,450 houses will be built within the vicinity of the study area.

Additional details pertaining to the traffic service rationale for the extension of Strasburg Road are presented in Sections 3.2.1 (Transportation Network) and 3.2.2 (Traffic Analysis) and Appendix D.1 (a) (Traffic Report).

1.4 Problem and Opportunity Statement

Based on the identification of transportation needs in relation to planned development in southwest Kitchener, as well as study area sensitivities identified by the Project Team early in the study process, the following Problem and Opportunity Statement was developed for the project.

The southwest quadrant of the City of Kitchener is served primarily by two north-south major arterial roads - Homer Watson Boulevard and Fischer Hallman Road. Homer Watson Boulevard is congested during peak hours, due to its central location and connection with Highway 401. The primary connections between these two north-south arterials are two east-west major arterials - Huron Road and New Dundee Road.

Traffic operations and demand studies since the late 1970s demonstrated the requirement for an additional north-south route, establishing connection to the existing arterial road network, to relieve the future demand on Homer Watson Boulevard and Fischer Hallman Road, as well as to accommodate future growth in the southwest quadrant of the City. To accommodate this growth and increases in travel demand, several transportation studies stated the need to provide an alternate north-south arterial by extending Strasburg Road from its current terminus to New Dundee Road.

The current City of Kitchener Official Plan (OP) recognizes Strasburg Road as a 4-lane secondary arterial with controlled access, with the exception of some future intersections with major collector roads within the Brigadoon Community and Doon South Community. The proposed study area for this environmental assessment extends from approximately 500 m north of Stauffer Drive to New Dundee Road to accommodate further extension of Strasburg Road. The tentative alignment for the proposed extension of Strasburg Road was identified in previous studies. At this time, there is an opportunity to identify a suitable corridor for the proposed extension, which could:

- Provide for approved future growth and increased travel demand in the southwest quadrant of the City, including facilitation of future transit service;
- Define the limits of future development and the location of any related road intersections, while assisting in the management/stewardship of important natural heritage and other environmental resources;
- Take advantage of the opportunity to Incorporate municipal services in the Strasburg Road corridor to serve new development; and
- Accommodate/enhance facilities for bicyclists and pedestrians through this part of the City.
2.0 STUDY APPROACH
This section of the report outlines the procedural approach followed in the study to comply with the Ontario Environmental Assessment Act (EA Act). In addition, the key study participants are identified and the conduct and results of the consultation program are summarized.

2.1 Class Environmental Assessment Process
This study is being conducted in accordance with the Municipal Engineers Association Municipal Class Environmental Assessment (October 2000, as amended in 2007 and 2011) (Municipal Class EA). The Municipal Class EA process was developed in accordance with the EA Act for a “class” of projects, including municipal road, water, wastewater and transit projects, that are recurring, similar in nature, limited in scale, responsive to mitigation measures, and have a predictable range of environmental effects. The purpose of the Municipal Class EA is to provide for the protection, conservation, and wise management of the “environment”, which includes the natural, social, cultural, built and economic environment, through comprehensive planning and informed decision-making. It allows municipalities to meet the requirements of the EA Act, while following a streamlined, self-administered process.

2.1.1 Project Classification
The Municipal Class EA process recognizes that potential environmental impacts may vary, depending on the nature of the project, and classifies projects into four “schedules”, as follows:

**Schedule ‘A’** municipal maintenance, operational and emergency activities. These projects are pre-approved and, therefore, allow the municipality to proceed without further approval under the EA Act.

**Schedule ‘A+’** the environmental effects are usually minimal. However, the public is to be advised prior to implementation. These projects are also pre-approved.

**Schedule ‘B’** projects that may have minimal environmental effects on the environment. These projects are approved subject to a screening process, including consultation with directly affected public and agencies.

**Schedule ‘C’** projects that may have significant environmental effects on the environment and must proceed under the full planning and documentation procedures outlined in the Municipal Class EA Document.

In accordance with project classification criteria in the Municipal Class EA, this study is being conducted as a **Schedule ‘C’** undertaking and involves completion of Phases 1 through 4 of the Municipal Class EA process:

- Phase 1 Identification of problem or opportunity
- Phase 2 Alternative planning solutions to address the problem or opportunity
- Phase 3 Alternative design concepts for the preferred planning solution
- Phase 4 Documentation of the study results (preparation of Environmental Study Report)
- Phase 5 Prepare Detail Design, proceed to construction/operations, and monitoring of environmental provisions and commitments

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5 Construction of new roads or other linear facilities costing more than $2.7 Million.
Since the Doon South – Brigadoon Transportation Network and Corridor Study (1994) provided the need and justification for the Strasburg Road Extension, as well as a multi-disciplinary assessment of various project alternatives and the general location of a recommended transportation corridor network (the planning solution) (refer to Section 1.3), Phases 1 and 2 of the Municipal Class EA process are deemed to have been completed.

Successful completion of Phase 4 of the Class EA process will permit the City of Kitchener to proceed to Phase 5 of the process, which is not included in the scope of this EA.

The step-wise Municipal Class EA process is illustrated in Figure 2.1. A simplified graphic showing the main study components for this EA study is presented in Figure 2.2.

The Strasburg Road Extension ESR will be filed with the Ontario Ministry of the Environment, and the City of Kitchener and Regional Municipality of Waterloo Clerks’ offices, and will be available for review at selected libraries in the City of Kitchener, as well as the City’s project website, for the mandatory 30 calendar day public review period. All parties previously expressing interest in this project through written comments have been notified directly regarding completion and filing of this ESR. An announcement of the ESR completion and filing will be placed in the Kitchener-Waterloo Record.

The City of Kitchener will address concerns and questions raised during the review period. Any significant changes to the project proposals presented in the ESR will be documented in an Addendum to the ESR, the process for which is described in Section 6.3.4 of this report.

The Municipal Class EA process also includes provisions for interested parties to request that the Minister of the Environment elevate the status of the project to an individual environmental assessment. The individual environmental assessment process normally addresses large scale projects with the potential to result in very significant and unpredictable impacts, and includes provisions for invoking more formal mechanisms for addressing stakeholders’ concerns (i.e., tribunal hearing or mediation). If concerns arise regarding this project, which cannot be resolved in discussion with the City of Kitchener, a person or party may request that the Minister of the Environment make an order for the project to comply with Part II of the EA Act (referred to as a Part II Order), which addresses individual environmental assessments. Part II Order requests must be received by the Minister of the Environment within the 30-day period established for public review of the Environmental Study Report. A copy of the request must also be sent to the City of Kitchener.
Figure 2.1: Municipal Class Environmental Assessment Process

Figure 2.2: Status of Strasburg Road Extension Class Environmental Assessment Process

**STUDY PHASE**

**WE ARE AT THIS STAGE IN THE PROJECT**

**PHASE 1**
**PROBLEM OR OPPORTUNITY**

**PIC No. 1**
(June 2010)

**PHASE 2**
**ALTERNATIVE SOLUTIONS**

**Mayor/Ward Councillors**
Property Owners
PIC No. 2
(June 2011)

**CONSULTATION**

**PHASE 3**
**ALTERNATIVE DESIGN CONCEPTS FOR PREFERRED SOLUTION**

**Mayor/Ward Councillors**
Property Owners
PIC No. 3 (Oct 2011)
Her. Com. (Nov 2011)
Env. Com. (Dec 2011)
Council Workshop (Feb, 2013)
PIC No. 4 (Apr 2013)
Env./Her. Com. (May 2013)
Special Planning & Strategic Initiatives Committee (May 22, 2013)

**PHASE 4**
**ENVIRONMENTAL STUDY REPORT**

**Draft ESR**
Project Team/
MNR/MOE
(Feb/Sept 2012)
Council/Public
(May 2012)
Council
(Oct/Nov 2013)

**PHASE 5**
**DETAIL DESIGN CONSTRUCTION MONITORING**

To Be Determined
2.1.2 Scope of Environmental Assessment

The Class Environmental Assessment study included a comprehensive set of integrated environmental and engineering investigations (inventories; impact assessment; mitigation recommendations) conducted by specialist consultants, using established/approved methods and protocols, as well as consultation with technical staff of regulatory agencies and other stakeholders with knowledge of the study area. Table 2.1 presents the general scope of the Class EA investigations.

<table>
<thead>
<tr>
<th>Terrestrial Ecosystems</th>
<th>Heritage Resources</th>
</tr>
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<tbody>
<tr>
<td>Wilderness surveys</td>
<td>Provision for Stage 2 Archaeological Assessment</td>
</tr>
<tr>
<td>• amphibians/reptiles search/monitoring</td>
<td>Heritage Resource Assessment (man-made Built Heritage Resources; Cultural Landscapes)</td>
</tr>
<tr>
<td>• habitat/habitat/communities</td>
<td>Recommendations for further archaeological investigations; heritage resource preservation</td>
</tr>
<tr>
<td>Vegetation inventories (Ecological Land Classification; wetland delineation)</td>
<td></td>
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<tr>
<td>Establish appropriate reference habitats/communities and targets/objectives for preparation of mitigation</td>
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<thead>
<tr>
<th>Aquatic Ecosystems</th>
<th>Noise</th>
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</thead>
<tbody>
<tr>
<td>Aquatic habitat and fish community assessment</td>
<td>Identify noise sensitive areas</td>
</tr>
<tr>
<td>• watercourse physical attributes, flow, thermal regime</td>
<td>Noise modeling; impact assessment</td>
</tr>
<tr>
<td>• fish community supported; sensitivity</td>
<td>Operations and construction phase impact assessment</td>
</tr>
<tr>
<td>Fish habitat mitigation/compensation</td>
<td>Noise mitigation recommendations</td>
</tr>
</tbody>
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<tr>
<th>Drainage, Hydrology, Stormwater Management</th>
<th>Air Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirm watershed regime</td>
<td>Establish base case (historical meteorological air quality monitoring data)</td>
</tr>
<tr>
<td>Establish hydraulic requirements for drainage/watercourse conveyance</td>
<td>High level assessment of design alternatives</td>
</tr>
<tr>
<td>Develop stormwater management strategy to achieve Blair-Bechtel-Bauman/Strasburg Creek watershed protection targets</td>
<td>Future exhaust emissions for preferred design option (nine contaminants)</td>
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<tr>
<th>Hydrogeology, Contaminated Property</th>
<th>Socio-Economic</th>
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<tbody>
<tr>
<td>Groundwater regime (recharge/discharge; stream baseflow)</td>
<td>Designated and approved land uses</td>
</tr>
<tr>
<td>Potential for encountering contaminated property</td>
<td>Agricultural and other business operations</td>
</tr>
<tr>
<td></td>
<td>Community amenities and social/cultural linkages</td>
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<tr>
<th>Transportation Planning</th>
<th>Engineering</th>
</tr>
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<tbody>
<tr>
<td>Roadway capacity analyses; traffic counts (intersection/link volumes; Level of Service)</td>
<td>Roadway structural deficiencies (Reidel Drive)</td>
</tr>
<tr>
<td>Safety analyses</td>
<td>Soil conditions; road and structural foundation requirements</td>
</tr>
<tr>
<td>Geometric improvement recommendations</td>
<td>Roadway geometric design (cross-section; horizontal/vertical alignment; grading, drainage; lighting)</td>
</tr>
<tr>
<td>Roundabout feasibility study</td>
<td>Drainage structure design</td>
</tr>
</tbody>
</table>
2.2 Project Organization

The City of Kitchener established a Project Team to provide technical input and direction on the project. The multi-agency, multi-disciplinary Project Team, representing a broad range of mandates and interests, included staff from the following groups:

City of Kitchener

- Community Services - Planning
  - i. Long Range & Policy Planning (Environmental, Cultural Heritage)
  - ii. Development Review
- Infrastructure Services - Engineering
  - iii. Development Engineering
  - iv. Transportation Planning
- Infrastructure Services - Operations

This group provided input on departmental matters. It was supported by and reported regularly to the City’s Corporate Leadership Team, local councillors and the mayor.

Regional Municipality of Waterloo (RMOW)

- Transportation and Environmental Services
- Planning, Housing and Community Services
- Water Services

Regional staff provided input on matters of regional interest, such as the provision of regional water supply services in the Strasburg Road Extension corridor, and long range transportation and land use planning policies and plans, including environmental resource protection, impacts on regional road operations, and roundabout initiatives at new intersections.

Grand River Conservation Authority (GRCA)

- Resource Planning
- Ecology
- Aquatic Biology
- Water Resources Engineering

A proportion of the study area lies within areas regulated by GRCA under the Ontario Conservation Authorities Act. GRCA staff provided information on and assisted in the delineation of environmental sensitivities within the Blair Creek watershed, and identified future permitting requirements within their mandate.

SNC-Lavalin Inc. (SLI) was retained to lead the Class EA study and assembled a multi-disciplinary team to conduct the technical investigations required to develop and assess the project alternatives, including specialists in the following disciplines:

- Terrestrial Biology
- Aquatic Biology
- Drainage, Hydrology and Stormwater Management
- Hydrogeology
• Soil and Groundwater Contamination
• Heritage Resources (Archaeology, Built Heritage, Cultural Heritage Landscapes)
• Noise
• Air Quality
• Land Use/Socio-economics
• Transportation Planning
• Traffic Engineering
• Civil Engineering

The management group of the Consultant Team was also represented on the Project Team.

In addition to providing technical input and direction, the Project Team was responsible for selection of the Technically Preferred Alignment for the Strasburg Road Extension.

2.3 Communications Program

This section of the ESR describes the communications program conducted by the City for engaging and consulting with known stakeholders and potentially interested parties at both mandatory and discretionary points in the environmental assessment process.

Public, regulatory agency and other stakeholder consultation has been recognized as an important component of the Strasburg Road Extension Class EA study. The Communications Plan established by the City was designed to capture a full range of opinions and perspectives at regular intervals and at milestone junctures throughout the study. In this regard, it provided multiple and ongoing opportunities for feedback during the planning and design process. It not only met the requirements for mandatory contact prescribed by the Municipal Class EA, but went beyond this protocol based on the complexity of the project, the range and degree of environmental sensitivities involved, the associated number of stakeholders potentially affected by the project, and the level of public interest and concern.

2.3.1 Guiding Principles

To address the needs inherent in the study scope of work, the guiding principles for the Consultation Plan included:

• The consultation program was highly inclusive and balanced, engaging the broadest range of audiences reasonably deemed to be potentially affected by the project.
• The program provided early and ongoing opportunities for stakeholders to provide constructive input, the timing of which was commensurate with the need to incorporate such input in the decision-making process, as appropriate.
• The program was transparent (utilizing multiple communication mechanisms) and traceable (documenting the comments, how they have been addressed, the results of any conflict resolution efforts, and the effects of the program on the decision-making process).
• The program was adaptive, incorporating the flexibility to be modified to meet the needs of participating stakeholders and the Project Team. This included an “Additional Consultation Stage” provided for public review of the Draft Environmental
Study Report over an extended period prior to Council making a decision on the project.

2.3.2 Consultation Mechanisms and Tools

The principal consultation mechanisms that were employed to implement the Communications Plan in included:

Notice of Commencement

- Prospective EA study participants were formally notified of the study commencement through published advertisements in the Kitchener-Waterloo Record on two separate dates. This is a mandatory contact point in the Municipal Class Environmental Assessment process. The notification included information on the study background, purpose, location, EA process, and opportunities/contacts for obtaining information and providing input.

City/Consultant One-Window Consultation

- To facilitate public access to the Project Team, project notifications identified the City of Kitchener and Consultant Team representatives through which public “one-window” contact was established and maintained. This included mail, phone, fax and email information.

Project Team Meetings

- Municipal technical representatives from the City of Kitchener, Region of Waterloo and the Grand River Conservation Authority, as well as the Consultant, formed the Project Team (refer to Section 2.2 for Study Organization), which met at regular intervals with the Consultant Team to receive information on study progress and provide direction on technical matters. The Consultant Team also met with separate factions of the Project Team off line from the regular Project Team meetings, as required, to convey information and discuss various technical matters in additional detail. Examples include presentations to Grand River Conservation Authority staff at the outset of the project, and meetings with Region of Waterloo Transportation Planning staff to discuss matters related to municipal servicing needs and the New Dundee Road/Reidel Drive-Cameron Road intersection. During the EA study, the City’s Project Manager and the Consultant’s Environmental Lead acted as the public and agency conduit to the Project Team.

Public Information Centres (PIC)

- Milestone PICs, also mandatory points of contact, were formally announced through advertisements in the Kitchener-Waterloo Record on two separate dates for each of the three PIC phases. The notification provided information on the PIC purpose, date, time, location and Project Team contacts for obtaining information and providing input. In addition, letter and/or flyer invitations were distributed to participating government agencies, elected representatives, aboriginal communities, interest groups and individuals. The PICs disseminated information through the use of one-on-one discussion; text and graphic display boards, including interactive displays at the alignment screening stage; reference to background resource materials brought to the PIC venue; handouts of selected display material; and comment sheets that were to be left at the PIC or returned to the Project Team via mail, fax or email. Four (4) PICs in the form of drop-in open house forums were held at strategic milestones in the study (refer to Section 2.3.2) to present the project findings/recommendations and provide an opportunity for public feedback.
Mayor/Ward Councillors and Senior Management Briefings

- The City’s Project Manager, assisted by the Consultant, provided progress and proposed action briefings to the Mayor, Ward Councillors and City Senior Management (Corporate Leadership Team) prior to the second, third and fourth Public Information Centres in preparation for possible direct contact with this group from project stakeholders.

Property Owner Meetings

- A meeting forum was established to provide information to and receive feedback from major property owners that may be directly affected by the road alignments developed as part of the Municipal Class EA study. The milestone presentations to the Mayor/Ward Councillors were followed by presentations to the property owners for the second and third Public Information Centres.

Face-to-Face Individual Meetings

- The PICs, providing information to a broad-based public, served to identify individuals that have significant concerns. Where appropriate, focus group or “kitchen table” meetings were held with such groups to provide information and receive feedback. These sessions included interpretive field visits.

Utility Coordination Meetings

- Utility companies that may be affected by the road alignments developed during the Municipal Class EA study were identified and met with either as a group or individually, as deemed appropriate.

Agency Consultation

- Federal, Provincial and Municipal agencies with policy or regulatory mandates that may affect the project development or implementation were identified and contacted with respect to obtaining technical information, and their desire to participate in the studies. A Government Review Team (GRT) was identified for distribution and review of the Environmental Study Report.

Aboriginal Communities Consultation

- At a minimum, each of the aboriginal communities that may have an interest in the project were identified and were included in the notification process for milestone PICs No. 3 and No. 4 and the filing of the ESR. Selected study information was provided to First Nations, upon request. As deemed appropriate, individual meetings/briefings will be provided to participating communities, also upon request.

On-line Consultation

- An internet portal was established by the City to provide on-line public access to information and provide opportunities for input throughout the Municipal Class EA study (www.kitchener.ca/en/businessinkitchener/Environmental_assessments.asp). These web-based opportunities were provided to mirror the information and documentation provided through milestone notifications and the PICs.

Other Public Forum

- In addition to the public information sessions described above, the Project Team provided information and received comments in other public forums, principally in relation to the selection of the Technically Preferred Alignment. These included a
presentation to the City of Kitchener Heritage Committee (November 4, 2011) and the City of Kitchener Environmental Committee (December 15, 2011), as well as a joint presentation to the Environmental and Heritage Committees (May 7, 2013). These meetings included provision for members of the public to make deputations to the committees and for committee members to question the Project Team on the study process.

- The City’s Planning and Strategic Initiatives Committee also received presentations from members of the Project Team at four (4) special meetings convened solely for the purpose of considering the Strasburg Road Extension project:
  - Draft Environmental Study Report (May 7, 2012), including the recommended Technically Preferred Alignment emerging from the Stage 1 comparative assessment, with a request to make the Draft ESR available for public review for an extended period prior to formal filing of the ESR in the public record (Additional Consultation Stage);
  - Report on results of Additional Consultation Stage (November 27, 2012);
  - Recommended New Technically Preferred Alignment emerging from the Stage 2 comparative assessment (May 22, 2013); and
  - Final Draft Environmental Study Report (October 21, 2013).

These meetings also included provision for public deputations and committee inquiries to the Project Team.

Notice of Completion

- The final Class EA mandatory contact point was the Notice of Completion, which was also published in the Kitchener-Waterloo Record on two separate dates. This notice advised that the EA study documentation (Environmental Study Report) has been prepared and placed in the Public Record for a review period of 30 calendar days. It provided information on the location(s) where the Environmental Study Report is available for review; the period within which the document will be available for review and comments must be submitted; the Project Team contacts for obtaining information and providing input; and the Ministry of the Environment contact for submitting objections to the project.

A summary of the manner in which the Communications Plan mechanisms and tools were used to facilitate and support activities in the Municipal Class EA process phases applicable to this study is presented in Table 2.2.
Table 2.2: Consultation Activities and Mechanisms Summary

<table>
<thead>
<tr>
<th>Consultation Element</th>
<th>Municipal Class EA Study Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identify/Assess Planning Solutions</td>
</tr>
<tr>
<td>Consultation</td>
<td></td>
</tr>
<tr>
<td>Project Team Meeting</td>
<td>✓</td>
</tr>
<tr>
<td>Mayor/Senior Mgmt. Briefing</td>
<td>✓</td>
</tr>
<tr>
<td>Public Information Centre (PIC)</td>
<td>✓</td>
</tr>
<tr>
<td>Face-to-Face Meeting</td>
<td>✓</td>
</tr>
<tr>
<td>Property Owner Meeting</td>
<td>✓</td>
</tr>
<tr>
<td>Utility Coordination Liaison</td>
<td>✓</td>
</tr>
<tr>
<td>Agency Consultation</td>
<td>✓</td>
</tr>
<tr>
<td>Aboriginal Consultation</td>
<td>✓</td>
</tr>
<tr>
<td>Online Consultation</td>
<td>✓</td>
</tr>
<tr>
<td>City/Consultant One-Window Consultation/Response</td>
<td>✓</td>
</tr>
<tr>
<td>Other Public Forum</td>
<td>✓</td>
</tr>
<tr>
<td>Communications</td>
<td></td>
</tr>
<tr>
<td>Notice of Commencement (newspaper ad; letters)</td>
<td>✓</td>
</tr>
<tr>
<td>Meeting Notification</td>
<td>✓</td>
</tr>
<tr>
<td>Public Information Centre (newspaper ad; letters; displays; handouts, Comment Sheets)</td>
<td>✓</td>
</tr>
<tr>
<td>Notice of Completion (newspaper ad; letters)</td>
<td></td>
</tr>
<tr>
<td>City Website/Project Page</td>
<td>✓</td>
</tr>
</tbody>
</table>

2.3.3 Consultation with Government Agencies and Other Stakeholders

In addition to the Project Team described in Section 2.2, the study involved participation by multi-disciplinary teams from several levels of government. Appendix A includes a detailed listing of principal agency staff and other stakeholders that were engaged during the study. Table 2.3 presents a summary of the agencies/stakeholders contacted for technical information.
### Table 2.3: List of Government Agencies and Other Stakeholders Contacted

<table>
<thead>
<tr>
<th><strong>Federal</strong></th>
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<tbody>
<tr>
<td>Aboriginal Affairs and Northern Development Canada</td>
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<tr>
<td>Environment Canada</td>
<td></td>
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<tr>
<td>Fisheries and Oceans Canada</td>
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<tr>
<td>Transport Canada</td>
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<table>
<thead>
<tr>
<th><strong>Provincial</strong></th>
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</thead>
<tbody>
<tr>
<td>Ministry of Aboriginal Affairs</td>
<td></td>
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<tr>
<td>Ministry of the Environment (Regional and District Offices; Environmental Assessment Branch)</td>
<td></td>
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<tr>
<td>Ministry of Municipal Affairs and Housing</td>
<td></td>
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<tr>
<td>Ministry of Natural Resources (Guelph District Office)</td>
<td></td>
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<tr>
<td>Ministry of Tourism, Culture and Sport</td>
<td></td>
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<tr>
<td>Ministry of Transportation</td>
<td></td>
</tr>
<tr>
<td>Ontario Heritage Trust</td>
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<tr>
<td>Ministry of Agriculture, Food and Rural Affairs</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Municipal</strong></th>
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<tbody>
<tr>
<td>Grand River Conservation Authority</td>
<td></td>
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<tr>
<td>City of Kitchener</td>
<td></td>
</tr>
<tr>
<td>• Corporate Leadership Team</td>
<td></td>
</tr>
<tr>
<td>• Community Services - Planning</td>
<td></td>
</tr>
<tr>
<td>v. Long Range &amp; Policy Planning</td>
<td></td>
</tr>
<tr>
<td>vi. Development Review</td>
<td></td>
</tr>
<tr>
<td>• Infrastructure Services - Engineering</td>
<td></td>
</tr>
<tr>
<td>vii. Development Engineering</td>
<td></td>
</tr>
<tr>
<td>viii. Transportation Planning</td>
<td></td>
</tr>
<tr>
<td>• Infrastructure Services - Operations</td>
<td></td>
</tr>
<tr>
<td>Regional Municipality of Waterloo</td>
<td></td>
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<tr>
<td>• Transportation and Environmental Services</td>
<td></td>
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<tr>
<td>• Planning, Housing and Community Services</td>
<td></td>
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<tr>
<td>• Water Services</td>
<td></td>
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<tr>
<td>• Ontario Works</td>
<td></td>
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<tr>
<td>Township of North Dumfries</td>
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<table>
<thead>
<tr>
<th><strong>Utilities</strong></th>
<th></th>
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<tbody>
<tr>
<td>Rogers Cable Communications</td>
<td></td>
</tr>
<tr>
<td>Bell Canada</td>
<td></td>
</tr>
<tr>
<td>Kitchener-Wilmot Hydro Inc.</td>
<td></td>
</tr>
<tr>
<td>Kitchener Utilities Limited</td>
<td></td>
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</tbody>
</table>
Notification letters and/or flyers were sent to these groups at the following study junctures:

- Notice of Commencement (refer to sample letter in Appendix A.1)
- Public Information Centre No. 1 (refer to sample letter in Appendix A.2)
- Public Information Centre No. 2 (refer to sample letter in Appendix A.3)
- Public Information Centre No. 3 (refer to sample letter in Appendix A.4)
- Public Information Centre No. 4 (refer to sample letter in Appendix A.5)
- Notice of Completion (refer to Appendix A.7)

Technical input was sought from these groups to assist in the identification of study area sensitivities, constraints, existing and planned infrastructure and potential impacts associated with the candidate alignments for the Strasburg Road Extension. Specific technical input in these regards is cited in Sections 3 (Existing Conditions) and 4 (Conceptual Design Alternatives) of this ESR.

In addition to the information conveyed and received through written correspondence and Project Team meetings, the Project Team met with government agencies, as required, to provide supplementary information and seek direction on regulatory matters. Table 2.4 provides a summary of these meetings.

### Table 2.4: Meetings with Regulatory Agencies

<table>
<thead>
<tr>
<th>Agency</th>
<th>Date</th>
<th>Meeting Purpose/Discussion/Outcome</th>
</tr>
</thead>
</table>
| Grand River Conservation Authority (GRCA)        | May 7, 2010     | - Provide project background and overview  
- Introduce key GRCA and SLI staff  
- Outline proposed work scope in relation to permitting requirements  
- Identify GRCA information requirements  
- Identify information available from GRCA                                                                 |
| Ministry of Natural Resources (MNR)               | September 22, 2010 | - Provide project background and overview, including alignment options developed to date  
- Introduce key MNR and SLI staff  
- Outline investigations completed to date and proposed work scope in relation to permitting requirements  
- Identify MNR information requirements  
- Identify information available from MNR  
- Seek initial comments on Evaluation Criteria and candidate alignments  
- Determine best course forward to establish permitting requirements for Species at Risk under Endangered Species Act, including additional surveys  
- Received September 2010 Draft Jefferson Salamander Regulated Habitat Mapping and MNR’s approach to applying the regulation (meet with and |
<table>
<thead>
<tr>
<th>Agency</th>
<th>Date</th>
<th>Meeting Purpose/Discussion/Outcome</th>
</tr>
</thead>
</table>
|        | February 22, 2011 | - Update the requirements for the project area inventories and information to date, and to obtain an update on the status of the Species at Risk regulation lines pertaining to project area  
- MNR has not completed property owner notification for the Jefferson Salamander regulation process and would prefer that the lines not be used in any mapping that would be shown publicly  
- MNR will provide updated draft Jefferson Salamander habitat regulation lines based on new information provided by others in the project area  
- MNR will review files to determine if there is documented information on Species at Risk presence/absence surveys on west side of Reidel Drive, at and south of Stauffer Drive  
- City committed to conduct new/additional seasonal Species at Risk (Chimney swift, Whip-poor-will, Common nighthawk, Jefferson Salamander) survey work in 2011 and provide results to MNR for their records/assessments |
|        | January 18, 2012 | - Received January 2012 Draft Jefferson Salamander Regulated Habitat Mapping. MNR subsequently provided a version of the mapping that can be shown in the ESR  
- Reviewed Species at Risk surveys completed to date and requirements for future SAR survey work based on updated Species at Risk in Ontario listing, draft MNR protocol for SAR surveys, and MNR habitat descriptions  
- Discussed steps in moving forward to permitting process in future design phases |
|        | September 20, 2012 | - Updated MNR on the status of the project, including results of additional Species at Risk surveys  
- discussed MNR’s August 30 response to the City’s July 20 Preliminary Information Gathering Form package  
- Continued discussion on how the Endangered Species Act (ESA) will be applied to the project (i.e., Species at Risk in general, and Jefferson Salamander (JESA) in particular)  
- JESA Recovery Strategy includes provision for “expansion”; the woodlot at the western end of the Blair Creek corridor is considered crucial in this |
<table>
<thead>
<tr>
<th>Agency</th>
<th>Date</th>
<th>Meeting Purpose/Discussion/Outcome</th>
</tr>
</thead>
</table>
| Agency | April 17, 2013 | - Provided MNR with a summary of the results of the Additional Consultation Stage and Stage 2 comparative assessment of alignment alternatives (W1 has been selected by the Project Team as the new TPA)  
- MNR staff stated that it is very likely that the need for an ESA permit for Jefferson Salamander habitat can now be avoided, provided that the ESR documents that the City is also avoiding or minimizing indirect impacts to wetlands, woodlots and hydrologic attributes that constitute JESA functional habitat (i.e., those features in the regulated area east of Alignment W1) |
| Regional Municipality of Waterloo / City of Kitchener | September 24, 2010 | - Reconciliation of past and current traffic forecasts for future Strasburg Road Extension based on differences in modelling parameters  
- Agreement on build-out rates for development and their influence on traffic forecasting  
- City to confirm the timing of the developments and provide development volume estimates for the 2016 and 2031 horizon years |
| Regional Municipality of Waterloo / City of Kitchener | August 16, 2011 | - Regional staff concerns with Strasburg Road intersection at New Dundee Road that is offset from existing Reidel Drive-Cameron Road intersection (Alignment E3), especially if roundabouts are being considered  
- Regional staff concerns with Strasburg Road alignment further west from a traffic/transit service perspective (Alignment W1)  
- Initial discussion on operational requirements at existing New Dundee/Reidel Drive-Cameron Road intersection to address safety concerns. Region has no plans to widen New Dundee here, but intersection may require urbanization |
| Regional Municipality of Waterloo / City of Kitchener | December 5, 2011 | - Additional discussion on alternative solutions to address safety concerns at existing New Dundee/Reidel Drive-Cameron Road intersection |
| Regional Municipality of Waterloo / City of Kitchener | December 19, 2011 | - Decision to adopt roundabouts for Strasburg Road |
| Regional Municipality of Waterloo / City of Kitchener | January 25, 2012 | - |
2.3.4 Public Consultation

This section summarizes the conduct and results of the public consultation program of the study, including the information presented and the principal concerns and questions received at the public information centres. A more detailed Consultation Record is presented in Appendix A.

Table 2.5 summarizes the dates on which the mandatory public notices for the consultation mechanisms described above were placed in the Kitchener-Waterloo Record.

<table>
<thead>
<tr>
<th>Notification</th>
<th>Date of Placement in Kitchener-Waterloo Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notice of Commencement</td>
<td>Friday, April 23, 2010 and Friday, April 30, 2010</td>
</tr>
<tr>
<td>Public Information Centre No. 1 Introduction and Background (June 10, 2010)</td>
<td>Friday, May 28, 2010 and Friday, June 4, 2010</td>
</tr>
<tr>
<td>Public Information Centre No. 2 Short-Listed Alignment Alternatives (June 1, 2011)</td>
<td>Friday, May 13, 2011 and Friday, May 27, 2011</td>
</tr>
</tbody>
</table>
### Notification

<table>
<thead>
<tr>
<th>Public Information Centre No. 3</th>
<th>Date of Placement in Kitchener-Waterloo Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technically Preferred Alignment (October 26, 2011)</td>
<td>Friday, October 7 and Friday, October 21, 2011</td>
</tr>
<tr>
<td>Public Information Centre No. 4</td>
<td>Friday, April 5 and Friday, April 19, 2013</td>
</tr>
<tr>
<td>New Technically Preferred Alignment (April 24, 2013)</td>
<td></td>
</tr>
<tr>
<td>Notice of Completion</td>
<td>Friday, December 6 and Friday, December 13, 2013</td>
</tr>
</tbody>
</table>

### Public Information Centre No. 1

Public Information Centre No. 1 was held on Thursday, June 10, 2010. The purpose of the information centre was to present the study scope and objectives in relation to a draft Problem Statement, outline the technical investigations that will be conducted, provide information on the proposed communications plan, identify preliminary criteria for assessing the project alternatives, and provide an opportunity for public and government agency review and comment.

The information presented at the PIC included:

- Welcome, requesting that attendees sign the register for future notification purposes; informing attendees that Project Team members were available to answer questions and receive comments/concerns; and requesting attendees to complete a comment sheet (provided at the PIC or available on the City’s project website);
- Study Background and Purpose, including study area limits;
- MEA Class EA Process;
- Proposed Consultation Mechanisms (from Communications Plan);
- City of Kitchener Municipal Plan – Transportation/Roads Schedule;
- City of Kitchener Municipal Plan – Land Use Schedule;
- Kitchener Growth Management Plan – Development Blocks (Brigadoon; Doon South);
- Future Traffic in Strasburg Road Extension Corridor;
- Draft Problem/Opportunity Statement;
- Aerial Photo of Existing Conditions/Sensitivities within Study Area;
- Scope of Multi-Disciplinary Investigations to be Conducted for the Class EA Study
- Preliminary List of Project Evaluation Criteria;
- Approved Brigadoon Community Plan;
- Next Steps and Consultation Opportunities

Following is a summary of participation and comments emanating from PIC No. 1:

- 78 people attended the PIC. Written comments were received from 61 people via comment sheets or email.
• Comments and questions were received regarding:
  o scope of the Environmental Assessment investigations;
  o length of the study time frame;
  o effects on property values; and
  o environmental impacts of noise, pollution and traffic on wildlife, wetlands, groundwater recharge areas, designated Environmentally Sensitive Policy Areas and the community.

At the June 2010 PIC, the Project Team also received comments on the segment of the Strasburg Road Extension between Rush Meadow Street and north of Stauffer Drive (North Section). These comments have been considered as part of the Detail Design work for that segment of the roadway extension, and the proposed plan for the North Section was presented at a separate PIC.

The project team addressed these comments and questions verbally, provided a written response to all written comments received and posted information on the City’s Environmental Assessments website: www.kitchener.ca/en/businessinkitchener/Environmental_assessments.asp.

Public input was used to refine the Evaluation Criteria and the scope of investigations and to develop and screen the initial set of alignment alternatives.

A more detailed summary of comments received and responses provided is presented in the Consultation Record in Appendix A.2.

Public Information Centre No. 2

Public Information Centre No. 2 was held on Wednesday, June 1, 2011. The purpose of the information centre was to report on study progress, present the route alignment alternatives that have been developed and the short list of alignment options proposed for more detailed study, and provide an opportunity for public and government agency review and comment.

The information presented at the PIC included:

• Welcome, requesting that attendees sign the register for future notification purposes; informing attendees that Project Team members were available to answer questions and receive comments/concerns; and requesting attendees to complete a comment sheet (provided at the PIC or available on the City’s project website);

• Key Plan (South Section vs North Section);

• Results of PIC No. 1;

• MEA Class EA Process;

• Project Objectives;

• Development of Alignment Alternatives;

• Long List of Alignment Alternatives;

• Natural Heritage Features and Sensitivities with Alignment Alternatives;

• Cultural Heritage Features and Sensitivities with Alignment Alternatives;

• Socio-Economic Features and Sensitivities with Alignment Alternatives;

• Doon South Community Plan (Intended Land Use Based on Approved Subdivisions);
• Results of Traffic Investigations;
• Strasburg Road Typical Cross-Section(s);
• Evaluation Criteria;
• Screening of Long List of Alignment Alternatives (summary matrix);
• Short List of Alignment Alternatives to be Carried Forward;
• Scope of Investigations to be Completed for Short-Listed Alternatives;
• Next Steps and Consultation Opportunities

Following is a summary of participation and comments emanating from PIC No. 2:

• Approximately 70 people attended the PIC. Written comments were received from 20 people via comment sheets or email;
• Retain Countryside and select an East alternative; there should be an option east of Reidel Drive;
• Preference for “No Road” option or W1;
• Recognized service/cost advantages of East Series, but concern over potential impacts to natural and cultural heritage features; noise impacts to existing residents;
• C1 and C2 represent best balance between East and West Series;
• Safety (lack of sight distance) concern over existing Reidel Drive-Cameron Road/New Dundee intersection and potential traffic impacts on Cameron Road;
• Protection of Stauffer Drive as walking trail.

The project team addressed these comments and questions verbally, provided a written response to all written comments received and posted information on the City’s Environmental Assessments website: www.kitchener.ca/en/businessinkitchener/Environmental_assessments.asp.

Public input was considered by the Project Team in its detailed assessment of the short-listed alignments.

At the June 2011 PIC, the Project Team again received some comments on the segment of the Strasburg Road Extension between Rush Meadow Street and north of Stauffer Drive (North Section). These comments have been considered as part of the Detail Design work for that segment of the roadway extension.

A more detailed summary of comments received and responses provided is presented in the Consultation Record in Appendix A.3.

Public Information Centre No. 3

Public Information Centre No. 3 was held on Wednesday, October 26, 2011. The purpose of the information centre was to report on study progress, present the assessment of the short-listed alignment alternatives, identify the Technically Preferred Alignment, and provide an opportunity for public and government agency review and comment.

The information presented at the PIC included:

• Welcome, requesting that attendees sign the register for future notification purposes; informing attendees that Project Team members were available to answer questions
and receive comments/concerns; and requesting attendees to complete a comment sheet (provided at the PIC or available on the City’s project website);

- Key Plan (South Section vs North Section);
- Results of PIC No. 2;
- MEA Class EA Process;
- Project Objectives;
- Natural Heritage Features and Sensitivities with Alignment Alternatives
- Cultural Heritage Features and Sensitivities with Alignment Alternatives
- Socio-Economic Features and Sensitivities with Alignment Alternatives
- Doon South Community Plan
- Results of Traffic Investigations
- Strasburg Road Typical Cross-Section(s)
- Evaluation Criteria
- Evaluation of Short-Listed Alignment Alternatives
- Summary/Rationale for the Technically Preferred Alternative
- Next Steps and Consultation Opportunities

Following is a summary of participation and comments emanating from PIC No. 3:

- Approximately 125 people attended the PIC. Written comments were received from 35 people via comment sheets or email;
- There were expressions of interest in seeing the project proceed to construction as soon as possible;
- About half of the comment sheets specified a preference for Alignment W1 either as the best option, or the best option, understanding that they prefer the road not be built at all;
- There were a number of comments focusing on impacts to the property at 500 Stauffer Drive and protection of the farm pond and preservation of the bed and breakfast business on the property;
- There were continued concerns expressed about the safety (lack of sight distance) concern over existing Reidel Drive-Cameron Road/New Dundee intersection and potential traffic impacts on Cameron Road.

A more detailed summary of comments received and responses provided is presented in the Consultation Record in Appendix A.4.

Public Information Centre No. 4

Public Information Centre No. 4 was held on Wednesday, April 24, 2013. The purpose of this PIC was to present the results of the supplementary (Stage 2 comparative assessment) work completed since December 2012, including the revised Evaluation Criteria, the comparative assessment of the alignment alternatives, and identification the New Technically Preferred Alignment, as well as to provide an opportunity for public and government agency review and comment.
The information presented at the PIC included:

- Welcome, requesting that attendees sign the register for future notification purposes; informing attendees that Project Team members were available to answer questions and receive comments/concerns; and requesting attendees to complete a comment sheet (provided at the PIC or available on the City’s project website);
- Project location (South Section vs North Section);
- Results of the Additional Consultation Stage (May 2012 – September 2012);
- MEA Class EA Process;
- Scope and timing of the supplementary work;
- Project Team Composition;
- Project Objectives
- Strasburg Road Typical Cross-Section
- Alignment alternatives under consideration in Stage 2 comparative assessment
- Socio-Economic Features and Sensitivities (Land Use) with Alignment Alternatives
- Natural Heritage Features and Sensitivities with Alignment Alternatives
- Cultural Heritage Features and Sensitivities with Alignment Alternatives
- Results of Traffic Investigations
- Initial Results of Region of Waterloo Watermain Route Study in Doon South
- Revised Evaluation Criteria
- Detailed Comparative Assessment of Alignment Alternatives
- Summary Evaluation of Alignment Alternatives
- Preliminary Cost Estimate for Alignment Alternatives
- Summary of Advantages and Disadvantages of Alignment Alternatives
- Project Team Evaluation (Scoring/Ranking) of Alignment Alternatives
- Plan of New Technically Preferred Alignment
- Summary Rationale for the New Technically Preferred Alternative
- Information on Intersection of Strasburg Road Extension with Future Robert Ferrie Drive, Future Blair Creek Drive and New Dundee Road
- Next Steps and Consultation Opportunities

Following is a summary of participation and comments emanating from PIC No. 4:

- Approximately 95 people attended the PIC. Written comments were received from 51 people via comment sheets or email;
- Support for the project, and expression of a desire to move quickly to alleviate traffic on surrounding roads and to reduce the costs associated with the EA process.
- Concern regarding traffic problems along Caryndale Drive and the need to move forward with project;
Many members (17 of the received comments) expressed a preference for Alignment W1 based on its potential to avoid sensitive natural heritage features (forested areas and wetlands) and minimize impacts to the bed and breakfast operation at 500 Stauffer Drive;

Some comments identified Alignment W1 as ‘the best of bad options”, indicating preference for no road;

Questions regarding provision of access to 500 Stauffer Drive;

Concern regarding impacts to local snakes and salamanders;

Suggestions that a do-nothing/no road option is preferred;

Concern regarding impacts from construction and traffic; suggesting planting trees along the roadway to reduce noise and pollution;

Continued comments related to the impacts of the North Section of the project (general overall concern that road will have an impact on the natural environment, forest and wetlands) in this area).

The project team addressed comments and questions verbally at the PICs, provided a written response to all written comments received (unless the respondent indicated that no response was required), and posted the PIC information on the City’s Environmental Assessments website: www.kitchener.ca/en/businessinkitchener/Environmental_assessments.asp.

Public input was used to refine the New Technically Preferred Alignment and develop it to the Preliminary Design level of detail, including development of mitigation strategies and treatments.

A more detailed summary of comments received and responses provided is presented in the Consultation Record in Appendix A.5.

2.3.5 First Nations Consultation

The City contacted the Ontario Ministry of Aboriginal Affairs and the federal Department of Aboriginal Affairs and Northern Development (AANDC) with respect to information on established or potential Aboriginal and treaty rights in the vicinity of the project, and advice on consultation with First Nations communities and groups representing First Nations.

AANDC’s Consultation and Accommodation Unit provided information regarding potentially affected Aboriginal communities within 100 km of the project site, from its Aboriginal and Treaty Rights Information System (ATRIS), which brings together information regarding Aboriginal groups, such as their location, related treaty information, claims (specific, comprehensive and special) and litigation (refer to Appendix A.6 in this ESR).

Based on the information provided, the City contacted the following First Nations groups (refer to letters in Appendix A.6):

- Six Nations of the Grand River
- Caldwell First Nation
- Mississauga of the Credit
- Oneida Nation of the Thames
- Métis Nation of the Thames
- Métis Consultation Unit
- Métis National Council
The City has also followed up the initial contacts with phone calls and/or email contact. To date, the City has received responses/requests from only the Caldwell First Nation and provided the requested information (refer to Appendix A.6).
3.0 EXISTING CONDITIONS

This chapter of the ESR describes the project study area in the context of the foregoing EA scope described in Section 2.1.2, including transportation infrastructure and the natural, socio-economic and cultural environments. It provides the baseline, including approved infrastructure and land use plans, against which the project alternatives and the effects of the project have been measured.

Information on the following components is presented here and, for selected components, is supplemented with detailed technical reports supporting the ESR in Appendix D:

- a) Transportation Network
- b) Traffic Analysis
- c) Municipal Services and Utilities
- d) Surface/Stormwater Drainage
- e) Geotechnical
- f) Designated Environmentally Sensitive Areas
- g) Land Use and Community Features
- h) Fish and Fish Habitat
- i) Terrestrial Ecosystems
- j) Groundwater
- k) Contaminated Property
- l) Noise
- m) Air Quality
- n) Built Heritage and Cultural Landscapes
- o) Archaeology

3.1 Study Area

The general study area for the Class EA (South Section) of the Strasburg Road Extension is shown in relation to the overall proposed extension of the roadway between Rush Meadow Street and New Dundee Road in Figure 1.2. Figure 3.1 shows the study area in the context of the current schematic alignment for the Strasburg Road Extension presented in the Kitchener Municipal Plan. The study area is generally bounded by the Region of Waterloo’s proposed Countryside Line, Reidel Drive and the Doon South Community to the east; New Dundee Road to the south; Lot 6 Beasley’s New Survey and Lot 4 Biehn’s Tract to the west; and Lots 10 and 11 Biehn’s Tract to the north.

The study area was originally more limited in extent and based on expansion of the corridor within which Strasburg Road Extension options might be located, as shown in the June 2009 Kitchener Growth Management Plan (KGMP) (refer to KGMP Parcel Detail graphic in Appendix D.3). Based on the need to expand the area under consideration to provide the additional flexibility to develop reasonable alignment alternatives (refer to Section 4.3 of this ESR for additional rationale in this regard), the study area was modified accordingly. Figure 3.1 shows the modified Class EA study area compared to the initial study area depicted in Figure 1.2.
Figure 3.1: Modified Class EA Study Area
3.2 Engineering

3.2.1 Transportation Network

This Class EA study assumes that the extension of Robert Ferrie Drive and the Blair Creek Drive (also referred to as the East-West Collector in the Doon South Community Plan) up to Strasburg Road will be completed and both the intersections (i.e., Robert Ferrie Drive/Strasburg Road and Blair Creek Drive/Strasburg Road) will be operational under the future traffic conditions. This report also assumes that traffic using the Stauffer Drive and Riedel Drive intersection will be turning at the Robert Ferrie Drive and Strasburg Road intersection under the future traffic conditions. Refer to Appendix D.1 (A) – Traffic Report for additional details on traffic network assumptions.

Figure 3.2 illustrates the transportation network in the area, which consists of the following major arterial roads:

**Huron Road** – A secondary arterial road, with a basic 4-lane urban cross-section within the study area. The posted speed on Huron Road is 60 km/h within the vicinity of the study area. The current intersection of Huron Road and Strasburg Road is a multi-lane roundabout. Huron Road terminates at Homer Watson Boulevard, forming an interchange. The eastbound left movement on Huron Road at Homer Watson Boulevard operates under ‘Stop’ control; all other movements at this intersection operate under free flow conditions.

**Homer Watson Boulevard** – is another 4-lane divided urban arterial within the City. Homer Watson Boulevard interchanges with Highway 401 and becomes Fountain Street to the south of the interchange.

**New Dundee Road** - is a basic 2-lane road, varying from a semi-urban to a rural cross-section as it travels west, and Fischer Hallman Road is also a basic 2-lane rural arterial with a posted speed of 80 km/h. The Region has long term plans to widen New Dundee Road, but have not yet initiated an Environmental Assessment.

**Strasburg Road** – a secondary arterial with a basic 4-lane urban cross-section, and a posted speed of 50 km/h. The City plans to implement the Strasburg Road Extension as a major 4-lane urban collector with a posted speed of 60 km/h.

**Reidel Drive and Stauffer Drive** – are local 2-lane roads with rural cross-sections that currently connect the existing built-up sections of the Brigadoon Community to New Dundee Road and provide access to two existing residential properties in the study area.

**Caryndale Drive** – is designated as a minor collector road and currently serves as major north-south spine in the Brigadoon Community immediately east of the Class EA study area, connecting the community to the Stauffer Drive/Reidel Drive corridor.
Figure 3.2: Transportation Network

City of Kitchener Municipal Plan

MAP 4
TRANSPORTATION

LEGEND
EXISTING PROPOSED
PRIVATE ROAD
PRIMARY TRANSPORT ROAD
SECONDARY TRANSPORT ROAD
MINOR COLLECTOR ROAD
MINOR COLLECTOR ROAD
CONNECTOR ROAD
SWITCHBACK ROAD
LOCAL STREET

Note: This map is a conceptual representation and may not reflect the final design. The actual construction may vary. The map was created using Kitchener Planning and Development GIS data.
3.2.2 Traffic Analysis

This study assumes two specific horizon years for the proposed developments around the Brigadoon and Doon South communities, as well as areas to the west of proposed Strasburg Road and south of Huron Road. The specific horizon years were 2018 (year of development build-out) and 2031. A total of 8,449 residential units are assumed to be constructed and occupied by the year 2018. This assumption is based on the horizon year forecasts given in the 2008 Paradigm report, adjusted to reflect current development plans (September 2010), as provided by the City of Kitchener.

Table 3.1 presents the net new trips that would be added onto the future area road network under the future traffic conditions due to all the developments in the Brigadoon and Doon South communities and the Conestoga College Boulevard area.

<table>
<thead>
<tr>
<th>Development Site</th>
<th>Land Use</th>
<th>Weekday AM Peak Hour</th>
<th>Weekday PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>In</td>
<td>Out</td>
</tr>
<tr>
<td>East of Strasburg Road</td>
<td>Residential</td>
<td>941</td>
<td>2,773</td>
</tr>
<tr>
<td></td>
<td>Commercial</td>
<td>406</td>
<td>291</td>
</tr>
<tr>
<td></td>
<td>Sub-total</td>
<td>1,347</td>
<td>3,064</td>
</tr>
<tr>
<td>West of Strasburg Road</td>
<td>Residential</td>
<td>550</td>
<td>1,645</td>
</tr>
<tr>
<td></td>
<td>Commercial</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sub-total</td>
<td>550</td>
<td>1,645</td>
</tr>
<tr>
<td>East + West</td>
<td>Total</td>
<td>1,897</td>
<td>4,709</td>
</tr>
</tbody>
</table>

The 2008 traffic volumes during the weekday morning and afternoon peak hours at the existing study area intersections were extracted from the turning volumes reported in the ‘Doon South Community and Broader Study Area – Traffic Impact Study’ of November 2008 (the Paradigm report). The 2008 turning movement volumes were factored with a growth rate of 1% per annum to bring them to 2010 (actual 2010 counts were used for 12 locations – refer to Appendix D.1 (C) regarding the additional analysis). Based on the current land use around Strasburg Road, south of Huron Road, no significant change in the traffic turning volumes is anticipated, other than the background corridor growth.

Figure 3.3 illustrates the estimated existing traffic volumes (2010) during the weekday morning and afternoon peak hours, respectively at all the intersections within the vicinity of the study area.

The same traffic growth rate of 1% per annum was also applied to estimate the background traffic volumes during the weekday peak hours under the future background traffic conditions in 2018 and 2031.
Figure 3.3: Estimated 2010 Traffic Volumes
The forecast future total traffic volumes under the 2018 and 2031 horizon years were estimated by adding the future background volumes and the net additional development volumes for all the intersections on Strasburg Road (i.e., from Rush Meadow Street to New Dundee Road). Figures 3.4 and 3.5 illustrate the future total traffic volumes with the Kitchener Municipal Plan alignment scenario by 2018 and 2031.

**Figure 3.4: Estimated 2018 Traffic Volumes**
Figure 3.5: Estimated 2031 Traffic Volumes

2031 Weekday AM Peak Hour

2031 Weekday PM Peak Hour
Note that, for convenience, the examples in Figures 3.4 and 3.5 assume that Strasburg Road connects to New Dundee Road at a 4-leg intersection with Cameron Road, but this is not the case for all the Strasburg Road Extension alternatives under consideration.

The predicted intersection turning volumes translate to AADT two-way volumes in the Strasburg Road corridor within the study area ranging, depending on the section of road, from 17,080 to 19,920 in 2018 and from 18,340 to 20,990 in 2031.

A signal warrant analysis was conducted for all the new intersections, as summarized in Table 3.2, based on the Ontario Traffic Manual warrant methodology (included in Appendix D.1 (A)). For intersections that warranted signal control, it was assumed that roundabouts would be preferred, unless roundabouts are not feasible to implement due to topography/sightline constraints.

### Table 3.2: Summary of Intersection Analysis

<table>
<thead>
<tr>
<th>Intersections</th>
<th>Signal Warrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rockcliffe Drive/Strasburg Road</td>
<td>Not warranted up to year 2031</td>
</tr>
<tr>
<td>Biehn Drive/Strasburg Road</td>
<td>Not warranted up to year 2031</td>
</tr>
<tr>
<td>Robert Ferrie Drive/Strasburg Road</td>
<td>Upon extension of Robert Ferrie Drive and connection to Strasburg Road</td>
</tr>
<tr>
<td>Blair Creek Drive/Strasburg Road</td>
<td>Upon extension of Blair Creek Drive and connection to Strasburg Road</td>
</tr>
<tr>
<td>New Dundee Road/Strasburg Road</td>
<td>Warranted as soon as Strasburg Road is opened</td>
</tr>
</tbody>
</table>

Table 3.2 indicates that three of the new intersections: Robert Ferrie Drive/Strasburg Road, Blair Creek Drive/Strasburg Road and New Dundee Road/Strasburg Road would warrant a signal control by the opening of the Strasburg Road Extension and extension of the new side roads connections to Strasburg Road. Details as to the type of intersection control selected for new intersections with the Strasburg Road Extension are presented in Section 5.1 and the intersection design analysis documentation is included in Appendix D.1 (A), Appendix D.1 (B) and Appendix D.1 (C).

#### 3.2.3 Municipal Services and Utilities

**Existing Condition**

There are currently no municipal services within the study area, and existing residents are serviced by private wells and septic systems on their lands. Utilities within the study area include Kitchener-Wilmot Hydro poles along the Reidel Drive/Cameron Road corridor, and along New Dundee Road.

**Proposed Condition**

It is expected that, with future growth, the local utility companies will require a corridor to provide services to new developments (Doon South Community). The City of Kitchener’s standard 30 m secondary arterial urban cross-section is proposed for the Strasburg Road Extension, matching into the same cross-section proposed for Strasburg Road north of the study area, and will provide a standard location within the new road corridor for each utility, including Kitchener-Wilmot Hydro, Kitchener Gas, Bell, and Rogers Cable.
In addition, the City provides sanitary sewer services, and may install a sewer along the new road corridor along the standard offset, if required.

The Region of Waterloo also plans to extend their Regional watermain to provide additional water supply from Pressure Zone 4 to Pressure Zone 2W, to the Doon South Community as identified in the Kitchener Zone 2 and 4 Optimization Study (Stantec, May 2009), and to facilitate a condition as identified in the OMB’s judgment dated March 25, 2009 Section 3 Regional Municipality of Waterloo Conditions Item #25 and as per OMB Approved Plan 30T-08203.

It was originally intended that a 600 mm diameter watermain extend from the terminus of the future 600 mm watermain proposed north of the Strasburg Road Extension Class EA study area, southerly to the intersection of future Blair Creek Drive and Strasburg Road, and continue east along future Blair Creek Drive as a 450 mm diameter Regional watermain, as per OMB Approved plan 30T-08203. The watermain would be provided within the proposed road corridor along the standard offset location. Connections would be required at all proposed intersections.

It should be noted that the original intentions for extension of regional watermain have changed. Please refer to Section 5.1.7 of this ESR for information on the Region’s 2013 investigations to update the 2009 optimization study, which were undertaken to address changing development patterns; updated Regional population projections and water demand projections; proposed changes in the transfer of water from Kitchener to Cambridge; the timing of development occurring in Zone Kit 2W; and changes to the originally proposed alignment for the Strasburg Road Extension.

3.2.4 Surface Water/Stormwater Drainage

The available background information and previous studies pertaining to surface water and stormwater drainage were reviewed. This included the following:

- Upper Blair Creek (Kitchener) – Functional Drainage Study (FDS), March 2009, Stantec Consulting Ltd.
- Environmental Study Report – Doon South Phase 2, Official Plan Amendment Area, City of Kitchener, Collector Road – Municipal Class Environmental Assessment, November 2008, Ecoplans Ltd. and MTE.

Hydraulic modelling and floodplain mapping for Upper Blair Creek at the Reidel Drive crossing have also been reviewed.

Detailed supporting information for this component of the study is presented in Appendix D.8 Drainage and Stormwater Management.

Existing Surface/Stormwater Drainage Conditions

The general existing drainage scheme and topography of the Upper Blair Creek sub-catchment is sloping from west to east. The catchment area located west of the existing Reidel Drive includes a large number of depression areas (wetlands). Figure 3.6 illustrates general surface drainage flow, and the location and storage volumes of depression areas.

The total catchment area contributing to the Upper Blair Creek crossing under Reidel Drive (crossing culvert C4) is approximately 210.5 ha. According to the Upper Blair Creek FDS, the estimated peak flow rates at this creek crossing resulting from the continuous model (GAWSER Model) are 0.51 m³/sec and 0.94 m³/sec for the 5- and 100-year storm events respectively.
According to the Upper Blair Creek FDS, the subject catchment area is part of the West Study Area, which represents the lands located to the west of existing Reidel Drive. This area is outside the current urban development boundary.

As indicated in the Environmental Study Report – Doon South Phase 2, Official Plan Amendment Area, the predominant land use of the Upper Blair Creek watershed is active agricultural fields and natural features, with a small amount of rural residential developments.

GENIVAR staff completed a site reconnaissance of existing Reidel Drive between New Dundee Road and Stauffer Drive. Reidel Drive has a rural cross-section with ditches located on both sides of the road. The road consists of two travelled lanes, one lane for each direction. In general the runoff from road side ditches, as well as from external areas, is conveyed across Reidel Drive through a number of crossing culverts. Based on the field observations, five (5) crossing culverts were identified and inspected along Reidel Drive. Table 3.3 summarizes the findings from the site visit.
Figure 3.6: Depression Storage Volumes
Table 3.3: Reidel Drive Crossing Culverts

<table>
<thead>
<tr>
<th>Culvert ID</th>
<th>Approximate Distance North of New Dundee Road (m)</th>
<th>Approximate Diameter (mm) /Material</th>
<th>Approximate Cover (m)</th>
<th>Observations/ Conditions</th>
</tr>
</thead>
</table>
| C1         | 400                                              | 500 CSP                            | 0.50                  | Inlet: fair condition, rusted with 40% siltation  
Outlet: not located – under heavy vegetation |
| C2         | 480                                              | 700 PVC                            | 1.0                   | Inlet: good condition, 
Outlet: good condition |
| C3         | 800                                              | 600 CSP                            | 0.4                   | Inlet: fair condition, with 20% siltation  
Outlet: not assessed - 80% siltation |
| C4         | 900                                              | 600 CSP                            | 0.8                   | Inlet: fair condition, with some corrosion  
Outlet: fair condition, With some corrosion |
| C5         | 1120                                             | 400 CSP                            | 0.5                   | Inlet: fair condition, heavy rusted at bottom.  
Outlet: not assessed – heavy vegetation. |

Future Surface/Stormwater Drainage Conditions

The middle and lower reaches of Blair Creek have been characterized as a sensitive coldwater fishery. Based on previous studies, it was demonstrated that increasing the watershed imperviousness would result in degradation of watercourses and aquatic habitat, especially in coldwater fisheries.

According to the Upper Blair Creek FDS, stormwater quantity control is required to ensure that downstream peak flow/flood risks are not increased due to proposed development. Also, stormwater quality control is required in accordance with the Ontario Ministry of the Environment (MOE) Design Guidelines to the latest applicable standard. In addition, City of Kitchener Design Standards, which requires naturalization of stormwater management facilities, will also apply to any proposed design.

The Grand River Conservation Authority (GRCA) was contacted to obtain the required stormwater management design criteria. According to GRCA, post-development peak flows should be controlled to match the pre-development peak flows. As for the quality control, it is required to achieve Level 1 (enhanced level) water treatment, as specified by MOE Design...
Criteria. In addition, water temperature should not increase, in order to protect the Blair Creek coldwater fishery.

The following SWM alternatives were considered to be applicable for this study:

   r) Enhanced grassed swales
   s) Wet ponds/wetlands
   t) Oil/grit separator

The new storm sewer system along the proposed Strasburg Road Extension will be designed to convey the minor system flow, while overland flow from the major system runoff will be assessed and conveyed in a safe manner (to a stormwater management pond, where possible) without flooding the travelled lanes or any adjacent properties. New crossing culverts/bridges will be designed as required to convey flow from watercourses within the proposed road extension limits.

3.2.5 Geotechnical

Site Geology

The subject site is located in the physiographic region known as the “Waterloo Hills” according to Chapman and Putnam. The area is characterized by rolling sandy hills formed by numerous glacial events during the Wisconsinan Ice Age, approximately 15,000 to 25,000 years ago. Thick glacial ice sheets advanced several times into the Kitchener area from various directions and then receded and created sandy hills and ridges of sandy till, with outwash sands and gravel occupying the intervening hollows.

The topography of the site is best described as “rolling” with intermittent ditches/creeks and wet swampy areas.

Additional quaternary information is presented in Section 3.9 of this ESR and Appendix D.2 Natural Environment in relation to groundwater conditions.

3.3 Natural Environment

3.3.1 Designated Environmentally Sensitive Areas

A number of Regionally designated environmentally sensitive areas are found both within and proximal to the study area (refer to Figure 3.7). These are the Stauffer Woods Environmentally Sensitive Policy Area (ESPA 33), Doon South Woods (ESPA 34), and Roseville Swamp (ESPA 39), and the Strasburg Floodplain Forest (ESPA 30).

According to policy 7.C.5 of the Regional Official Plan, Environmentally Sensitive Policy Areas are regionally significant natural areas that comprise:

a) Provincially or regionally significant Life Science Areas of Natural and Scientific Interest (ANSI), or provincially significant Earth Science ANSI; or

b) Meet at least two of the following criteria:

i. comprise ecological communities deemed unusual, of outstanding quality or particularly representative regionally, provincially or nationally;

ii. contain critical habitats which are uncommon or remnants of once extensive habitats such as old growth forest, forest interior habitat, Carolinian forest, prairie-savanna, alvars, cliffs, bogs, fens, marl meadows, and cold water streams;
iii. provide a large area of natural habitat of at least 20 hectares which affords habitat to species intolerant of human intrusion; or

iv. provide habitat for organisms native to the region recognized as regionally, provincially or nationally significant; or

c) Fulfill one of the criteria in Policy 7.C.5 (b), and any two of the following:

i. contain an unusual diversity of native life forms due to varied topography, microclimates, soils and/or drainage regimes;

ii. perform a vital ecological function such as maintaining the hydrological balance over a widespread area by acting as a natural water storage, discharge or recharge area;

iii. provide a linking system of relatively undisturbed forest or other natural habitat for the movement of wildlife over a considerable distance;

iv. serve as major migratory stop-over or significant over-wintering habitat; or

v. contain landforms deemed unusual or particularly representative at the regional scale.

A brief description of each ESPA and its location in relation to the project study is presented in the following section. Additional information is provided in Appendix D.2 Natural Environment.

Stauffer Woods (ESPA 33)

Stauffer Woods is located at the southeast corner of the intersection of Reidel Drive and Stauffer Drive. It is approximately 26.2 hectares in size and is predominantly a Sugar Maple-Beech forest on hilly ground surrounding swamp depressions which provides significant amphibian breeding habitat. Numerous springs from the surrounding slopes sustain its wetland features. It is a locally significant life science area and is designated as an ecologically significant Open Space Area by the City of Kitchener.

Doon South Woods (ESPA 34)

Located approximately 1.0 km to the east of the study area, Doon South Woods is a low-lying mixed forest along a small tributary of Doon South Creek flanked by low ridges of maple-beech forest. A hydro corridor severs this ESPA. It is considered a local life science site and is designated as an ecologically significant Open Space Area by the City of Kitchener.

Roseville Swamp (ESPA 39)

This is the largest and one of the best wetland forest complexes and breeding bird areas in the Region. Although parts of it were lumbered some decades ago, it still contains many interesting plant and animal species.

The extensive swamp forest, mainly Silver Maple-Yellow Birch-Black Ash, is impressive for its large trees, especially White Pine, and its lush growth of ferns and mosses. This swamp is an excellent breeding area for deer and is important for migrating and breeding bird species, including warblers. The northern part of the ESPA in the City of Kitchener is traversed by Blair Creek which becomes a coldwater stream in this area. Numerous springs in the southern part in North Dumfries Township serve as headwaters for Cedar Creek, the Region's largest coldwater stream. The area is an International Biological Programme site. It is mapped by the Ministry of Natural Resources as a significant biological area for wildlife and a regionally significant life science area.
Strasburg Floodplain Forest (ESPA 30)

This large complex of swamp forest and adjoining wooded uplands occupies the Strasburg Creek floodplain and is located approximately 500 metres northeast of the northern portion of the study area.

Adjacent to the east is an extensive swamp forest which contains a notable hemlock stand. Mixed Sugar Maple-Beech forest occupies the slopes away from the floodplain. The floodplain is a complex and diverse mixture of trees and shrubs interspersed with rank herbaceous growth, mainly of grasses and asters. The area is designated as an ecologically significant Open Space Area by the City of Kitchener's Municipal Plan.

3.3.2 Fish and Fish Habitat

The study area includes the upper reach and headwaters of Blair Creek, which is a productive and healthy coldwater stream that supports brook trout and other coldwater species throughout its length.6 The presence of groundwater, a reasonable baseflow and gravel substrates provide ideal habitat for brook trout.

The entire length of Blair Creek is considered to be a natural channel with little anthropogenic disturbance noted. There are a couple of known barriers to the upstream passage of fish including the v-notch weir at the Reidel Road culvert and a residential driveway culvert that is perched, presenting a seasonal barrier to fish passage.7

Existing fish habitat information for Blair Creek suggests that the watercourse supports a diverse assemblage of cold, cool and warmwater fish species and that there is suitable habitat to support highly sensitive coldwater species, such as brook trout. The review of the Grand River Watershed Management Plan identified that Blair Creek is managed as a coldwater system by MNR and GRCA, with suitable thermal and habitat conditions to support a self-sustaining population of brook trout.

Designated Aquatic Species at Risk

The designation of aquatic species of national significance is given by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which may then qualify for legal protection and recovery under the federal Species at Risk Act (SARA). Endangered, Threatened or Extirpated species on Schedule 1 of the SARA are afforded protection under the Act. The designation of species of provincial significance is based on recommendations made by the Committee on the Status of Species at Risk in Ontario (COSSARO). Species classified as "at risk" (i.e., Extirpated, Endangered, Threatened or Special Concern) by COSSARO are placed on the Species at Risk List in Ontario (SARO List) and are afforded protection under the Ontario Endangered Species Act, with the exception of species of “special concern”.

From the review of background information, there are no designated aquatic species at risk present in Blair Creek within the study area.

3.3.3 Biophysical Characteristics of Blair Creek

Main Branch of Blair Creek

Blair Creek is a tributary of the Grand River located on the outskirts of the cities of Kitchener and Cambridge. Blair Creek is a coldwater stream that is 10 km in length with a catchment area

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6 Grand River Conservation Authority. 1991. Blair Creek Habitat Assessment and Fishery Inventory.
7 Stantec, 2009.
of 1,800 ha. Land use surrounding Blair Creek is mainly agricultural in the upper parts of the watercourse and residential in the downstream reaches. Wooded buffers are present throughout much of the length of the watercourse, except for the headwaters, where agricultural lands predominate and cover consists of grassed banks.

**Downstream of Reidel Drive**

Downstream of Reidel Drive, the stream flows are permanent through lowland/wetland areas and are conveyed in a defined channel. There is a V-notch weir located at the outlet of the culvert conveying Blair Creek at Reidel Drive, which is a barrier to the upstream passage of fish. The stream was flowing, albeit slowly, through the culvert during SLI field investigations in May, August and October, 2010.

The average wetted width of the watercourse downstream of Reidel Drive is 0.6 – 0.7 m, with depths of 0.06 - 0.08 m. Observation of the stream morphology was restricted by the thick overhead vegetation cover and in-stream watercress, but it is dominated mainly by flats due to the low gradient. There were also a few pools noted and a small riffle reach. The substrate is composed predominantly of muck and detritus, which is consistent with observations by GRCA during the habitat assessment in 1991.

**Upstream of Reidel Drive**

Upstream of Reidel Drive, assumed diffuse groundwater contribution in combination with the lack of a defined channel, obscure the stream flow to the extent that flow is not discernable through the wetland.

Standing water was observed in the wetland during the SLI field investigations in May 2010; however, flow was not evident. This reach does not provide permanent fish habitat, but could provide seasonal fish habitat, except for the V-notch weir located at the Reidel Drive culvert that is currently considered to be a barrier to the upstream passage of fish. Further upstream in the study area, Blair Creek is characterized as a shallow intermittent swale feature through forest and agricultural lands. A smaller ephemeral tributary of Blair Creek joins the main branch from the southwest approximately 200 m upstream from Reidel Drive. There is no permanent fish habitat through these upstream reaches as they contribute only seasonal flows to the downstream reaches.

There is an un-named pond located approximately 50 m north of the terminus of Reidel Drive on the north side of Stauffer Drive, on the property at 500 Stauffer Drive. Origins of the pond are unknown, but it appears that it is an old agricultural pond that was dug some years ago. Twentieth century topographic maps of the area confirm that a pond was not there until sometime after 1951. In the 1964 and 1974 maps, the pond is labelled as "dugout" beside the feature. There is no inlet or outlet stream, which is a distinguishing characteristic of dug ponds. Active agricultural fields are located on the east side

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9 Ibid.
10 Grand River Conservation Authority. 1991. Blair Creek Habitat Assessment and Fishery Inventory.
11 Stantec. 2009. Upper Blair Creek (Kitchener) Functional Drainage Study.
of the pond and the remaining edges are a combination of manicured lawn with some small shrubs and scattered trees. Extensive fish community investigations were not conducted at the pond; however, some minnow traps were set and a single brown bullhead (*Ameiurus nebulosus*) was sampled in the spring of 2010. The pond is considered to support a fish community and, typical of dug agricultural ponds; the fish have likely been stocked purposely or introduced accidentally.

### 3.3.4 Fish Community

Fish community sampling and inventory was not conducted by SLI in 2010, as it was determined there was sufficient background information from within the study area available from the Ministry of Natural Resources, GRCA and background reports prepared in support of development applications for the Doon South Community. Refer to the aquatic resources report in Appendix D.2 Natural Environment for additional information in this regard.

The fish community sampling stations (conducted by others) were located between Reidel Drive and Dodge Drive and are detailed on Figure 3.8.

In general, the fish community sampling was conducted in the headwaters area in the vicinity of Dodge Drive, as reaches upstream of this location have characteristic thick growth of overhead vegetation, which make sampling very difficult and the heavy growth of watercress and lower baseflow contributions contribute to poor visibility and low water levels that restrict the effectiveness of the sampling effort and also restrict the visual observations.\(^{12}\)

While the majority of the fish sampling stations were located outside of the study corridor, there was one exploratory electrofishing survey conducted by GRCA in 1991 at Reidel Drive.\(^ {13}\) The GRCA survey of Blair Creek at Reidel Drive found only fathead minnows.

During the SLI investigations of May and August 2010, no fish were observed at Blair Creek for the reaches in the study area that had either ponding water or minimal flow.

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\(^{12}\)Grand River Conservation Authority. 1991. Blair Creek Habitat Assessment and Fishery Inventory.

\(^{13}\)GRCA, November 1991.
Ephemeral Reach

Intermittent - Provides seasonal coldwater habitat.

Permanent - Provides year round coldwater habitat.

SLI Water Quality (May 26, 2010)

Figure 3.8: Fish Community Sampling Stations

Legend

Fish Community Sampling (Year)
- 1991
- 1998
- 2007
- 2008
- Water Quality 2010

Study Area
3.3.5 Spawning Surveys

Spawning surveys were not conducted by SLI during the fall of 2010, as spawning surveys had been previously conducted during the fall of 2008 by others and these surveys were deemed sufficient. As well, the sand and muck substrate and sections with poor channel form likely limits fish movement within and immediately downstream of the study area and therefore does not meet the basic requirements for brook trout spawning.\(^{14}\)

The spawning surveys conducted by GRCA in 1991 took place from Dodge Drive downstream to the outlet at the Grand River, which is a considerable distance downstream of the study area for the Strasburg Road Extension. No spawning surveys were conducted upstream of Dodge Drive due to extensive overhead cover and poor substrate conditions. Spawning surveys conducted by others in 2008 noted 3 confirmed redds at Dodge Drive and no confirmed spawning upstream of Dodge Drive which is consistent with past spawning surveys conducted by GRCA.

3.3.6 Wetlands

There are several wetland complexes in or near the study area; these are: the Roseville Swamp – Cedar Creek Wetland Complex and PSW; and the Strasburg Creek Wetland Complex and PSW. The terrestrial vegetation report in Appendix D.2 Natural Environment provides additional detail on these resource areas. A brief description of each is presented below and the general extent of the features is shown in Figure 3.7.

**Roseville Swamp – Cedar Creek Complex (PSW)**

The upper reaches of the Roseville Swamp - Cedar Creek complex PSW runs directly through the study area, crossing Reidel Drive approximately 200 m south of the intersection with Stauffer Drive and continuing to the east. The majority of this feature is located east of the study area (west of Highway 401, south of the Homer Watson Boulevard interchange in the City of Kitchener/Township of North Dumfries) and covers an area of 338.7 hectares. This is one of the best wetland forest complexes and breeding bird areas in the Region, as it contains many interesting plant and animal species and is one of the largest swamp forest complexes in the Region. Many of the significant species listed for this area are concentrated around Rainbow Lake, in a small marl meadow close by, or are within the hydro corridor, which severs this feature.

The swamp forest, mainly Silver Maple-Yellow Birch-Black Ash, is impressive for its large trees, especially White Pine, and its lush growth of ferns and mosses. This swamp is an excellent breeding area for deer and is important for migrating and breeding bird species, including warblers. Numerous springs serve as headwaters for Cedar Creek. The area is an International Biological Program site. It is mapped by the Ministry of Natural Resources as a significant biological area for wildlife and a regionally significant life science area. The feature includes the Grand River Conservation Authority Regulated Area. Specific portions of the Roseville Swamp – Cedar Creek Wetland Complex and PSW potentially affected by the proposed extension of Strasburg Road are described in Section 3.3.7 Vegetation Communities.

**Strasburg Creek Wetland Complex (PSW)**

Strasburg Creek Wetland complex is located approximately 200 m from the northwestern border of the study area. It is a Provincially Significant Wetland, composed of two wetland types (77% swamp and 23% marsh) (Coulson et al., 1986), which occupies the Strasburg Creek valley

\(^{14}\)Stantec, 2009.
system, forming a complex of marshes, deciduous, mixed, coniferous, and thicket swamps. This area is one of the more significant wetland forest complexes in the Region, as it contains many diverse habitats, along with interesting plant and animal species. It provides nesting for colonial waterbirds, as well as active feeding areas (Coulson et al., 1986). It also provides winter cover for wildlife and is of local significance for deer (MNR, Cambridge), (Coulson et al., 1986).

3.3.7 Vegetation Communities
Terrestrial vegetation field investigations were designed to confirm/update the literature review/investigations conducted during the initial phase of the study, delineate habitat and vegetation assemblages, determine the presence and/or potential of rare, endangered or threatened species within the study area boundaries and confirm the delineation of known sensitive areas in close proximity to the study area.

The field program consisted of detailed site investigations of vegetation units delineated from the 2009 Ortho-imagery provided by the City of Kitchener. These investigations were conducted during the spring (May 19 and 27) of 2010 for spring emergents, and the summer (August 4 and 17) of 2010 when vegetation is in leaf to confirm and refine habitat delineations and develop a vegetative composition profile for each habitat unit identified within the study area. The Ecological Land Classification (ELC) system, for Southern Ontario, was also applied to develop the ELC designations for the study area. A full ELC assessment was applied to units directly affected by the alignment alternatives.

Field visits were also conducted in the fall of 2010 to capture late season vascular plants. The late season flowering plants survey was completed on October 1.

The study area was defined as all vegetated areas that may be affected by the proposed alignment alternatives. For those communities east of Reidel Drive, the study area was limited to approximately 100 m from the existing road.

Vegetation communities within the general study area are characteristic of areas in southern Ontario that have been heavily influenced by historical clearing for agriculture and residential development. That said, a significant portion of the study area traverses or encroaches on relatively untouched natural areas associated with portions of Blair Creek and its tributaries. The most important of these is the wetland associated with the headwaters of Blair Creek, which forms part of a Provincially Significant Wetland, but the associated woodlots surrounding the wetland are also of high quality and have significant ecological, aesthetic and recreational value. Refer to Appendix D.2 for additional detail in the full terrestrial vegetation report.

Twenty (20) vegetation units, not including hedgerows are delineated on Figure 3.9. A detailed map of the vegetation communities associated with the Blair Creek system is presented in Figure 3.10.
Figure 3.10: Vegetation Communities Associated with Blair Creek
Deciduous Forest Communities

Natural deciduous forests within the study area are primarily concentrated in two areas, a large woodlot to the west of the end of Stauffer Drive ("western woodlot"), and a portion of the Stauffer Woods ESPA at the southeast corner of the intersection of Stauffer Drive and Reidel Drive.

At the west end of Stauffer Drive, the woodlot is dominated by a dry-fresh sugar maple-beech community (FOD 5-2) over rolling uplands and valleys. This mature woodlot is dominated by sugar maple, with other common tree species consisting of American beech, white ash, and black cherry.

The woodlot at the southeast corner of the intersection of Stauffer drive and Reidel Drive is part of the larger Stauffer Woods ESPA, which continues to the east of the study area. It contains a fresh-moist sugar maple hardwood community (FOD 6-5) with other common species including American beech, and white ash along with rarer red oak and bitternut hickory.

Both of these woodlots are mature communities and contain many large trees, especially the portion of the Stauffer Woods ESPA under consideration. The species within these woodlots are expected to continue replacing themselves over time and they will continue to provide similar habitat function in the future. Subcanopy and shrub layers are typically well developed with smaller individuals of the same species. Ground cover varies within the woodlots and is typically sparse in upland areas, and fairly dense in low lying portions. There is also a small woodlot consisting of a dry-fresh sugar maple-black cherry community (FOD 5-7) approximately 500 m north of Stauffer Drive.

Other forest communities within the project limits are mostly early successional forest communities dominated by poplar or aspens (FOD 3-1, FOD 8-1). These are principally associated with the margins of mature woodlots, or the slopes of the Roseville Swamp - Cedar Creek PSW corridor. These are regenerating forests that have likely been cleared at some point to allow for agricultural activities, or access to fields. The subcanopy and shrub layers in these communities show evidence of establishment by species from adjacent vegetation units, which will likely replace the existing tree community over time.

Cultural Communities

There are several vegetation communities within the study area that have been altered by human activity. There are several cultural plantations (CUP 3-1, CUP 3-2), including a remnant of a larger red pine plantation at the south end of the large woodlot at the west end of Stauffer Drive, and two pine plantations along the east side of Reidel Drive. The plantations along Reidel Drive consist of red or white pine and have little in the way of subcanopy or ground cover. At the south end of the large western woodlot there is substantial evidence of infiltration by species such as sugar maple and white ash.
A small cultural woodlot (CUW 1) is located north of the residence located at 271 Reidel Drive (west side). It consists of a stand of trees, mostly black walnut and black locust, which is likely the result of plantings. At the centre of this unit is a small cattail shallow marsh inclusion.

Cultural thicket communities (CUT 1-5, CUT 1-7) are also found within the study area. A red raspberry cultural thicket has grown up adjacent to the red pine plantation adjacent to the western woodlot in areas where logging has removed most of the pines. Within the Blair Creek corridor there is a section of hawthorn-buckthorn thicket, which has replaced the thicket swamp found on either side. This is likely the result of clearing for an access between agricultural fields at some point in the past.

There are also several patches of cultural meadow (CUM 1-1) within the study area. These are mostly associated with old agricultural areas or homesteads that have been left unmanaged, and are dominated by typical old field type vegetation.

**Hedgerows**

There are numerous hedgerows (HROW) found throughout the study area. Those located within the agricultural fields are mature, with numerous large trees such as a black cherry (98 cm dbh), white ash (73 cm dbh), sugar maple (102 cm dbh), and basswood (144 cm dbh). Dominant tree species include sugar maple, white ash, basswood, black walnut and black cherry, with some bitternut hickory, red oak, green ash, Manitoba maple, trembling aspen, and apple present. Shrub species are numerous, with species such as common buckthorn, hawthorn, riverbank grape, Virginia creeper, red raspberry, staghorn sumac, and nannyberry. Red osier dogwood, and willow were observed in the wetter pockets. Herbaceous vegetation was found to be similar to that described in the cultural meadow areas.

**Wetlands**

There are a variety of wetland vegetation communities within the study area. The majority of these wetlands are part of MNR's Blair Creek Provincial Significant Wetland; however, there are also several unevaluated wetlands. Some of these wetlands are hydrologically connected to the Blair Swamp, while others are not. Overall, this wetland complex is a mosaic of treed swamp, thicket swamp, and meadow marsh.

The only treed swamp is a yellow birch mixed swamp community (SWD 6-1), which is found within the western woodlot. Tree species consist of yellow birch, red maple, white pine, and black ash. Shrub and herbaceous vegetation is dense throughout, but varies, as this unit contains several open areas and ponded water.

Much of the Blair Creek corridor is willow thicket swamp consisting of two types (SWT 3-2, SWT 2-2) as the depth of organic soils changes. This thicket contains scattered trees, mostly red maple, poplar, tamarack and black ash, but is dominated by dense shrub vegetation consisting of abundant willow, spicebush, nannyberry,
and swamp red current, as well as red osier dogwood, gray dogwood, Virginia creeper. While there is some watercourse channelization through parts of the Blair Creek corridor, this was noted to be dry during the SLI 2010 and 2011 summer investigations.

Meadow marsh wetland types are found as inclusions within the treed and thicket wetland communities, as well as on their own. There are two principle types of meadow marsh within the study area. The first is a broad leaved sedge meadow marsh community (MAM 3-6), located just north of the road closure at the west of Stauffer Drive, which consists of broad-leaved sedges with some goldenrod and aster species at the edges of the depression. Trees can be found adjacent to the old road adjacent to this pond, including big tooth aspen, Scots pine and weeping willow. This unit has a hydrologic connection to the Blair Swamp via a culvert under the old farm road. A similar wetland is located approximately 500m north of the Stauffer Drive/Reidel Drive intersection.

The other meadow marsh type consists of cattail shallow marsh features, which also occur within the other wetland types, but can be found as a discrete unit located south of a cultural plantation on the east side of Reidel Drive. At this location, it is an open herbaceous community dominated by cattails. Along the edges where the land rises to north, south and west, other vegetation, including sedges, water hemlock, goldenrod and shrubs such as willow and buckthorn can be found.

**Vegetation Species at Risk**

One species at risk was found within the study area. A single butternut (*Juglans cinerea*) was found on the south facing slope of the Blair Creek valley, just west of Riedel Drive in Unit 4. The butternut is considered Endangered under COSEWIC, SARA (Species at Risk Act), and SARO (Species at Risk in Ontario). It is also has a SRank of S3? under the NHIC (Natural Heritage Information Centre) listing. Its location is shown on Figure 3.10.

### 3.3.8 Wildlife

LGL Limited conducted a review of background information and conducted field surveys to characterize the wildlife habitat and communities within the EA portion of the project area as detailed in the *Strasburg Road Extension Part A Draft Interim Report – Wildlife* (LGL Ltd., June 2011), contained in Appendix D.2 Natural Environment.

Potential wildlife habitat identified within the study area through a review of background information and further field studies conducted by LGL Limited included remnant natural features, watercourses, wetlands, woodlands and agricultural fields. These habitats were screened for significant wildlife habitat (SWH) as measured against the MNR criteria outlined in the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and Ecoregion Criteria Schedules (MNR, June 2000).

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15 S? - Not Ranked Yet; or if following a ranking, Rank Uncertain (e.g., S3?). S? species have not had a rank assigned. NHIC Glossary.
2011) to identify the following four types of SWH:

- Woodland breeding amphibian habitat;
- Wetland breeding amphibian habitat;
- Movement corridors associated with the above;
- Habitat for Species of Conservation Concern; and
- Turtle overwintering habitat.

Numerous common and secure species were also identified, including: 4 reptile; 16 mammal; 27 invertebrate; 15 amphibian; and, 92 bird species. Field studies conducted by LGL Limited between April 2010 and June 2011 included detailed surveys for salamanders, frogs, breeding birds, whip-poor-will/nighthawk, and reptiles; as well as incidental observations of mammals and species at risk (SAR) screening within the project area. Field observations verified the presence of 2 reptile, 6 amphibian, 20 invertebrate, 44 bird, and 5 mammal species within the study area, most of which were common and secure species.

SAR screening within the project area resulted in the documentation of monarch (Danaus plexippus), and the confirmation of snapping turtle (Chelydra serpentina) within the project area; both are listed as species of special concern provincially and federally. Although milksnake (Lampropeltis triangulum triangulum) was not confirmed within the study area limits for the Class EA, it was documented further north, and potential habitat for this species does exist within the Class EA study area. Although whip-poor-will (Caprimulgus vociferus) was observed as a spring migrant in April 2010 just outside the limits of the study area, this species was not documented in subsequent breeding bird surveys in June 2011. Of the species noted here, Candidate SWH was only identified for snapping turtle.

The overarching constraint to the project area from a wildlife perspective remains the regulated habitat for Jefferson Salamander (Ambystoma jeffersonianum)\(^{16}\); a species listed as endangered, both provincially and federally. MNR has mapped regulated habitat in the area and would determine if any of the ponds identified within the current study area merit inclusion into the regulated habitat limits\(^{17}\). Alignments with the potential to impact the salamander and regulated habitat would trigger a Section 17(2)(c) permit under the Endangered Species Act, 2007.

### 3.3.9 Groundwater

The following is a summary of the current understanding of the hydrogeology and geology of the Strasburg Road Extension Class EA study area. More detailed information on groundwater

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\(^{16}\) Photo used with permission of Dr. James Bogart, University of Guelph.

\(^{17}\) MNR updated the Jefferson Salamander Regulated Habitat Mapping in the vicinity of the Class EA study area several times during this study (most recently on January 9, 2012). Over most of the course of the study, the ministry advised the City of Kitchener that it was not in a position to grant permission to include the mapping in this ESR or any other study documentation that may be presented in a public forum. After further requests by the City at a meeting on January 18, 2012, MNR prepared Jefferson Salamander Regulated Habitat Mapping for only the study area, including disclaimers and explanatory notes, and granted the City permission to show this mapping in the ESR (refer to January 24, 2012 correspondence from MNR in Appendix B).
conditions in the study area are presented in the hydrogeology report contained in Appendix D.2

Natural Environment.

Much of the information provided herein has been distilled from larger area studies, including
the Blair, Bechtel and Bauman Creeks Subwatershed Plan (CH2M Gore & Storrie et al., 1997),
hereafter referred to as the BBB Study, and the Upper Blair Creek (Kitchener) Functional
Drainage Study (Stantec, 2009), referred to in this section as the UBC study. It is understood
that the geotechnical/hydrogeological fieldwork and analysis for the UBC study was provided to
Stantec by Naylor Engineering Associates Ltd. (NEAL).

The study area is located in an upland area associated with the Waterloo Moraine Complex,
within the physiographic region of southern Ontario known also known as the Waterloo Sand
Hills.

The Quaternary Geology map of the Cambridge Area (Karrow, 1987) identifies soils in the
general study area as composed mainly of sands of an ice contact origin, as well as lower
quantities of Port Stanley sandy silt till, isolated pockets of ice-contact gravel, and stream
deposits of mixed lithology, although investigation of the subsurface stratigraphy of the study
area through borehole drilling by NEAL has revealed a more heterogeneous assemblage of soil
types than the Quaternary Geology mapping suggests.

Water Well Records (WWR) from the MOE indicate that overburden soils in the study area are
composed of quaternary deposits approximately 50 m to 60 m in depth. Beneath the
overburden soils lies sedimentary bedrock of the Salina and Guelph Formations. The Salina
Formation is composed of deposits of shale and dolostone, while the Guelph Formation is
typically a massive fine to medium crystalline dolostone. Bedrock has a gentle regional slope to
the southwest.

Northwest of Reidel Drive and Stauffer Drive, test pits by NEAL typically encountered
subsurface deposits of sand or silt, with occasional occurrences of silt till and sand and gravel.
Two boreholes were advanced in this area, and they encountered approximately 3.5 to 6 m of
sand deposits overlying silt or silt till up to approximately 5 m or more in thickness. West of
Reidel Drive, test pits encountered a variety of soils types, with silty deposits being more
common close to New Dundee Road, and sand/silt and sand deposits being more common
further from New Dundee Road.

The hydraulic conductivity of the various subsurface soil types encountered across the study
area varies widely. Typically, conductivity ranges are $10^{-6}$ to $10^{-4}$ m/sec for sandy and silty sand
soils, $10^{-7}$ to $10^{-5}$ m/sec for silty and sandy silt soils, and $10^{-8}$ m/sec for clayey fine grained till
soils, which were only sporadically indicated in the majority of the investigated area.

As described in the BBB Report, groundwater in the area occurs in two overburden deposits of
sand and gravel, which are separated by Catfish Creek till; a low permeability confining layer.
The shallow and deep overburden aquifers provide water for residential and municipal wells, in
addition to contributing flow to Blair Creek, Roseville Swamp, and the Grand River.

The Region of Waterloo operates four water supply wells in the general vicinity of the study
area; production wells K34 and K36 to the north and Roseville production wells R5 and R6 to
the southwest. In addition, the Ayr production wells A1, A2, and A3 are found to the south of
the study area. Wellhead Protection Sensitivity Areas (WPSAs) 2, 3, and 4 for the Strasburg
wells extend into the northwestern corner of the Upper Blair Creek drainage system, and a very
small area at the intersection of Reidel Drive and New Dundee Road, representing the edge of
the lowest sensitivity (Category 8) area (i.e., the area is outside of the ten-year time of travel to the limit of the total land area contributing water to a municipal drinking-water supply well).

In addition to the existing supply wells, a target area for potential future groundwater supply was identified to the east of the study area, in the eastern part of the subwatershed as part of the Region’s Long Term Water Strategy (RMOW, 2003 and Golder, 2007). In the immediate vicinity of the study area, only one residential well was identified (at 500 Stauffer Drive), and it was noted to draw water from the shallow overburden aquifers, as well as being potentially tied into a surface pond.

Historic water level measurements, as summarized in the UBC report, have identified shallow groundwater flow to be in a south to southeasterly direction, towards Blair Creek. Specific contours for the area of concern are reproduced from the UBC report in Figure 3.11 below.

**Figure 3.11: Water Table Contours (from UBC, 2009)**
From Figure 3.11, it can be seen that the headwater area of Blair Creek is a shallow groundwater destination, and that flow is focused there from the south, west and north. The BBB study had concluded that, while Blair Creek originates in the ice-contact sands and gravels of the Waterloo Moraine, it is primarily an intermittent and losing stream fed by surface water runoff. However, consistent with the water table contours indicated in Figure 3.11, the UBC report noted that measurements of surface water and groundwater elevations in and beside the creek indicate that at some times during the year, groundwater discharge to Blair Creek does occur even west of Reidel Drive, supporting wetlands and marshes in the area. The intermittent nature of the headwaters area has been confirmed via site inspections and ecological investigations as part of this study.

As is documented in the UBC report, monitoring wells with multiple well screens exhibit a downwards hydraulic gradient in the area of the study. Therefore, in addition to some shallow discharge to surface, a portion of shallow groundwater also continues to percolate through the stratigraphic sequence to the deeper overburden aquifer, providing recharge to the more regional deep aquifer.

The shallow groundwater table generally occurs at a depth of less than 7 m below ground surface across the study area. Topographic influences, such as kettle depressions, hummocky topography, and the Blair Creek valley, all cause variation in the depth at which groundwater is encountered.

The lands west of Reidel Drive were identified as regionally significant in terms of providing high rates of recharge to the Strasburg and Ayr wells and contributing base flow to Blair Creek. Accordingly, these lands were identified in the BBB Plan and in Report PC-97-008/E-97-009 as Regional Recharge Areas. Additional hydrogeologic work in support of the FDS confirmed the presence of higher recharge rates on the West Side.

Although the Region has no immediate plans to develop additional groundwater supplies in this area, it remains a target area for future water supply with respect to the Long Term Water Strategy, and, therefore, the groundwater resources in the subwatershed should be protected accordingly.

SLE understands that the existing farm pond at 500 Stauffer Drive is a dug pond that is spring-fed and is likely hydraulically connected to the potable supply well via the shallow aquifer. This is consistent with MOE water well records that identify a shallow overburden well in the area.

### 3.3.10 Contaminated Property

SLI conducted a Contaminated Overview Study (COS) for the study area – refer to Appendix D.2 Natural Environment for full details. The objective of the COS was to provide a general overview of the area and identify properties or areas with the potential for site contamination, either within the road corridor, or in adjacent areas with the potential to migrate onto the proposed work area.

The following activities were conducted in order to collect information on the potential for contamination in the study area:

- **d) Description of the Study Area:** The location and limit of the work, the current land use, topography and drainage, physiography, geology and hydrogeology of the project area have been described.

- **e) Review of Records:** Historical information was reviewed to identify any past, actual or potential environmental issues within the project area. This included the
identification of activities that have the potential to result in environmental impact, as well as occurrences such as spills. An EcoLog Environmental Risk Information Services (ERIS) database search was commissioned for the study area to obtain information from federal, provincial and private databases that may be relevant to the project area.

f) **Review of Historical Aerial Photographs:** Historical aerial photographs were requested from the Ministry of Natural Resources and reviewed in order to identify any potential sources of contamination or disturbances that may have existed in the study area in the past.

g) **Review of Historical Fire Insurance Plans:** Fire insurance plans for the City of Kitchener were reviewed to identify potential sources of contamination that may have existed in the study area.

h) **Study Area Reconnaissance:** A reconnaissance of the study area was performed by an SLI investigator experienced in the assessment of environmental issues related to the area of concern. The investigator observed the area by a windshield survey. Actual or potential sources of contamination were recorded.

The findings of the activities outlined above were analysed to determine the potential for contamination to soil and/or groundwater in the study area.

The reconnaissance survey was conducted on March 7, 2010 by an SLI Site inspector. Key observations made during the field visit include:

i) The land use within and adjacent to the study area is predominantly agricultural, with three farms located on Stauffer Drive, Reidel Drive and New Dundee Road.

j) Various litter, tires and scrap metals were noted on the property west of the Stauffer Drive terminus.

k) Scrap metals and tires were noted on two farms located on Reidel Drive and New Dundee Road, respectively.

It should be noted that snow cover prevented full inspection of the ground surface.

### 3.4 Socio-Economic Environment

#### 3.4.1 Land Use

**Designated Land Use**

The majority of the study area is situated within an area in the southwest segment of the City of Kitchener that is designated for agricultural and/or rural uses by both the City and the Region of Waterloo. The Region’s Countryside Line represents the long-term boundary between the existing Urban Area/Township Urban Areas and the Countryside. It is currently defined, in part, by the Strasburg Road Extension alignment shown in the City’s Municipal Plan. The north end of the study area (approximately 15%) is situated within an urban area designated for low density residential uses in the southwest corner of the Brigadoon Community. The other designated land uses in the study area are Open Space (by the City) and Core Environmental Features (by the Region), principally within the Blair Creek corridor.
The City of Kitchener’s Growth Management Plan (KGMP)\textsuperscript{18} outlines growth management goals and a related strategy for achieving those goals. Within the KGMP, lands in the Strasburg Road Extension study area in the 2009 - 2010+ KGMP were assigned a lower level of development priority (Priority C) than other areas of the City, based on growth management criteria, including the need to complete additional planning and development-related investigations, or based on the need and timing of the delivery of necessary infrastructure to support development, including the Strasburg Road Extension EA (refer to Appendix D.3 for KGMP excerpts). The Fall 2011 - Fall 2013+ KGMP\textsuperscript{19} has given many of the properties in Doon South north of New Dundee Road a Priority B status and this is reflected in the new KGMP. This further reinforces the need for the Strasburg Road Extension, as the timing of the registration of the subdivisions will now be a higher priority.

Land uses defined in the City’s Municipal Plan are shown in Figure 3.12. The Region of Waterloo’s land use designations for the Countryside area are shown in Figure 3.13.

\textsuperscript{18} Kitchener Growth Management Plan (KGMP) 2009-2010 and Post 2010. City of Kitchener, June 2009.

\textsuperscript{19} Kitchener Growth Management Plan (KGMP) Fall 2011- Fall 2013+. City of Kitchener, November 14, 2011.
Figure 3.12: Study Area Land Uses Designated by the City of Kitchener
The Countryside area includes Rural Area and Prime Agricultural Area designations, overlain by a Protected Countryside designation, where urban uses are generally not permitted. Future expansions to the boundaries of the Urban Area are only permitted onto lands within the Countryside Line under certain conditions, including that the existing or planned infrastructure required to accommodate the proposed expansion can be provided in a financially and environmentally sustainable manner and is consistent with any applicable Regional and/or Area Municipal infrastructure master plan.

Where the Countryside Line coincides with the Protected Countryside designation, as shown on ROP Map 7 (refer to Figure 3.13), the Countryside Line is considered a permanent boundary. The Region of Waterloo has vigorously asserted and applied its policy positions on the Countryside Line in southwest Kitchener taken in its June 2009 recommendations to Regional Council and its June 2010 Report to Council in relation to protection of the Countryside Area and Regional Recharge Area from development, particularly in light of the potential additional impacts/costs associated with infrastructure needed to support urban development in this part of
However, these policies are currently the subject of objections to the Regional Official Plan by some study area landowners and are currently before the Ontario Municipal Board for consideration.

**Existing Land Use**

The study area is approximately 271 ha in size. Approximately 86% of the study area is owned by non-resident development interests; 10% is owned by the resident owner at 500 Stauffer Drive; and the remaining 4% is owned by the City of Kitchener and the Region of Waterloo in the form of opened and unopened road allowances. The latter category includes the designated Strasburg Road Extension corridor, which extends into the study area from the north.

Lands in the study area are used primarily for agricultural activities and rural residential uses (one owner-occupied (500 Stauffer Drive) and one tenant occupied (271 Reidel Drive)).

The study area comprises soils with high capability to support agriculture. Over half (53.3%) of the area is considered prime agricultural land (Capability for Agricultural Rating of Class 1 to Class 3 soils) and 43.1% are Class 4 soils, the remainder (3.6%) being low capability (organic) soils within the Blair Creek corridor. Cultivated land is used primarily for cash crops (corn, soybeans, wheat), with most of the custom planting and harvesting being contracted to two operators from the Cambridge area. The woodlot on the property at 500 Stauffer Drive is used by the owner to provide firewood for the house and business; and the farm pond is used to water the grounds immediately surrounding the house.

Apart from farming, the primary economic activity in the study area is the bed and breakfast operation run by the owner of the 40 ha property at 500 Stauffer Drive since 1997. The business is run out of the 140 year old farmhouse, which serves as the sleeping and eating quarters, with the outdoor amenity area situated principally on the grounds to the east of the house, overlooking the pond and the lands to the east. The business reportedly caters to local, regional and international clientele, and has also served as a venue for seminars, meetings, weddings and other special events.

The Countryside Line, land parcel configurations and agricultural capability are shown in Figure 3.14, Figure 3.15, and Figure 3.16.

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Figure 3.14: Countryside Line and Noise Points of Reception (POR)
Figure 3.15: Study Area Agricultural Capability
Figure 3.16: Study Area Land Parcel Configurations

Parcel Ownership
1  City of Kitchener (including designated allowance for Strasburg Road Extension)
2  Froure Development Ltd.
3  Hallman Construction Ltd.
4  Sunvest Reid Ltd.
5  500 Stauffer Drive
6, 8  Activa Holdings
7  Stonefield Properties

- Property Boundaries
- Study Area

Strasburg Road Property Fabric

Date: 07/10/2013
3.4.2 Communities

Defined communities within the study area are limited to the western periphery of the Doon South Community - Phase 2 and the southwest corner of the Brigadoon Community (refer to Appendix D.3), which are areas that the Strasburg Road Extension is intended to serve, through the provision of additional road network connections and as a conduit for municipal services.

The Doon South Community Plan (1997) identified two separate phases, based on what were thought to be servicing constraints associated with lands within the Blair Creek Subwatershed, given information that was available at the time. Development within Phase 2 was deferred pending the completion of a functional drainage plan for the Blair, Bechtel and Bauman Creeks Subwatershed Plan and adoption of a Municipal Plan Amendment which considers the subwatershed plan. The City of Kitchener formally initiated the Upper Blair Creek (Kitchener) Functional Drainage Study in October of 2003. At the same time, the City of Kitchener initiated a Community Plan and Transportation Study intended to establish land use and a collector road network for Phase 2. Detailed planning, environmental, engineering and traffic studies were also completed on behalf of major property owners as input to the City-initiated planning process and Functional Drainage Study. The studies concluded that the Phase 2 lands can develop with complete municipal services, at residential densities consistent with servicing and other priorities detailed by Provincial Policy and the Regional Official Policies Plan (1995).

Planning for Phase 2 included the development of a collector road network for a fully serviced Doon South Community, with road and transit connections internal to the Community and to the broader area, recognizing what was deemed to be inefficient traffic movement to/from areas west of the Doon South Community. The recommended network, derived through an environmental assessment process that evaluated social, economic, environmental and planning considerations, included an additional east-west connection (now referred to as Blair Creek Drive) that extends westerly from Robert Ferrie Drive across Blair Creek to the future extension of Strasburg Road. Blair Creek Drive will connect the Doon South Community to the broader area and enhance connections (including transit service) between all parts of the community. Transportation network development policies in the community plan also recognize the need to consider all forms of transportation, including walking, cycling, public transit and automobile, including minimizing walking distances to transit stops (e.g., 95% of development to be within 450 m of transit service). With the possible conversion of Phase 2 Limited Service Residential areas to Low Rise Residential, it is expected that this policy will be extended to Phase 2 areas.

The Doon South Phase 2 plan also recognizes the desire to close certain Scenic-Heritage roads and incorporate them into the community trail network. Based on the Doon South Scenic Roads Study (1995), the plan calls for closure of the north end of existing Reidel Drive and the section of Stauffer Drive within the Class EA study area and their incorporation in the Scenic Roads Community Trail Network. It is intended that roads designated as part of the Scenic Roads Community Trail Network may be used to access new subdivision development until such time as the permanent collector and local road network is in place to access such development.

The land uses designated in Brigadoon and Doon South in proximity to the study area are shown in Figure 3.12, and include Open Space (in the Blair Creek corridor (with the decision relating to the redesignation from Limited Service Residential to Low Rise Residential proposed for lands identified as Deferral 1 in Figure 3.12 deferred until such time as environmental analysis has been finalized, environmental setbacks established and the potential movement of endangered and threatened species assessed relative to environmental features to the north and south of the deferral area); Low Rise Residential; and Neighbourhood Mixed Use Centre.
Within Doon South Phase 2, the development proposal of most interest to this study is the Stauffer Woods Subdivision (Activa Holdings Inc. - Plans 30T-08203 and 30T-06203), which is bounded on the west by existing Reidel Drive, north and south of the Blair Creek corridor. The subdivision will be developed in a staged manner as part of a multi-use community comprising a mix of single family, street fronting townhouses and multi-family residential uses, open space, minor retail/commercial and future institutional (school) blocks. There are also stormwater management facilities planned within the subdivision, including one (SWM Facility - 5) south of Blair Creek immediately east of Reidel Drive.

Plan 30T-08203 (presented in Appendix D.3) has Draft Approved status. The conditions of Draft Approval include caps on development related to the extension of Strasburg Road from its current terminus at Rush Meadow Street to New Dundee Road, extension of Robert Ferrie Drive from its current terminus at Tilt Drive to Strasburg Road, and construction of the internal collector road network and. Lands south of Blair Creek are not subject to the cap provisions. In addition, prior to the final approval, the subdivider must dedicate to the City of Kitchener any required lands for the new Strasburg Road right-of-way in accordance with the Strasburg Road Environmental Assessment to be undertaken to determine the alignment of Strasburg Road from a point north of Stauffer Drive to New Dundee Road.

There are no development plans for the southwest corner of the Brigadoon Community currently under review by the City of Kitchener. The community land use plan is presented in Appendix D.3. It should be noted that the RMOW Countryside Line and the west limit of the Brigadoon Community are not coincident in the area immediately north of Stauffer Drive.

3.4.3 Noise

The noise impact assessment for this study was conducted by J. E. Coulter Associates Limited. Full details for the study are presented in Appendix D.4 Noise. The noise impacts of the proposed Strasburg Road Extension have been evaluated using the Ministry of Transportation’s “Environmental Guide for Noise” (the protocol). This protocol compares the future daytime (0700h – 2300h) equivalent sound levels (16hr L eq) under two different scenarios at a point 10 years after the hypothetical completion of the project. The comparison is between the sound levels that would be present with the project in place (the “with project” scenario) and the sound levels that would be present assuming the project did not proceed (the “no project” scenario). If the difference between these two scenarios is 5 dB or greater, the economic, technical, and administrative feasibility of noise control needs to be investigated. In some areas, there may not be an existing dominant noise source, which can sometimes be the case for green-field projects such as this. Where there is no dominant noise source, the protocol requires that the receptors be classified as Class 1 (urban), Class 2 (suburban) or Class 3 (rural). For these areas, the ambient sound limits used for comparison purposes are 55 dB L eq, 50 dB L eq, and 45 dB L eq for Class 1, Class 2, and Class 3 areas, respectively.

A total of five (5) points of reception (PORs), alternatively referred to as noise sensitive areas, have been identified in the study area, as shown in Figure 3.14. The point of evaluation at each receptor is typically an outdoor living area (OLA). For a well developed area (Class 1 or Class 2), the OLA is normally a point 3 m from the rear façade of a house, or a balcony more than 4 m deep for an apartment. For a rural area (Class 3), the OLA is less clearly defined and can usually be a point within 30 m of the dwelling on all sides.

The five PORs are:

POR1 Residence located on Hearthwood Drive (considered rural; ambient sound level of 45 dB L eq without Strasburg Road in place);
POR2 Residence located at 500 Stauffer Drive (future ambient sound level of 45 dB L_{eq} without Strasburg Road in place);

POR3 Residence at 271 Reidel Drive (future ambient sound level of 45 dB L_{eq} without Strasburg Road in place);

POR4 Residence on New Dundee Road, east of Cameron Road and east of all proposed Strasburg Road alternatives (future ambient sound level of 50 dB L_{eq} without Strasburg Road in place); and

POR5 Residence on New Dundee Road, west of Cameron Road and west of all proposed Strasburg Road alternatives (future ambient sound level of 57 dB L_{eq} without Strasburg Road in place).

3.4.4 Air Quality

Relevant Thresholds

The air quality impact assessment for this study was conducted by RWDI AIR Inc. Full details for the study are presented in Appendix D.5 Air Quality. The air contaminants of interest in this study are:

- Carbon Monoxide (CO)
- Nitrogen Dioxide (NO₂)
- Respirable Particulate Matter (PM_{2.5})
- Inhalable Particulate Matter (PM_{10})
- Benzene (C₆H₆)
- 1,3-Butadiene (C₄H₆)
- Formaldehyde (CH₂O)
- Acetaldehyde (CH₃CHO)
- Acrolein (C₃H₄O)

The Province of Ontario has established both criteria and standards for concentrations of airborne contaminants. The Ambient Air Quality Criteria (AAQC’s) are effects-based levels in air, based on health and/or other effects. They are used in environmental assessments, special air monitoring studies and assessments of general air quality to determine the potential for adverse effects. The standards, on the other hand, are established by Ontario Regulation 419/05, and are legal requirements that emitters in Ontario must meet. Most of the standards are based on the AAQC’s but, in some cases, the standard and AAQC for a contaminant differ from each other. Since Ontario Regulation 419/05 does not apply to discharges of contaminants from motor vehicles, only the AAQC’s apply to the present assessment.

In addition to provincial AAQC’s, the Federal Government and the Canadian Council of Ministers of the Environment have established National Ambient Air Quality Objectives and Canada-Wide standards (CWS) for some contaminants. These levels are effects-based levels in air, based on health and other effects, depending on the pollutant. Of particular relevance is the CWS for PM_{2.5} (respirable particulate matter), since PM_{2.5} currently does not have a provincial AAQC in Ontario.

The aforementioned air quality criteria, objectives and standards are collectively referred to as air quality thresholds in this report. The thresholds used to assess potential project impacts are summarized in Table 3.4. In general, if the concentration or deposition level of an airborne pollutant can be maintained below its threshold, then either no health effect is observed or the
effect is small enough that it presents an acceptably low risk to the population and the environment.

It should also be noted that these thresholds represent target levels and are not specifically enforceable for motor vehicle emissions.

### Table 3.4: Summary of Relevant Air Quality Thresholds (µg/m³)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Criterion (µg/m³)</th>
<th>Averaging Period</th>
<th>Source</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM&lt;sub&gt;2.5&lt;/sub&gt;</td>
<td>30</td>
<td>24-hour</td>
<td>CWS</td>
<td>[3]</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>24-hour</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
<tr>
<td>PM&lt;sub&gt;10&lt;/sub&gt;</td>
<td>50</td>
<td>24-hour</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
<tr>
<td>CO</td>
<td>36,200</td>
<td>1-hour</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td>15,700</td>
<td>8-hour</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
<tr>
<td>NO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>400</td>
<td>1-hour</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>24-hour</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
<tr>
<td>Benzene</td>
<td>2.3</td>
<td>24-hour</td>
<td>AAQC</td>
<td>[4]</td>
</tr>
<tr>
<td></td>
<td>0.45</td>
<td>Annual</td>
<td>AAQC</td>
<td>[4]</td>
</tr>
<tr>
<td>1,3-Butadiene</td>
<td>10</td>
<td>24-hour</td>
<td>AAQC</td>
<td>[5]</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Annual</td>
<td>AAQC</td>
<td>[5]</td>
</tr>
<tr>
<td>Acrolein</td>
<td>4.5</td>
<td>1-hour</td>
<td>AAQC</td>
<td>[6]</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>24-hour</td>
<td>AAQC</td>
<td>[6]</td>
</tr>
<tr>
<td>Acetaldehyde</td>
<td>500</td>
<td>30-minute</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td>500</td>
<td>24-hour</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>65</td>
<td>24-hour</td>
<td>AAQC</td>
<td>[1]</td>
</tr>
</tbody>
</table>

**Background Air Quality Conditions**

Background concentrations (i.e., concentrations due to non-project emission sources in the surrounding area) are an important part of the total air quality concentration. The dispersion model will predict the incremental impact of the project. An estimate of the maximum coincident background level will be added to the maximum modelled concentration for each contaminant, to determine the worst-case combined impact of the project, together with background. The results will then be compared to the relevant thresholds.

The current background air quality conditions in the study area can be generally characterized with air quality monitoring data. There is an air quality monitoring station located at West Avenue and Homewood Avenue in Kitchener. CO is no longer monitored in Kitchener; therefore, data were taken from the monitoring station located at 900 Highbury Avenue North in London. The stations are operated by the MOE and are part of the National Ambient Pollution Surveillance (NAPS) network. These locations are not exactly representative of the study area,
but provide the best estimates available of general background air quality. Since they are both located in more built-up environments, they are likely to overestimate background levels somewhat.

Table 3.5 summarizes the five most recent years of ambient air quality monitoring data for NO₂, CO, PM₁₀ and PM₂.₅. All concentrations in the tables are hourly except PM₂.₅ and PM₁₀, which are presented as 24-hour concentrations.

Neither the MOE nor NAPS currently reports PM₁₀ data in Ontario. Lall et al. (2004), however, determined that the nationwide PM₂.₅/PM₁₀ ratios for the USA are normally distributed with a mean of 0.54, a median of 0.53, a minimum of 0.16, and a maximum of 0.94. This result was based on an analysis of a large amount of data and stations. Therefore, 90th percentile PM₁₀ concentrations are calculated using the mean PM₂.₅/PM₁₀ ratio of 0.54.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Statistic</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO₂ (µg/m³)</td>
<td>1-hr Max</td>
<td>134</td>
<td>128</td>
<td>117</td>
<td>98</td>
<td>132</td>
<td>134</td>
</tr>
<tr>
<td></td>
<td>24-hr Max</td>
<td>89</td>
<td>94</td>
<td>68</td>
<td>60</td>
<td>60</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>Annual Mean</td>
<td>25</td>
<td>24</td>
<td>20</td>
<td>19</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>1hr-90th Percentile</td>
<td>49</td>
<td>51</td>
<td>42</td>
<td>38</td>
<td>36</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Times &gt; 1-hr AAQC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(400 µg/m³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Times &gt; 24-hr AAQC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(200 µg/m³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO (µg/m³)</td>
<td>1-hr Max</td>
<td>2654</td>
<td>2769</td>
<td>2077</td>
<td>1385</td>
<td>1385</td>
<td>2769</td>
</tr>
<tr>
<td></td>
<td>8-hr Max</td>
<td>1673</td>
<td>1431</td>
<td>1431</td>
<td>750</td>
<td>750</td>
<td>1673</td>
</tr>
<tr>
<td></td>
<td>Annual Mean</td>
<td>519</td>
<td>196</td>
<td>219</td>
<td>185</td>
<td>185</td>
<td>519</td>
</tr>
<tr>
<td></td>
<td>1hr-90th Percentile</td>
<td>773</td>
<td>369</td>
<td>358</td>
<td>335</td>
<td>335</td>
<td>773</td>
</tr>
<tr>
<td></td>
<td>Times &gt; 1-hr AAQC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(36,200 µg/m³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Times &gt; 8-hr AAQC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(15,700 µg/m³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM₂.₅ TEOM (µg/m³)</td>
<td>1-hr Max</td>
<td>64</td>
<td>73</td>
<td>52</td>
<td>62</td>
<td>54</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>24-hr Max</td>
<td>41</td>
<td>48</td>
<td>35</td>
<td>41</td>
<td>37</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Annual Mean</td>
<td>8.1</td>
<td>9.5</td>
<td>7.7</td>
<td>8.0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>1hr-90th Percentile</td>
<td>19</td>
<td>24</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>24hr-90th Percentile</td>
<td>17</td>
<td>22</td>
<td>16</td>
<td>16</td>
<td>15</td>
<td>22</td>
</tr>
</tbody>
</table>
Table 3.6 summarizes the ambient monitoring data from the four most recent years of available data for benzene and 1,3-butadiene from the Kitchener ambient monitoring station.

**Table 3.6: Summary of Ambient Monitoring Data for Benzene and 1,3-Butadiene (NAPS Network Data) in µg/m³**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Statistic</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>24-hr Max</td>
<td>3.7</td>
<td>2.2</td>
<td>2.4</td>
<td>3.3</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Annual Mean</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>24-hr-90th Percentile</td>
<td>1.6</td>
<td>1.4</td>
<td>1.2</td>
<td>1.2</td>
<td>1.6</td>
</tr>
<tr>
<td>1,3-Butadiene</td>
<td>24-hr Max</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Annual Mean</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>24-hr 90th Percentile</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Notes:
[1] n/a = not available
Table 3.7 presents a summary of the five most recent years of 90th percentile concentrations for aldehydes and acrolein. Recent multiple years of data for aldehydes and acrolein are readily available for only two stations: Simcoe and Windsor. Data from Simcoe were selected as more representative of the Strasburg Road Extension area, given its relatively rural nature.

Table 3.7: Summary of 90th Percentile Ambient Monitoring Data for Acrolein, Acetaldehyde, and Formaldehyde in µg/m³

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrolein</td>
<td>0.096</td>
<td>0.193</td>
<td>0.109</td>
<td>0.077</td>
<td>--</td>
<td>0.193</td>
</tr>
<tr>
<td>Acetaldehyde</td>
<td>4.88</td>
<td>2.64</td>
<td>2.27</td>
<td>1.49</td>
<td>1.47</td>
<td>4.88</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>8.59</td>
<td>5.56</td>
<td>5.22</td>
<td>4.35</td>
<td>2.30</td>
<td>8.59</td>
</tr>
</tbody>
</table>

Conclusions

The review of historical ambient air quality measurements indicates that existing levels of CO, NO₂, 1,3-butadiene, acrolein, acetaldehyde and formaldehyde are well below their respective thresholds at the representative monitoring sites. The 90th percentile PM_{2.5}, PM_{10} and benzene concentrations are below their respective thresholds; however, the maximum concentrations are above their respective thresholds.

3.5 Cultural Environment

3.5.1 Built Heritage and Cultural Landscapes

A cultural heritage resource assessment was undertaken by Archaeological Services Inc. (ASI) to provide: an existing conditions inventory of above-ground cultural heritage resources in the study area for the proposed Strasburg Road Extension; an assessment and evaluation of the impacts of the proposed road extension; and appropriate conservation measures and/or additional investigations that may be required to mitigate potential impacts of the proposed project on above ground cultural heritage resources. This section of the ESR presents the inventory of above-ground cultural heritage resources. Additional details are presented in the cultural heritage assessment report in Appendix D.6 Built Heritage and Cultural Heritage Landscapes.

In order to make a preliminary identification of existing built heritage resources and cultural heritage landscapes within the study area, a number of sources were consulted, including the following reports and indexes: Kitchener Scenic Roads Study (LACAC, 1994); Doon South Community Plan: Scenic Roads Study (City of Kitchener, 1995); Doon South Community Plan (Consolidated, 2003; City of Kitchener Municipal Plan (City of Kitchener, 2005); Index of Non-designated Properties of Heritage Value or Interest (City of Kitchener, 2010); Index of Properties Designated Under Part IV of the Ontario Heritage Act (City of Kitchener, 2009); and Index of Properties Designated Under Part V of the Ontario Heritage Act (City of Kitchener, 2007).

Both Reidel Drive and Stauffer Drive were identified in the Scenic Roads Study (LACAC, 1994) as having high scenic qualities and they were recommended to be considered for designation. In 1995, the Doon South Community Plan: Scenic Roads Study further investigated scenic roads within Doon South and recommended that Stauffer Drive and the northern most portion of Reidel Drive (from Stauffer Drive south to the Blair Creek System) be designated as scenic roads. According to the City of Kitchener Municipal Plan, Stauffer Drive, from Reidel Drive to
Tilt Drive was designated as a Scenic-Heritage Road. According to the Doon South Community Plan (2003), the north end of Reidel Drive is to be incorporated in the community’s Scenic Roads Community Trail Network. The City of Kitchener’s Municipal Plan also states that Reidel Drive is presently under study for designation as a Scenic-Heritage Road.

Scenic-Heritage Roads include roads that meet all or some of the following criteria:

- They have unique structural, topographic and visual features compared to most other roads in the municipality;
- They have unique abutting vegetation, including mature tree cover or enclosure;
- They are located within or abut a quality woodlot or significant environmental area;
- They function as a wildlife corridor;
- The abutting built environment and cultural landscape or road segment itself is of heritage or historical significance; and
- They are located within an approved or proposed Heritage Conservation District.

A field review was undertaken by ASI in July 2010 to document the existing conditions of the study area. An additional field review was undertaken in August 2011 to complete detailed assessments of the short-listed alignment alternatives. Field review confirmed that this area retains many elements evocative of its early agricultural roots, mainly in the form of farmscapes and scenic/historic roadscapes along both Reidel Drive and Stauffer Drive. The area features rolling topography, easily experienced while travelling along Reidel Drive, and which contributes to the scenic, rural views from the Reidel Drive and Stauffer Drive roadscapes.

The results of historical research confirmed that the study area features historically surveyed thoroughfares located in an agricultural setting that dates back to the early- to mid-nineteenth century. The field review confirmed that this area retains elements evocative of its early agricultural beginnings. A total of seven (7) cultural heritage landscapes were identified within the study area. The following provides a summary of field review and data collection findings (refer to Table 3.8 and Figure 3.18).

A total of three cultural heritage resources identified in the study area were previously identified by the municipality: CHL 1 in the Municipal Heritage Register, and CHL 3 and CHL 4 in the Municipal Plan (City of Kitchener 2009) and Doon South Community Plan (City of Kitchener 2003). Field review confirmed that the Scenic-Heritage Road attributes for CHL 3 and CHL 4, as cited in the Doon South Scenic Road Study, remain intact.

Four additional resources were identified during the field review (CHL 2, CHL 5, CHL 6 and CHL 7). There is one cultural heritage resource designated under the Ontario Heritage Act, that being the entire property at 500 Stauffer Drive (CHL2). Of the total identified cultural heritage resources, two are farm complexes (CHL 1 and CHL 2), one is a remnant farm complex (CHL 7), one is a roadscape that is designated as a Scenic-Heritage Road (CHL 4), one is a roadscape that is a candidate for designation as a Scenic-Heritage Road (CHL 3), and two are scenic/historic roadscapes that were identified during field review (CHL 5 and CHL 6).
### Table 3.8: Summary of Cultural Heritage Landscapes

<table>
<thead>
<tr>
<th>CHL 1</th>
<th>Farm Complex</th>
<th>271 Reidel Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IDENTIFIED CULTURAL HERITAGE LANDSCAPES AND BUILT HERITAGE FEATURES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This farm complex is located on the west side of Reidel Drive north of New Dundee Road and features a 1½ storey Ontario Gothic cottage, a barn, ruins of another barn, and two silos. The farmhouse has design value, given that it displays a high degree of craftsmanship and artistic merit. The site also features mature vegetation and views of rolling agricultural fields. The property retains contextual value in that it is an intact agricultural landscape with association with township farming practices and development, and this contributes to the rural, agricultural character of the area.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHL 2</th>
<th>Farm Complex</th>
<th>500 Stauffer Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>This farm complex is sited on elevated ground at the junction of Reidel Drive and Stauffer Drive. It includes a 1½ storey, nineteenth century house with gable roof. The house has design value, given that it displays a high degree of craftsmanship and artistic merit, particularly in its use of stone. The farm complex also features a number of outbuildings and landscape features, including two gable roof, frame barns; a pond; mature trees; a mature woodlot; a long driveway lined with trees; and fields with undulating topography. The contextual value of the property lies in its contribution to the historic and agricultural character of the area and its significant visual and spatial relationship with Stauffer Drive and Reidel Drive. Further, the property features significant views to and from Stauffer and Reidel Drive, as well as Caryndale Drive. The City has designated the property under Part IV of the Ontario Heritage Act.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHL 3</th>
<th>Roadscape</th>
<th>Reidel Drive (from Stauffer Drive southerly to Blair Creek)</th>
</tr>
</thead>
<tbody>
<tr>
<td>This transportation corridor follows the original road allowances as illustrated on historic mapping. Field review confirmed that this roadscape contains elements evocative of its historic origin: a narrow, two-lane alignment without shoulders, bounded on both sides by agricultural fields and diverse roadside vegetation; spatial and visual relationship between the road thoroughfare and Blair Creek; and associated vegetation.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHL 4</th>
<th>Roadscape</th>
<th>Stauffer Drive (from Reidel Drive to Tilt Drive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>This transportation corridor follows the original road allowances as illustrated on historic mapping. Field review confirmed that this roadscape contains elements evocative of its historic origin: a narrow, two-lane alignment without shoulders; scenic views to surrounding agricultural fields, hills and woodlots; and diverse roadside vegetation providing a definite edge to the road.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHL 5</td>
<td>Roadscape</td>
<td>Stauffer Drive (from Reidel Drive westerly to the end of the road)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>CHL 6</td>
<td>Roadscape</td>
<td>Reidel Drive (from Blair Creek southerly to New Dundee Road)</td>
</tr>
<tr>
<td>CHL 7</td>
<td>Remnant Farm Complex</td>
<td>Western terminus of Stauffer Drive</td>
</tr>
</tbody>
</table>
Figure 3.17: Cultural Heritage Features

Legend
- Study Area
- Historic Feature
- Archaeological Potential
- Historic Road

NEW DUNDEE RD
3.5.2 Archaeological Resources

A Stage 1 Archaeological Assessment was undertaken by ASI to provide information about the geography, history, previous archaeological fieldwork and current land condition of the proposed Strasburg Road Extension study area and to evaluate in detail the archaeological potential of the study area that can be used, if necessary, to support recommendations for a Stage 2 Archaeological Assessment for all or parts of the study area.

A Stage 1 Archaeological Assessment involves a background study to provide detailed documentary research on the archaeological and land use history and present conditions of the study area. Specifically, the background study provides information about previous archaeological fieldwork within and around the study area, its geography and history, and current land conditions.

In order for an inventory of archaeological resources to be compiled for the study area, three sources of information were consulted: the site record forms for registered sites housed at the Ministry of Tourism and Culture and Sport (MTCS; formerly Ministry of Tourism and Culture (MTC)); published and unpublished documentary sources; and the files of ASI.

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MTCS. According to the OASD a single archaeological site, AiHc-22, has been registered within the Strasburg Road Extension study area. Six additional archaeological sites have been registered within 1 km of the study area. AiHc-22 was discovered during the Museum of Indian Archaeology’s archaeological assessment for the proposed Huron Road and Strasburg Road alignments associated with the Huron Industrial Park (LMA 1982). The site was located while surveying a cornfield, adjacent to the proposed corridor. A single artifact of unknown Aboriginal affiliation was recovered. No further work was recommended, and the site was cleared of further archaeological concern.

A review of the general physiography and local nineteenth century land use of the study area suggested that it has potential for the identification of both Aboriginal and Euro-Canadian archaeological sites.

The Standards and Guidelines for Consultant Archaeologists list characteristics that indicate where archaeological resources are most likely to be found (2009: 5-6). Archaeological potential is confirmed when one or more features of archaeological potential are present. Per Section 1.3.1 of the standards and guidelines, the study area meets four of the criteria used for determining archaeological potential:

- Previously registered archaeological sites (i.e. AiHc-22);
- Water sources: primary, secondary, or ancient water sources (i.e., Blair Creek);
- Early Euro-Canadian settlement (i.e., pioneer homestead); and
- Early historical transportation route (i.e., New Dundee Road, Reidel Drive, and Stauffer Drive).

These criteria characterize the study area as having potential for the identification of Aboriginal and Euro-Canadian archaeological sites, the extent of which is illustrated in Figure 3.17.
4.0 CONCEPTUAL DESIGN ALTERNATIVES

As stated in Section 1.2.1 of this ESR, the principal purpose of this study is to determine the most appropriate alignment for Strasburg Road from north of Stauffer Drive to New Dundee Road. This chapter of the report documents the development and assessment of alignment alternatives, leading to selection of the Technically Preferred Alignment.

4.1 Design Criteria

The development of the alignment alternatives was based on the designation of the Strasburg Road Extension as a 4-lane Secondary Arterial road with an urban (curb and gutter) cross-section and 30 m right-of-way platform. The engineering Design Criteria template used for the development of the alignment alternatives is presented in Table 4.1.

**Table 4.1: Engineering Design Criteria for Development of Strasburg Road Extension**

<table>
<thead>
<tr>
<th>DESIGN PARAMETERS</th>
<th>PRESENT CONDITIONS (NORTH OF EXTENSION)</th>
<th>DESIGN STANDARDS (KITCHEENER DEVELOPMENT MANUAL – APRIL 2010)</th>
<th>TAC GEOMETRIC DESIGN MANUAL</th>
<th>PROPOSED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROW Width</td>
<td>26 m</td>
<td>30 m – 35 m</td>
<td>N/A</td>
<td>30 m</td>
</tr>
<tr>
<td>Posted Speed</td>
<td>50 km/h</td>
<td>N/A</td>
<td>60 km/h</td>
<td>60 km/h</td>
</tr>
<tr>
<td>Design Speed</td>
<td>N/A</td>
<td>60 - 80 km/h</td>
<td>70 km/h</td>
<td>70 km/h</td>
</tr>
<tr>
<td>Minimum Stopping Sight Distance</td>
<td>N/A</td>
<td>85 - 140 m</td>
<td>95 - 110 m</td>
<td>110 m</td>
</tr>
<tr>
<td>Equivalent Minimum 'K' Factor</td>
<td>N/A</td>
<td>9 or 16 Sag</td>
<td>20 - 25 Sag</td>
<td>25 Sag</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13 or 36 Crest</td>
<td>16 - 23 Crest</td>
<td>25 Crest</td>
</tr>
<tr>
<td>Grade Range</td>
<td>N/A</td>
<td>0.5 % - 5.0 %</td>
<td>0.5 % - 5.0 %</td>
<td>0.5 % - 5.0 %</td>
</tr>
<tr>
<td>Minimum Radius</td>
<td>N/A</td>
<td>130 m</td>
<td>200 m</td>
<td>200 m</td>
</tr>
<tr>
<td>Pavement Width</td>
<td>4 Lanes @ 3.5 m</td>
<td>10.0 m – 18.0 m (1.5 m bike lane on both sides of road if required)</td>
<td>3.5 m - 3.7 m lane width</td>
<td>14.0 m pavement width (4 Lanes @ 3.5 m)</td>
</tr>
<tr>
<td>Boulevard Width</td>
<td>5.5 m</td>
<td>5.5 – 9.5 m</td>
<td>3.0 m min.</td>
<td>7.5 m</td>
</tr>
<tr>
<td></td>
<td>(1.5 m conc. sidewalk on east side)</td>
<td>(1.5 m conc. sidewalk on both sides)</td>
<td>(1.5m min. sidewalk)</td>
<td>(3.0 m asphalt multi-use path on both sides)</td>
</tr>
<tr>
<td>DESIGN PARAMETERS</td>
<td>PRESENT CONDITIONS (NORTH OF EXTENSION)</td>
<td>DESIGN STANDARDS (KITCHENER DEVELOPMENT MANUAL – APRIL 2010)</td>
<td>TAC GEOMETRIC DESIGN MANUAL</td>
<td>PROPOSED STANDARDS</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>----------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Curb</td>
<td>Curb and Gutter (OPSD 600.040)</td>
<td>Curb and Gutter (OPSD 600.040)</td>
<td>Curb and Gutter</td>
<td>Curb and Gutter (OPSD 600.040)</td>
</tr>
<tr>
<td>Median Width</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Intersection Geometrics</td>
<td>N/A</td>
<td>Intersection Angle 90°</td>
<td>Intersection Angle 70° to 110°</td>
<td>Intersection Angle 70° - 110°</td>
</tr>
<tr>
<td>Maximum Grade for Through Roads at Intersection</td>
<td>N/A</td>
<td>3.0 %</td>
<td>N/A</td>
<td>3.0 %</td>
</tr>
<tr>
<td>Maximum Grade for Stop Roads at Intersection</td>
<td>N/A</td>
<td>1.5 %</td>
<td>N/A</td>
<td>1.5 %</td>
</tr>
<tr>
<td>Minimum Curb Radius at Intersection with Arterial Road</td>
<td>N/A</td>
<td>15.0 m</td>
<td>10.7 m (WB-20 - Outside Front Wheel)</td>
<td>15.0 m</td>
</tr>
<tr>
<td>Minimum Curb Radius at Intersection with Collector Road</td>
<td>15.0 m (Strasburg Rd / Huron Rd intersection)</td>
<td>15.0 m</td>
<td>10.7 m (WB-20 - Outside Front Wheel)</td>
<td>15.0 m</td>
</tr>
<tr>
<td>Minimum Curb Grade</td>
<td>N/A</td>
<td>0.5 %</td>
<td>N/A</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Minimum Curb Grade at Radius of Intersections</td>
<td>N/A</td>
<td>0.8 %</td>
<td>N/A</td>
<td>0.8 %</td>
</tr>
<tr>
<td>Maximum Superelevation</td>
<td>N/A</td>
<td>As Required</td>
<td>0.04 m/m</td>
<td>0.04 m/m</td>
</tr>
<tr>
<td>Minimum Intersection Spacing Between Adjacent Intersections (measured from centerline to centerline of the intersections)</td>
<td>N/A</td>
<td>200.0 m</td>
<td>680 m</td>
<td>200.0 m</td>
</tr>
<tr>
<td>Roundabout Inscribed Circle Diameter</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>55 m – 60 m (45 m – 55 m urban double lane - FHWA Roundabout Guide)</td>
</tr>
</tbody>
</table>
Figure 4.1 illustrates the typical cross-section of the Strasburg Road Extension (refer to Appendix E Design Plates for engineering details) and an example of the road’s appearance.

**Figure 4.1: Facsimile Cross-Section of Strasburg Road Extension**

4.2 Evaluation Criteria

Based on identified study area sensitivities, and the approved scope of the EA investigations for this project (refer to Table 2.1), in addition to the Design Criteria presented in Table 4.1, the criteria presented in Table 4.2 were adopted by the Project Team for the purposes of development and assessment of the Strasburg Road Extension alignment alternatives.
<table>
<thead>
<tr>
<th>FACTOR GROUP/FACTOR</th>
<th>INDICATOR/MEASURE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NATURAL ENVIRONMENT</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Terrestrial Ecosystems (Including Species at Risk)</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Wetlands</td>
<td>- Encroachment on PSWs or other wetlands (area; classification/quality, relative extent in relation to entire complex)</td>
</tr>
<tr>
<td>▪ Designated Environmentally Sensitive Policy Areas / Areas of Natural and Scientific Interest</td>
<td>- Encroachment on ESPAs/ANSIs, including Core Environmental Features (area; relative extent in relation to entire designated area)</td>
</tr>
<tr>
<td>▪ Vegetation communities</td>
<td>- Encroachment on vegetation communities (area, type, quality, composition, relative extent; and potential for mortality, stress, composition change)</td>
</tr>
<tr>
<td>▪ Significant vegetation species (including Species at Risk)</td>
<td>- Effects on vegetation SAR or species of local/regional significance</td>
</tr>
<tr>
<td>▪ Wildlife habitat</td>
<td>- Encroachment on and/or reduction of interior habitat (area; fragmentation) - Effects on wildlife movement corridors or corridors between critical habitat features (e.g., upland/breeding ponds) (number of crossings) - Degree of potential increases in animal-vehicle conflicts</td>
</tr>
<tr>
<td>▪ Significant wildlife species (including Species at Risk)</td>
<td>- Effects on terrestrial SAR, species of local/regional significance (critical habitat; breeding timing windows)</td>
</tr>
<tr>
<td><strong>Aquatic Ecosystems (Including Species at Risk)</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Watercourses providing fish habitat (including food/shelter)</td>
<td>- Number of watercourse crossings, sensitivity of fish/fish habitat and thermal regime (warm, cool or cold water) - Extent (area) and function of riparian habitat removed - Extent and type of fish habitat (in-stream) altered/displaced at watercourse, including importance to aquatic ecosystem (e.g., spawning, nursery areas)</td>
</tr>
<tr>
<td>▪ Aquatic Species at Risk</td>
<td>- Effects on aquatic SAR</td>
</tr>
<tr>
<td>▪ Water quality, thermal regime or baseflow</td>
<td>- Encroachment on headwater areas (1st or 2nd Order Streams) (area) - Degree of interference with known groundwater discharge areas that contribute to creek baseflow - Effects on surface drainage/flood plain contributions to fish habitat</td>
</tr>
<tr>
<td><strong>Groundwater Resources</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Groundwater recharge areas</td>
<td>- Encroachment on significant groundwater recharge areas (removal/disruption of function - area; depth)</td>
</tr>
<tr>
<td>▪ Groundwater quality</td>
<td>- Potential for impacts to vulnerable areas (area)</td>
</tr>
<tr>
<td>▪ Shallow groundwater movement</td>
<td>- Potential for interference with existing flow patterns (baseflow) relative to proximity to surface water and significant groundwater discharge areas</td>
</tr>
<tr>
<td><strong>Surface Drainage</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Watercourses; drainage catchments</td>
<td>- Need for diversion/channelization of Blair Creek (length) and catchment area impacts (area)</td>
</tr>
<tr>
<td>▪ Flood plain function</td>
<td>- Changes (+/-) to Blair Creek flood plain hydrologic function</td>
</tr>
<tr>
<td>▪ Stormwater management</td>
<td>- Opportunities to enhance roadway stormwater management measures, including coordination with/use of adjacent development facilities</td>
</tr>
<tr>
<td>FACTOR GROUP/FACTOR</td>
<td>INDICATOR/MEASURE</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>SOCI-ECONOMIC ENVIRONMENT</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td></td>
</tr>
<tr>
<td>- Land use/resource designations and policies</td>
<td>Degree of compatibility with provincial and municipal growth/development goals/objectives (high, moderate, low)</td>
</tr>
<tr>
<td>- Approved private development proposals</td>
<td>Encroachment on development lands (area)</td>
</tr>
<tr>
<td>- Agricultural operations (physical resource consumption; facility resource consumption; operational impacts)</td>
<td>Prime agricultural land out of production (Class 1-3; specialty crop) (area); Total farm properties affected (number; type; area; severances); Farm infrastructure displaced (type, number, area)</td>
</tr>
<tr>
<td>- Other business operations</td>
<td>Business infrastructure/employees displaced (type; number); Changes (+/-) in business exposure/viability</td>
</tr>
<tr>
<td><strong>Communities</strong></td>
<td></td>
</tr>
<tr>
<td>- Encroachment on communities/individual properties</td>
<td>Encroachment on individual properties (number/area); Influence in defining proposed community areas (high, moderate, low)</td>
</tr>
<tr>
<td>- Community connectivity (cultural/social linkages)</td>
<td>Physical changes (+/-) to established community connectors (trails/roads); Changes to delivery of community services (emergency; school transportation)</td>
</tr>
<tr>
<td>- Community amenities</td>
<td>Changes (+/-) in community access to recreational/interpretive areas</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td></td>
</tr>
<tr>
<td>- Noise sensitive areas</td>
<td>Noise sensitive receivers experiencing resultant absolute noise levels over 55 dBA; Noise sensitive receivers experiencing increases (5 dB ranges) in sound levels over pre-existing conditions</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td></td>
</tr>
<tr>
<td>- Sensitive receptors</td>
<td>Number of nearby receptors and proximity to the alignment; Proximity of sensitive receptors to roadway intersections</td>
</tr>
<tr>
<td>- Airshed burden</td>
<td>Degree of increase (exceedance) in critical AQ parameters in local airshed</td>
</tr>
<tr>
<td><strong>CULTURAL ENVIRONMENT</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Archaeological Resources</strong></td>
<td></td>
</tr>
<tr>
<td>- Known archaeological sites</td>
<td>Number/type/significance of direct/indirect impacts to registered archaeological sites</td>
</tr>
<tr>
<td><strong>Heritage Resources</strong></td>
<td></td>
</tr>
<tr>
<td>- Built heritage features</td>
<td>Number/type/significance of direct/indirect impacts to above ground heritage resources (based on presence of above ground cultural heritage features identified or designated, by the City of Kitchener, as having heritage value or interest, or identified during EA field studies)</td>
</tr>
<tr>
<td>- Cultural heritage landscapes (historic; scenic-heritage roads, farm complexes, etc.)</td>
<td>Number/type/significance of direct/indirect impacts to cultural heritage landscapes</td>
</tr>
</tbody>
</table>
### FACTOR GROUP/FACTOR

<table>
<thead>
<tr>
<th>TRANSPORTATION/UTILITIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transportation Network/Infrastructure</strong></td>
<td></td>
</tr>
</tbody>
</table>
| - Transportation network | - Provision of Doon South Community access (Robert Ferrie Drive; E-W Collector)  
- Compatibility with RMOW New Dundee Road proposals  |
| - Traffic operations | - Road safety and accessibility (sight distance; turning movements)  |
| - Transportation policy initiatives | - Capability to support municipal policy initiatives (transit, active transportation, roundabouts)  |
| **Municipal Services and Utilities** |  |
| - Municipal services | - Opportunities for connections to existing services  
- Provision of standard cross-section location for services  
- Provision of continuous services  |
| - Utilities (existing and proposed plant) | - Degree of exposure of utilities and/or utility conflicts with road design  |
| **FINANCIAL/TECHNICAL** |  |
| **Financial** |  |
| - Cost | - Estimated capital cost ($)  
- Property requirements (number, area)  
- Extraordinary operations and maintenance requirements/costs  |
| **Technical** |  |
| - Roadway geometric design requirements | - Conformance to TAC and City of Kitchener/RMOW standards  |
| - Structural/foundation/pavement design requirements | - Conformance to TAC and City of Kitchener standards  
- Requirements for pavement depth and/or foundation footprint, based on soil conditions  
- Structural requirements relative to capital cost and long term maintenance requirements  |
| - Topographic; earth balance | - Potential for excessive borrow quantity or excessive off-site disposal of earth material (volume)  
- Requirements for excessive (steep) grades (length)  |
| - Constructability | - Adequate access to corridor  
- Potential conflicts with existing infrastructure (other than utilities)  
- Provision of standard horizontal and vertical clearance requirements  
- Extraordinary staging requirements  |

* Air Quality criteria were applied only to the Technically Preferred Alignment only, due to the inability to distinguish between differences between alignment alternatives in close proximity to each other.

These Evaluation Criteria include refinements made on the basis of input by stakeholders during the spring of 2010, including comments received at Public Information Centre No. 1.

It should also be noted that there was consensus at the Project Team level that there would be no advantage to weighting the Evaluation Criteria during the assessment process. There was general agreement that graphic scoring (i.e., pie charts) can be used initially to score the degree to which alternatives meet project objectives/criteria, and that the most significant factors would emerge through further discussion and gauging of stakeholder values.
4.3 Development of Alignment Alternatives

The development of alignment alternatives for the Strasburg Road Extension was based on the following major considerations:

- The alignment of the Strasburg Road Extension from Rush Meadow Street to north of Stauffer Drive, established through the community planning process under the Planning Act, as described in Section 1.1 of this ESR, and the lands acquired by the City of Kitchener to accommodate the established alignment;
- The Strasburg Road Extension alignment between Rush Meadow Street and New Dundee Road shown on Map 4 Transportation in the City of Kitchener's approved Municipal Plan;
- Study area sensitivities identified by the Consultant Team during the spring and summer of 2010; and
- Input received at Public Information Centre No. 1.

At its May 18, 2010 meeting, the Project Team agreed to modify the starting (origin) point for the alignment alternatives, away from the location of the south end of the established corridor for the Strasburg Road Extension, in order to provide additional flexibility to develop the alignment alternatives from north of Stauffer Drive to New Dundee Road. This involved pulling the point of origin for the alignment alternatives northerly. The modified study area is presented in Figure 3.1 (Modified Study Area).

This adjustment resulted in the opportunity to develop alignment alternatives to the west of the property at 500 Stauffer Drive and some of the sensitivities identified in the Blair Creek corridor, which may not otherwise have been possible if the south end of the city-owned corridor (as shown in Figure 3.16) had been retained as the origin point for the alignment alternatives.

Nine (9) alignment alternatives were initially developed by the Consultant Team and were categorized under three series, based on the geographical location, as described below and shown in Figures 4.2a, 4.2b and 4.2c:

- **East Alignments (E1, E2, E3, E4)** – These alignments are based on the Strasburg Road Extension designated in the Kitchener Municipal Plan (which was retained as an option – Alignment E1). They reduce impacts to the B&B/agricultural operation to the east side of the property (compared to the Municipal Plan alignment), avoid the Stauffer Woods ESPA; retain the Reidel Drive scenic-heritage route; and/or relocate the existing Reidel Drive-Cameron Road/New Dundee Road intersection to a location that may provide better sight distance.

- **Central Alignments (C1, C2)** – These alignments limit impacts to the B&B/agricultural operation to the west side of the property; and/or relocate the existing Reidel Drive-Cameron Road/New Dundee Road intersection to a location that may provide better sight distance.

- **West Alignments (W1, W2, W3)** – These alignments minimize or avoid impacts to the B&B operation, the most sensitive groundwater recharge area; the Roseville Swamp - Cedar Creek PSW and large woodlot at the west end of the stream corridor; and/or relocate the existing Reidel Drive-Cameron Road/New Dundee Road intersection to a location that may provide better sight distance.
It is very important to note that there are two future east-west collector roads (Robert Ferrie Drive and Blair Creek Drive), as shown in the designated road network presented in Figure 3.12, that will intersect with the Strasburg Road Extension alignment and must be accounted for in the development and assessment of the alignment alternatives to maintain road network continuity.

In June 2013, Council decided that the alignment for the future extension of Robert Ferrie Drive west of its current terminus will be determined through an Official Plan Amendment process and the design of the road will be developed as part of a Plan of Subdivision process. Therefore, the future Robert Ferrie Drive alignment west of the Countryside Line assessed during the Strasburg Road Extension environmental assessment should be considered as a “possible” alignment (based on the alignment currently shown in the City’s Municipal Plan).

At the same time, Council also decided that the alignment for the extension of Blair Creek Drive west of Reidel Drive will be determined through the Municipal Class Environmental Assessment process. Therefore, the future Blair Creek Drive alignment assessed during the Strasburg Road Extension environmental assessment should also be considered as a “possible” alignment (based on the alignment currently shown in the draft approved plans of subdivision for Doon South Phase 2).

The alignments of Robert Ferrie Drive and Blair Creek Drive adopted for this Class EA, beyond what is shown in the Municipal Plan or on approved plans of subdivision, are shown as dashed grey lines on the alignment figures below, and should be considered as “possible” alignments. They reflect the best current information available to the Project Team at the time and were deemed to represent reasonable assumptions.
Figure 4.2a: Long List of Alignment Alternatives (East Series)

**East 1 [E1]**
- Skirts west side of Stauffer Woods (ESPA 33) and connects to Reidel Drive 250 m south of Stauffer Drive to preserve Scenic-Heritage section of Reidel Drive designated as part of Doon South trail system.
- Uses existing Reidel Drive crossing point of Blair Creek
- Coincident with Regional Countryside Line
- Generally avoids direct new impacts to agricultural operation at 271 Reidel Drive and uses existing New Dundee/Reidel intersection

**East 2 [E2]**
- Diverges from Official Plan alignment at north end of farm/B&B operation
- Skirts east side of farm/B&B operation pond and west side of Stauffer Woods (ESPA 33)
- Connects to Reidel Drive 325 m south of Stauffer Drive to preserve Scenic-Heritage section of Reidel Drive designated as part of Doon South trail system
- Generally avoids direct new impacts to agricultural operation at 271 Reidel Drive and uses existing New Dundee/Reidel Drive intersection

**East 3 [E3]**
- Diverges from Official Plan alignment at north end of farm/B&B operation
- Skirts east side of farm/B&B operation pond and west side of Stauffer Woods (ESPA 33)
- Crosses narrow point of Blair Swamp PSW
- Connects to Central 1 500 m north of New Dundee Road and to New Dundee Road 260 m west of Reidel Drive to improve intersection sight distances compared to existing New Dundee/Reidel intersection

**East 4 [E4]**
- Diverges from Official Plan alignment at north end of farm/B&B operation
- Skirts east side of farm/B&B operation pond and west side of Stauffer Woods (ESPA 33)
- Crosses narrow west point of Blair Swamp PSW
- Swings east behind farm buildings at 271 Reidel Drive
- Intersects New Dundee Road at an angle compatible with opposing Cameron Road leg
Figure 4.2b: Long List of Alignment Alternatives (Central Series)

Central1 [C1]
- Diverges from Official Plan alignment at north end of farm/B&B operation
- Coincident with Lot 9/Lot 14 Concession BT property line to south limit of farm/B&B operation
- Crosses Blair Creek outside designated PSW
- Connects to New Dundee Road 260 m west of Reidel Drive to improve intersection sight distances compared to existing New Dundee/Reidel intersection

Central2 [C2]
- Diverges from Official Plan alignment at north end of farm/B&B operation
- Coincident with Lot 9/Lot 14 Concession BT property line to south limit of farm/B&B operation
- Connects to Reidel Drive corridor 625 m south of Stauffer Drive, avoids direct new impacts to agricultural operation at 271 Reidel Drive and uses existing New Dundee/Reidel Drive intersection
At its August 26, 2010 meeting, the Project Team adopted these alignment alternatives for assessment.

### 4.4 Comparative Assessment and Evaluation of Alternatives

This section of the ESR describes the comparative assessment of the alignment alternatives for the Strasburg Road Extension, culminating with the selection of the Technically Preferred Alignment.

It should be noted that the comparative assessment process involved two (2) major stages, the first ending in September 2011 and the second ending in March 2013. After Stage 1, a Draft Environmental Study Report was prepared, at which time the City initiated an extended public and agency consultation process (referred to hereinafter as the Additional Consultation Stage) to ensure that it had a comprehensive set of comments upon which to base its decision related to the proposed Technically Preferred Alignment. The Draft ESR was filed in the public record (May 7, 2012), with provision for receipt of stakeholder comments until September 26, 2012.
Based on the comments received, and other information that came to light, during the Additional Consultation Stage (refer to Section 4.4.2), City of Kitchener Council determined that additional work was required to complete the Environmental Study Report.

Section 4.4.1 below describes the comparative assessment and evaluation work completed in Stage 1; Section 4.4.2 describes the rationale for proceeding to, and the results of Stage 2.

4.4.1 Comparative Assessment and Evaluation of Alternatives - Stage 1

Stage 1 of the assessment process was completed in two steps, which were subject to stakeholder review through the consultation process described in Section 2.3 of this report:

- Step 1 - Screening of the long list of alignment alternatives to a more manageable number for the purpose of conducting a detailed assessment (Spring 2011);
- Step 2 - Detailed assessment of the short-listed alignment alternatives (Summer 2011).

In each step, the advantages and disadvantages of the alternatives were evaluated against the ability of the options to fulfill the following set of project objectives derived from the problem and opportunity statement:

Primary Objective
- Provide for approved development and future growth (Doon South and other areas in southwest Kitchener), including traffic service and municipal services.

Secondary Objectives
- Relieve future demand on Homer Watson Boulevard, Huron Road and Fischer Hallman Road.
- Achieve compatibility with City and Regional policies for future growth and development, and the location of any related road intersections.
- Minimize impacts to natural heritage features and other important environmental resources.

Stage 1 of the comparative assessment of alignment options included the use of “pie charts” as indicators of the degree to which technical discipline groups preferred an option (i.e., “Most Preferred” to “Least Preferred”). The adoption of pie charts, including the associated scale of preference indicators as a means for presenting the summary assessment of the project alternatives is widely used and accepted by the Ministry of the Environment. As was the case in this stage of the study, the use of the pie charts need not be accompanied by numerical scores. The pie charts are simply a means of helping the discipline specialists think about and summarize their comparative assessment, and convey this to the other members of the Project Team in a “snap shot” graphic. The pie charts have been accompanied by text in the summary matrices describing the most salient points of the assessment.

Similarly, since no numerical scoring is associated with the pie charts, no numerical weighting of the Evaluation Criteria or Factor Groups was attempted. Further, with a large multi-disciplinary Project Team (15-25 members at any given time) comprising such varied stakeholder interests, it was deemed impractical to attempt to achieve consensus on a numerical weighting of the evaluation criteria.
Rather, the most significant criteria were identified through Project Team discussions during the two-stage alignment assessment process. The most significant considerations emerging from the alignment assessment discussions included:

- Ability to provide highest level of transportation and municipal services to proposed/approved new development (Primary Objective);
- Compatibility with existing and proposed regional and municipal long range planning land use policies;
- Optimum crossing point of the Blair Creek corridor; and
- Balance of impacts to cultural heritage resources.

4.4.1.1 Screening of Long List of Alignment Alternatives

Figures 4.3a, 4.3b and 4.3c show the long list of alignment alternatives (9 options) in a consolidated manner in relation to study area features and sensitivities, including natural heritage, land use and cultural heritage components.
Figure 4.3a: Long List of Alignment Alternatives in Relation to Principal Natural Heritage Features

Legend

Long List Alignment Alternatives

- E1
- E2
- E3
- E4
- C1
- C2
- W1
- W2
- W3

Significant Tree

MNW Wetland Designations

- SWT 2-2 (Willow Mineral Swamp Thicket)
- MAS 3-1 (Cattail Organic Shallow Marsh)
- MAM 3-6 (Broad-leaved Sedge Organic Meadow Marsh)
- SAM 1-4 (Pondweed Mixed Shallow Aquatic)
- FOD 3-1 (Dry Fresh Poplar Deciduous Forest)
- FOD 4-1 (Fresh Moist Poplar Deciduous Forest)
- OAO (Open Water)

MNW Wetland Designations

- SWT 2-3 (Willow Organic Swamp Thicket)
- MAM 1-1 (Broad-leaved Sedge Organic Meadow Marsh)
- MAS 1-3 (Cattail Organic Shallow Marsh)
- SAM 1-2 (Pondweed Mixed Shallow Aquatic)
- FOD 3-1 (Dry Fresh Poplar Deciduous Forest)
- FOD 4-1 (Fresh Moist Poplar Deciduous Forest)
- OAO (Open Water)

Jefferson Salamander Regulated Habitat

- SWJ 6-1 (Yellow Birch Conifer Mixed Swamp)
- FOD 2-2 (Dry Fresh Sugar Maple-Beech Forest)
- FOD 6-5 (Fresh Moist Sugar Maple-Hardwood Forest)
- SWT 3-2 (Willow Organic Swamp Thicket)

Recharge Areas

- C1
- C2
- W1
- W2
- W3

Jefferson Salamander Regulated Habitat

- SWJ 6-1 (Yellow Birch Conifer Mixed Swamp)
- FOD 2-2 (Dry Fresh Sugar Maple-Beech Forest)
- FOD 6-5 (Fresh Moist Sugar Maple-Hardwood Forest)
- SWT 3-2 (Willow Organic Swamp Thicket)

Recharge Areas

- C1
- C2
- W1
- W2
- W3
Jefferson Salamander Habitat Notes

Legend

Long List Alignment Alternatives

MNR Wetland Designations

- E1
- E2
- E3
- E4
- C1
- C2
- W1
- W2

Jefferson Salamander Regulated Habitat within Class EA Study Area

Recharge Areas

MNR Wetland Designations

- SWT 2-2 (Willow Mineral Swamp Thicket)
- MAS 3-1 (Cattail Organic Shallow Marsh)
- MAM 3-6 (Broad-leaved Sedge Organic Meadow Marsh)
- SAM 3-4
- SWM 6-1 (Yellow Birch Conifer Mixed Swamp)
- FOD 5-2 (Dry Fresh Sugar Maple-Beech Forest)
- FOD 6-5 (Fresh Moist Sugar Maple-Hardwood Forest)
- SWT 3-2 (Willow Organic Swamp Thicket)

Figure 4.3a: Long List of Alignment Alternatives in Relation to Principal Natural Heritage Features (continued)

- Intermittent Reach
- Provides some indirect fish habitat
- May provide some seasonal fish habitat immediately upstream of Reidel Drive but is limited due to lack of channel definition

• Ephemeral Tributary
• Provides indirect fish habitat

• Permanent Coldwater Watercourse
• Provides direct fish habitat
• Barrier to fish passage (perched culvert) at Reidel Drive
Figure 4.3b: Long List of Alignment Alternatives in Relation to Land Use
Figure 4.3c: Long List of Alignment Alternatives in Relation to Principal Cultural Heritage Resources

Legend

- Historic Feature
- Historic Road
- Archaeological Potential
- Future Collector Roads
- Required Extension of Proposed Collector Roads

Future Collector Roads
Required Extension of Proposed Collector Roads
The nine alignment alternatives were screened against the evaluation criteria presented in Table 4.2, assuming a basic 30 m wide footprint, and the project objectives:

**Primary Objective**
- Provide for approved development and future growth (Doon South and other areas in southwest Kitchener), including traffic service and municipal services.

**Secondary Objectives**
- Relieve future demand on Homer Watson Boulevard, Huron Road and Fischer Hallman Road.
- Achieve compatibility with City and Regional policies for future growth and development, and the location of any related road intersections.
- Minimize impacts to natural heritage features and other important environmental resources.

The results were documented in summary matrices, which were presented to and reviewed by the Project Team at its May 10, 2011 meeting.

The full screening matrices are presented in Appendix C.1. The summary matrices are presented in Table 4.3.
Table 4.3: Summary Screening of Long List of Alignment Alternatives

<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>ALIGNMENT ALTERNATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WEST</td>
</tr>
<tr>
<td>Terrestrial Ecosystems</td>
<td>W1</td>
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<tr>
<td>W2</td>
<td>![Green Circle]</td>
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<tr>
<td>W3</td>
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<tr>
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<td>![Blue Circle]</td>
</tr>
<tr>
<td>C2</td>
<td>![Blue Circle]</td>
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<td>E1</td>
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<tr>
<td>E2</td>
<td>![Red Circle]</td>
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<tr>
<td>E3</td>
<td>![Red Circle]</td>
</tr>
<tr>
<td>E4</td>
<td>![Red Circle]</td>
</tr>
</tbody>
</table>

NATURAL ENVIRONMENT

**SUMMARY**
- W1 is the preferred option with respect to potential impacts to natural heritage features because it avoids crossings of the Blair Creek corridor (including the major Dry Fresh Sugar Maple-Beech Forest (FOD 5-2) at the west end, the Roseville Swamp - Cedar Creek Provincially Significant Wetland (PSW) and Species at Risk habitat regulated area) and the most sensitive groundwater recharge area. It would also create less of a barrier to wildlife movement because it does not cross contiguous natural features associated with the creek corridor.
- Central and West alternatives that involve new crossings of the Blair Creek corridor are slightly preferred to more easterly ones with respect to potential impacts to aquatic resources because the creek is more ephemeral/intermittent in that area. E1 is the only alternative that would displace the pond north of Stauffer Drive.
- Alternatives with alignments close to and parallel with the creek corridor (W3 and C2) may be more problematic with respect to potential impacts to the groundwater regime and flood plain.
### EVALUATION FACTOR

<table>
<thead>
<tr>
<th>SOCIO-ECONOMIC ENVIRONMENT</th>
<th>WEST</th>
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<th>EAST</th>
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<tr>
<td>Land Use</td>
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<td>E1</td>
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<tr>
<td>Communities</td>
<td>W2</td>
<td>C2</td>
<td>E2</td>
</tr>
<tr>
<td>Noise</td>
<td>W3</td>
<td></td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E4</td>
</tr>
</tbody>
</table>

### ALIGNMENT ALTERNATIVE

- **W1**
- **W2**
- **W3**
- **C1**
- **C2**
- **E1**
- **E2**
- **E3**
- **E4**

### SUMMARY

- **Alternative W1** is the least compatible with City of Kitchener and Region of Waterloo land use policy initiatives with respect to protection of agricultural land and rural areas. The further west of the designated Countryside Line (Reidel Drive) an alignment is, the more pressure there would be for expansion of the urban area into designated Protected Countryside in the Prime Agricultural Area and the Rural Area. E1 exhibits a high degree of compatibility because it is the alignment identified in the existing City of Kitchener Official Plan and appears to have been used to define the north-south segment of the Countryside Line in this area.

- W1 would take the most land with highest capability to support agricultural uses (Class 1-3; Specialty Crop) out of production. Alignments that utilize the existing Reidel Drive corridor to the largest degree (E1 and E2) would displace the least agricultural land. Other East alignments (E3 and E4) would affect only a nominal amount of prime agricultural land (mostly Class 4-7 land).

- Impacts to the agricultural community are generally similar for all alternatives, based on the number of severances, with E1 creating only one severance. Alternative C2 makes good use of existing property lines and existing Reidel Drive to minimize severances. E1 represents the highest potential for displacement of the existing bed and breakfast/farm operation north of Stauffer Drive due to proximity to the buildings and encroachment on the associated outdoor living areas.

- The roadway represents a new/altered noise source in close proximity to the two homes on Stauffer Drive and Reidel Drive. Alignments W1 and W2 would result in the least impact based on distance from the homes. Alignments C1/C2, E2 and E4 have the potential to create the highest degree of change in sound levels due to the introduction of a new roadway adjacent to the homes and their outdoor living areas (assuming E1 displaces the home on Stauffer Drive).
### EVALUATION FACTOR

<table>
<thead>
<tr>
<th>WEST</th>
<th>CENTRAL</th>
<th>EAST</th>
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</thead>
<tbody>
<tr>
<td>W1</td>
<td>C1</td>
<td>E1</td>
</tr>
<tr>
<td>W2</td>
<td>C2</td>
<td>E2</td>
</tr>
<tr>
<td>W3</td>
<td></td>
<td>E3</td>
</tr>
</tbody>
</table>

#### CULTURAL ENVIRONMENT

#### Archaeological Resources

- W1: Green
- W2: Green
- W3: Green
- C1: Green
- C2: Green
- E1: Green
- E2: Green
- E3: Green
- E4: Green

#### Heritage Resources

- W1: Green
- W2: Green
- W3: Green
- C1: Green
- C2: Green
- E1: Green
- E2: Green
- E3: Green
- E4: Green

### SUMMARY

- Alignments W1 and W2 exhibit the least potential for disturbance of heritage resources due to their distance from existing/former historic transportation corridors and limited impact to the Blair Creek corridor.
- Alignments that will significantly alter the existing Reidel Drive cultural heritage landscape/scenic heritage resource (W3, C2, E1, E2) are less preferable than the more westerly options.
- Alignment E1 is least preferred due to its potential to displace the century farm on Stauffer Drive, combined with its impacts on Reidel Drive.
<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>ALIGNMENT ALTERNATIVE</th>
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<tbody>
<tr>
<td></td>
<td>WEST</td>
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<td></td>
<td>W1   W2  W3</td>
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**TRANSPORTATION/UTILITIES**

Transportation Network/Infrastructure

Municipal Services/Utilities

**SUMMARY**

- Alignment W1 is least preferred because it has the least potential to meet traffic service objectives and will result in the greatest impacts to existing local roads. Traffic from new development in Doon South will not use the new roadway to the intended level and traffic from that area will infiltrate existing neighbourhoods to the north.
- Alternatives E1 and E2 are the most likely to meet traffic service objectives, including diverting traffic from Homer Watson Boulevard and Huron Road.
- Similarly, the West alignments are least compatible with City of Kitchener and Region of Waterloo municipal servicing objectives and plans, requiring extension and additional infrastructure to properly serve the Doon South Community, whereas Alignments E1 and E2 would best meet City and Regional objectives.
### EVALUATION FACTOR

<table>
<thead>
<tr>
<th>ALLOCATION ALTERNATIVE</th>
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<tbody>
<tr>
<td></td>
<td>W1</td>
<td>W2</td>
<td>W3</td>
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<tr>
<td></td>
<td>C1</td>
<td>C2</td>
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<tr>
<td></td>
<td>C3</td>
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<td>E4</td>
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### FINANCIAL/TECHNICAL

**Financial**

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**Technical**

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### SUMMARY

- Alignments W1 and W2 are the least preferred alternatives with respect to construction cost, primarily because of the greater length of east-west collector roads (Robert Ferrie Drive and Blair Creek Drive in Doon South) and the associated services carried in the those corridors. W1 would also have the highest operations/maintenance costs.

- Alignment E1 has the least construction cost, but the City would likely incur significant costs associated with a full buy-out of the bed and breakfast/farm operation on Stauffer Drive (not estimated here).

- The construction costs of the remaining alternatives would be relatively similar.

- The technical aspects of the alternatives are generally similar, but E1 may be the least complex to construct with respect to accessibility (greatest use of an existing road allowance - Reidel Drive).

### SHORT LIST: ALIGNMENTS RECOMMENDED FOR FURTHER DETAILED ANALYSIS

<table>
<thead>
<tr>
<th>WEST</th>
<th>CENTRAL</th>
<th>EAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>C1</td>
<td>E1</td>
</tr>
<tr>
<td>Do Not Retain for Further Study</td>
<td>Do Not Retain for Further Study</td>
<td>Retain For Further Study Based on a Balance of Environmental and Transportation Service Considerations</td>
</tr>
<tr>
<td>Do Not Retain for Further Study</td>
<td>Do Not Retain for Further Study</td>
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<td>Retain For Further Study Based on a Balance of Environmental and Transportation Service Considerations</td>
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<td>Do Not Retain for Further Study</td>
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<tr>
<td>Retain For Further Study Based on a Balance of Environmental and Transportation Service Considerations</td>
<td>Retain For Further Study Based on a Balance of Environmental and Transportation Service Considerations</td>
<td>Retain For Further Study Based on a Balance of Environmental and Transportation Service Considerations</td>
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It was deemed appropriate to retain at least one option from each of the East, Central and West series of alignments. The initial recommendations emerging from the May 2011 Project Team meeting were that the following three (3) alignment alternatives be retained:

- Alignment E2 - based on a balance of transportation service and environmental considerations;
- Alignment C2 - based on a balance of transportation service and environmental considerations; and
- Alignment W1 – based on the potential to reduce or eliminate most direct short term environmental impacts.

The following key considerations and actions should be noted:

**West Series**

- **Alignment W1** - Retention of Alignment W1 was not favoured by some of the Project Team members (Region of Waterloo) based on potential traffic service deficiencies and the significant encroachment on the Region’s Countryside designation. On a consensus level, these shortcomings were acknowledged by the team, as was the expectation that these factors would come to the fore during the detailed assessment. The potential pressure to retain an option that would eliminate most of the potential direct short term environmental impacts created by other options (the primary advantage of Alignment W1) was also considered. There was some discussion on retaining one of the other West options that may exhibit better servicing attributes, rather than W1, but it was agreed that W1 should be retained.

- **Alignments W2** – Alignment W2 was discarded based on the combination of the following major considerations:
  
  - Inability to provide transportation and municipal services to Doon South Community in an efficient and cost-effective manner (distance from users; relatively high capital and operations/maintenance costs associated with extension of future Blair Creek Drive and municipal services in this road corridor);
  
  - Degree of incompatibility with long range land use planning policies (encroachment on Countryside area);
  
  - Crossing of Blair Creek corridor at a relatively sensitive point (sugar maple-beach forest and meadow marsh inclusion that extend to the east from the mixed swamp in the woodlot at the western end of the creek corridor);
  
  - Impacts to traffic operations in New Dundee Road corridor as a result of introducing an additional intersection leg from the north, and the introduction of staggered intersection with for motorists travelling south to Cameron Road.

- **Alignment W3** - Alignment W3 was discarded based on the combination of the following major considerations:
  
  - Inability to provide transportation and municipal services to Doon South Community in an efficient and cost-effective manner (distance from users; relatively high capital and operations/maintenance costs associated with extension of future Blair Creek Drive and municipal services in this road corridor);
- Degree of incompatibility with long range land use planning policies (encroachment on Countryside area);
- Crossing of Blair Creek corridor at a relatively sensitive point (sugar maple-beach forest that extends to the east from the woodlot at the western end of the creek corridor).

In summary, Alignment W1 was retained based solely on its advantages in avoiding most the major natural heritage sensitivities in the study area, while Alignments W2 and W3 could not match these advantages and exhibited disadvantages associated with level of service and incompatibility with long range planning policy directions.

Central Series

- **Alignment C1** – Although it has the advantage of distributing property impacts equitably between 500 Stauffer Drive and Activa lands north of Stauffer Drive (this is the basis on which it was originally developed), Alignment C1 was discarded based on the combination of the following disadvantages, which are associated principally with the segment south of Stauffer Drive, where it is different from Alignment C2 (carried forward):
  - Inability to provide transportation and municipal services to Doon South Community in an efficient and cost-effective manner (distance from users; relatively high capital and operations/maintenance costs associated with extension of future Blair Creek Drive and municipal services in this road corridor);
  - Degree of incompatibility with long range land use planning policies (encroachment on Countryside area);
  - Relatively long crossing of Blair Creek corridor;
  - Impacts to traffic operations in New Dundee Road corridor as a result of introducing an additional intersection leg from the north, and the introduction of staggered intersection with for motorists travelling south to Cameron Road.

- **Alignment C2** – Although this alignment has essentially the same length of crossing as Alignment C1 over the Blair Creek corridor, it does not exhibit the same disadvantages with respect to encroachment on the Countryside area, level of service and traffic operations in the New Dundee Road corridor as C1. Therefore, this alignment was retained from the Central Series

East Series

- **Alignment E1** – although Alignment E1 is shown as the Strasburg Road Alignment corridor in the current City of Kitchener Municipal Plan, it was discarded due to the severity of impacts to (virtual displacement of) the pond, house and B&B business at 500 Stauffer Drive, and the added cost of full buyout of this property.
- **Alignment E2** – Alignment E2 was initially selected as the option to be retained from the East Series of alignments based primarily on its ability to satisfy the primary project objective and its degree of compatibility with long range planning policy directions.
- **Alignments E3 and E4** – Based on the level of information available at the time of the initial screening of alignment options, Alignments 3 and 4 were ranked below Alignment E2 key Socio-Economic and Transportation criteria, but showed more
promise with respect to key Natural Environment criteria, including crossing the Blair Creek corridor at potentially less sensitive areas. To finalize opinions on which East alignment(s) should be retained, a site visit of the Blair Creek corridor was conducted by SLI primarily for City, GRCA and RMOW staff to view sensitivities and potential impacts associated with Alignments E3 and E4 prior to PIC No. 2 (presentation of short-listed alignment alternatives). Ultimately, it was agreed that both Alignment E3 and Alignment E4 should be added to the short list of options to be carried forward for more detailed assessment, based on their potential to minimize the impacts of a Blair Creek crossing.

Therefore, the following alignment alternatives (shown in Figure 4.4) were presented at PIC No. 2 as the options the Project Team recommended for more detailed assessment.

- Alignment E2
- Alignment E3
- Alignment E4
- Alignment C2
- Alignment W1
Figure 4.4: Short-Listed Alignment Alternatives
4.4.1.2 Detailed Comparative Assessment of Short List of Alignment Alternatives

Whereas the initial nine (9) alignment alternatives were screened using the basic 30 m right-of-way for the roadway, the five (5) short-listed alignment alternatives were developed further to define their footprint based on their respective earthworks requirements, including nominal working easements (i.e., placing the basic 30 m right-of-way within the topographic relief, and the associated grading required to meet the geometric criteria presented in Table 4.1).

Figures 4.5a, 4.5b and 4.5c illustrate the short-listed alignment footprints, used for the detailed assessment in relation to study area features and sensitivities, including natural heritage, land use and cultural heritage components.

Again, the grey footprints shown for the Robert Ferrie Drive and Blair Creek Drive extensions, beyond what is shown in the Municipal Plan or on approved plans of subdivision, should be considered as “possible” alignments based on the best current information available to the Project Team at the time.
**Figure 4.5a: Footprints of Short-Listed Alignment Alternatives in Relation to Principal Natural Heritage Features**

**Legend**

**Short-Listed Alignment Alternatives**
- C2
- E2
- E3
- E4
- W1

**MNR Wetland Designations**
- MAM 3-6 (Broad-leaved Sedge Organic Meadow Marsh)
- SAM 1-4 (Ponweed Mixed Shallow Aquatic)
- FOD 3-1 (Dry Fresh Poplar Deciduous Forest)
- FOD 8-1 (Fresh Mossy Poplar Deciduous Forest)
- HROW (Hedgerow)
- CUM 1-1 (Dry-Moist Old Field Meadow)
- OAO (Open Water)

**Significant Tree**
- Ag (Corn)

**Recharge Areas**
- SNC-LABINE
- CUM 1-1 (Dry-Moist Old Field Meadow)
- OAO (Open Water)

*Jefferson Salamander Habitat Notes*

*Regulated Habitat within Class EA Study Area*

*Provincially Significant Wetland (PSW)*

*Un-Evaluated Wetland*

*Jefferson Salamander Regulated Habitat*
• Intermittent Reach
• Provides some indirect fish habitat
• May provide some seasonal fish habitat immediately upstream of Reidel Drive but is limited due to lack of channel definition

• Permanent Coldwater Watercourse
• Provides direct fish habitat
• Barrier to fish passage (perched culvert) at Reidel Drive

Figure 4.5a: Footprints of Short-Listed Alignment Alternatives in Relation to Principal Natural Heritage Features (continued)
Figure 4.5b: Footprints of Short-Listed Alignment Alternatives in Relation to Land Use, Agricultural Capability and Property Fabric

Parcel Ownership
1 City of Kitchener (including designated allowance for Strasburg Road Extension)
2 Freure Developments
3 Hallman Construction
4 Sunvest Reid
5 500 Stauffer Drive
6, 8 Activa Holdings
7 Stonefield Development
Figure 4.5c: Footprints of Short-Listed Alignment Alternatives in Relation to Cultural Heritage Features
The short-listed alignment alternatives were subjected to a detailed assessment by the Consultant Team during the summer of 2011, using the evaluation criteria presented in Table 4.2. The results were documented in a summary brief, which was provided to the Project Team for review, and presented to the Project Team at its September 26, 2011 meeting.

The full assessment matrices are presented in Appendix C.2. The summary matrices are presented in Table 4.4.
Table 4.4: Summary Assessment of Short-Listed Alignment Alternatives

<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>ALIGNMENT ALTERNATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL ENVIRONMENT</td>
<td>WEST</td>
</tr>
<tr>
<td>Terrestrial Ecosystems (Vegetation)</td>
<td>W1</td>
</tr>
<tr>
<td>Terrestrial Ecosystems (Wildlife)</td>
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</tr>
<tr>
<td>Aquatic Ecosystems</td>
<td></td>
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<tr>
<td>Groundwater Resources</td>
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<tr>
<td>Surface Drainage</td>
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</table>
Natural Environment Summary

- W1 is the preferred option with respect to minimizing or eliminating potential direct short term impacts to natural heritage features because it avoids crossings of the Blair Creek corridor (including the significant woodlot at the west end, the Roseville Swamp - Cedar Creek Provincially Significant Wetland (PSW), Species at Risk (SAR) habitat regulated area, and regulated floodplain area) and the most sensitive groundwater recharge area. It would also create less of a barrier to wildlife movement because it does not cross contiguous natural features associated with the creek corridor. However, Alignment W1 has the potential to create the greatest shift in the urban envelope, including the western boundary of the Brigadoon South and Doon South Phase 2 Community areas, if the Countryside Line is relocated to coincide with this alignment. If this shift occurs, the natural heritage features in the Blair Creek corridor, as well as additional areas within the Regional Recharge Area initially avoided with the alignment may ultimately come under increased pressure from urban development (refer to Section 4.5).

- E2 and C2 are the least preferred due to large (E2), or multiple crossings (C2) which result in higher impacts to wetlands, aquatic habitat, wildlife passage, SAR habitat, and groundwater resources. E2 is good from a surface drainage perspective because it minimizes the number of new drainage outlets required.

- E3 and E4 have lower impacts to natural heritage features than E2 and C2 due to narrower crossings of the Blair Creek Corridor. E3 is preferred to E4 in this regard.

### Socio-Economic Environment

<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>WEST</th>
<th>CENTRAL</th>
<th>EAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communities</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Noise</td>
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</table>

**Socio-Economic Environment Summary**

- With respect to land use, significant weight was attached to compatibility with the Region of Waterloo’s Countryside Line and the City of Kitchener’s urban-rural boundary, in association with the approved limits of the Doon South Community. Alignment E2 exhibits the highest degree of compatibility with land use policies,
imposes the least impacts to prime agricultural lands and agricultural operations, and is the preferred option. However, E2 imposes the most impacts to the B&B business at 500 Stauffer Drive. Alignments E3, E4 and C2 exhibit different degrees of compatibility, but are considered equal in the overall assessment (moderate degree of compatibility). Although W1 imposes the least impacts to the B&B business at 500 Stauffer Drive, it exhibits the lowest degree of compatibility with policy directions (including the potential for increased pressure on, or loss of prime agricultural land, if the Countryside Line is relocated to coincide with this alignment and the urban envelope is expanded). It also exhibits the most direct impacts to agricultural resources and operations and is the least preferred option.

- Alignment E2 is preferred with respect to community impacts based on its potential to minimize property takings and define the limits of the Doon South Phase 2 Community. However, E3 or E4 represent the best opportunities for maintaining or enhancing community connectivity, when considering retaining the existing Reidel Drive corridor as part of the future Doon South trail system to enhance connectivity. See also Cultural Environment Summary.
- Background noise will increase in the study area due to natural growth in traffic. W1 is the preferred option acoustically (only one sensitive receptor would experience significant noise increases), but there are few receptors in the study area (key receptors are 500 Stauffer Drive and 271 Reidel Drive).

<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>ALIGNMENT ALTERNATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CULTURAL ENVIRONMENT</td>
<td>WEST</td>
</tr>
<tr>
<td>Archaeological Resources</td>
<td>W1</td>
</tr>
<tr>
<td>Heritage Resources</td>
<td></td>
</tr>
</tbody>
</table>

**Cultural Environment Summary**
- W1 is the preferred option with respect to potential impacts to cultural heritage features because it avoids all cultural heritage units (homesteads and roadscapes) along the existing Reidel Drive corridor, minimizes impacts to those north of Stauffer Drive, and avoids areas with higher archaeological potential near the Blair Creek corridor.
- E2 and C2 are the least preferred options, given that both alignments will result in the displacement of CHL 6, as well as the farmhouse at CHL 1, given its close proximity to Reidel Drive. E2 would also impact CHL 2, CHL 3, CHL 4 and CHL 5 through disruption. C2 will also impact CHL 7 through disruption.
- E3 and E4 have lower impacts to cultural heritage features compared to E2 and C2 due to avoiding scenic...
### Transportation/Utilities Summary

- **E2** is the preferred option with respect to compliance with transportation/municipal services policies, and also shows the highest projected use for passenger vehicle and public transit usage. The use of existing Reidel Drive makes this preferred from a servicing perspective as well.
- **E4** and **C2** are moderate options in these regards due to partial use of the existing Reidel Drive corridor with **E4** being slightly higher than **C2** because its alignment north of Stauffer Drive is more consistent with transportation/municipal services policy.
- **E3** and **W1** are the least preferred options since their distance from existing infrastructure reduces projected usage by passenger vehicles and transit users and reduces demand/connectivity for services/utilities, while increasing new infrastructure requirements. They also create the need for a staggered (E3), or additional (W1) intersection with New Dundee Road which are not desirable in terms of achieving efficient traffic operations in the New Dundee Road corridor.
Strasburg Road Extension  
From North of Stauffer Drive to New Dundee Road  
Environmental Study Report  
October 2013

### Financial/Technical Summary

<table>
<thead>
<tr>
<th>Financial/Technical</th>
<th>W1</th>
<th>C2</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td></td>
<td></td>
<td>●</td>
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</tr>
<tr>
<td>Technical</td>
<td>●</td>
<td>●</td>
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</table>

- E2 is the preferred option from a financial perspective, with the lowest capital and operational costs. E3, E4, and C2 have similar capital and operational costs. W1 has the highest capital and operational costs, making it the least preferred option financially. W1 also requires longer road and service extensions for the side roads which full further increase both the capital cost and operating costs.
- W1 is the easiest to construct from a technical perspective due to the avoidance of large crossing structures and the need to clear/grub vegetation, while C2 is the least preferred option due to requirement for two watercourse crossing structures.
- It should be noted that technical considerations are relative only, and all options are technically feasible.
The September 26, 2011 Project Team meeting was organized as a workshop, wherein the detailed assessment was presented to the Project Team by various Consultant Team discipline specialists to ensure that all Project Team members gained a full appreciation of the potential advantages and disadvantages associated with the alignment alternatives, and that there was open discussion in this regard. The identified advantages and disadvantages were then enumerated by the full Project Team and round table discussion ensued to select the Technically Preferred Alignment.

The advantages and disadvantages of the alignments, as identified by the Project Team, are summarized in Table 4.5. Note that the advantages and disadvantages of Alignments E2, E3 and E4 are common north of Stauffer Drive, since the alignments are coincidental.

**Table 4.5: Summary of Advantages and Disadvantages of Short-Listed Alignments**

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>Avoids Natural Features in Blair Creek corridor; groundwater recharge areas.</td>
<td>Does not meet traffic operation, transit, or servicing objectives.</td>
</tr>
<tr>
<td></td>
<td>Avoids most direct impacts to Cultural Heritage Landscape features.</td>
<td>Highest amount of prime agricultural lands out of production.</td>
</tr>
<tr>
<td></td>
<td>Lowest noise impacts.</td>
<td>Requires highest amount of private property.</td>
</tr>
<tr>
<td></td>
<td>Least impacts to B&amp;B business.</td>
<td>Most expensive from a capital cost, maintenance, and servicing perspective.</td>
</tr>
<tr>
<td></td>
<td>Most constructible.</td>
<td>Does not meet land use policy objectives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Most intrusive to Protected Countryside, with the potential to create the greatest shift in the urban envelope.</td>
</tr>
<tr>
<td>C2</td>
<td>Most equitable property impacts north of Stauffer Drive.</td>
<td>Does not fully meet traffic operations, transit or servicing objectives.</td>
</tr>
<tr>
<td></td>
<td>Reduces proximity impacts to B&amp;B business compared to East alignments.</td>
<td>Largest impact to Natural Heritage Features including wetlands, regulated SAR habitat, streams and fish habitat (2 crossings), wildlife passage, groundwater recharge areas (including surface/groundwater interactions).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B&amp;B business still affected to some degree by both Strasburg Road and Robert Ferrie Drive.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impacts on one Cultural Heritage Landscape and a scenic roadscape.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two directly impacted sensitive noise receptors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Most challenging to construct.</td>
</tr>
</tbody>
</table>
### E2 (E2/E3/E4 North of Stauffer Drive)

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best from a traffic operation, transit, and servicing perspective.</td>
<td>Impacts to Natural Features in Blair Creek corridor, farm pond.</td>
</tr>
<tr>
<td>Least impacts to existing agricultural operations.</td>
<td>Highest impact to Cultural Heritage Landscapes (houses and scenic roadscapes).</td>
</tr>
<tr>
<td>Least expensive from a capital cost, maintenance, and servicing perspective.</td>
<td>Highest impacts to B&amp;B business.</td>
</tr>
<tr>
<td>Least intrusion on Protected Countryside, and highest overall conformance with Official Plan and policies.</td>
<td>Two directly impacted sensitive noise receptors.</td>
</tr>
</tbody>
</table>

### E3

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short crossing of Blair Creek minimizes impacts to Natural Heritage features including wetland, streams and fish habitat, groundwater resources, wildlife. Best among E alignments.</td>
<td>Does not meet traffic operations objectives (creates an additional intersection on New Dundee Road close to Cameron), or transit and servicing objectives.</td>
</tr>
<tr>
<td>Provides best opportunity to enhance scenic trail network in Reidel Drive corridor.</td>
<td>Intrusive to the Protected Countryside south of Stauffer Drive.</td>
</tr>
<tr>
<td></td>
<td>Highest impacts to B&amp;B/Conference Centre business (common to all East alignments)</td>
</tr>
<tr>
<td></td>
<td>Two directly impacted sensitive noise receptors.</td>
</tr>
<tr>
<td></td>
<td>Highest property impacts among East alignments.</td>
</tr>
</tbody>
</table>

### E4

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate for traffic, transit, and servicing objectives.</td>
<td>Impacts to Natural Environmental features slightly worse than E3 due to a poorer crossing of Blair Creek.</td>
</tr>
<tr>
<td>Less intrusive to Protected Countryside than all alignments, except E2.</td>
<td>Highest impacts to B&amp;B/Conference Centre business (common to all East alignments)</td>
</tr>
<tr>
<td></td>
<td>Two directly impacted sensitive noise receptors.</td>
</tr>
</tbody>
</table>
4.4.1.3 Selection of Technically Preferred Alignment

Following is the rationale for selection of the Technically Preferred Alignment by the Project Team in Stage 1, which was determined through a process of elimination.

West Alignment (W1)

While Alignment W1 exhibits distinct initial advantages with respect to avoiding direct impacts to the natural heritage features in the Blair Creek corridor (and would, therefore, likely be the easiest to construct); and would impose the least impacts to cultural heritage resources and the B&B business at 500 Stauffer Drive (670 m removed from house; least proximity (noise) impacts) it has the following disadvantages:

- It has the least potential to meet the primary project objectives of serving traffic and transit demand in approved and future development in southwest Kitchener, specifically the Doon South Community. Average daily traffic volumes using this alignment would be in the order of 10% lower than those using the most easterly alignments. This has the potential for increasing traffic infiltration through existing local Brigadoon and Doon South neighbourhoods north and east of Doon South Phase 2, where some streets are already under pressure during peak travel periods (e.g., Caryndale Drive, Robert Ferrie Drive, Doon South Drive, Doon Mills Drive and Doon Village Road), which may, in turn, adversely affect the level of service at a number of local road intersections;

- It has the least potential to meet other transportation objectives, including minimizing cycling and walking distances to enhance attractiveness for transit ridership (more walking distance from OMB-approved subdivisions for transit riders). Further, it is expected that bus routes in the area would have to travel entirely on local.

- It does not meet Region of Waterloo of City of Kitchener objectives related to providing and maintaining municipal services in southwest Kitchener, specifically the Doon South Community. This includes additional capital, operations and maintenance costs associated with the extra length of services carried in the future Robert Ferrie Drive and Blair Creek Drive corridors;

- It is the least compatible with Regional and City land use policy direction related to protection of agricultural and rural resources. Its encroachment well into the Protected Countryside area is almost exclusively within the Prime Agricultural Land designation;

- It will have the most impacts to existing agricultural lands and farming operations. It will result in taking the largest amount (9.98 ha) of prime agricultural land out of production, since it traverses primarily Class 2 and Class 3 lands. This is almost ten times the amount of prime agricultural land occupied by the option with least impact on Class 1-3 lands. It will also create the most severances on land parcels that are currently being farmed (8);

- An additional intersection will be formed at Strasburg Road and New Dundee Road about 730 m west of the existing intersection at Reidel Drive/Cameron Road and New Dundee Road. This is not conducive to the Region of Waterloo's aspirations for New Dundee Road to function as a regional arterial road (an additional traffic flow impediment is introduced);
This alignment requires the most private property (requires land from 7 individual private properties; 19.99 ha, including 3.34 ha for future Robert Ferrie Drive and 3.36 ha for future Blair Creek Drive); and

This alignment would cost the most to build ($20.1 Million), operate and maintain.

As an over-arching concern, given the property ownership in the study area (the vast majority of the lands are held by development interests) and the fact that the future Strasburg Road corridor has historically been used to define both the Regional Countryside Line and the City’s urban-rural boundary, the Project Team feels that it is not unreasonable to suggest that Alignment W1 has the potential to create the greatest shift in the urban envelope, including the western boundary of the Brigadoon South and Doon South Phase 2 Community areas. If this shift occurs, the natural heritage features in the Blair Creek corridor, as well as additional areas within the Regional Recharge Area initially avoided with the alignment may ultimately come under increased pressure from urban development, thereby compromising the rationale for developing this alignment in the first place. This potential is illustrated in Figure 4.6.

These disadvantages are of particular concern to the Region of Waterloo (refer to September 6, 2011 and April 19, 2012 correspondence from the Region to the City of Kitchener in Appendix B) and the City’s long range planning staff.

**Figure 4.6 : Potential Shift in Urban Envelope Associated with Alignment W1**
In the foregoing regard, reviewers may also refer to the Region of Waterloo's report entitled Regional Transportation Master Plan: Implications of Southwest Kitchener Development Beyond Countryside Line (DOCS #803593). The document presents a review of the transportation implications of potential development in southwest Kitchener beyond the Countryside Line, based on assumptions related to the use of lands for residential and employment purposes. The area under consideration, as shown in Figure 3.13 of this ESR, is bounded by Reidel Drive on the east, New Dundee Road on the south, Trussler Road on the west and an irregular boundary to the north, and includes approximately 85% of the Strasburg Road Extension Class EA study area. The report concludes that there would be significant challenges in providing new and expanded transportation/transit infrastructure and services needed to support such development, including additional capacity on the Strasburg Road Extension, which is considered to be “environmentally constrained”. The report clearly identifies the Region’s concerns over any potential expansion of the current limit of development identified in the Regional Official Plan from a transportation perspective.

Based on the foregoing disadvantages, the Project Team recommends that **Alignment W1 not be adopted as the Technically Preferred Alignment.**

**Central Alignment (C2)**

Alignment C2 would impose the most equitable distribution of property impacts north of Stauffer Drive by virtue of the fact that it straddles the boundary between 500 Stauffer Drive and Activa lands. It would also situate Strasburg Road on the west side of the B&B business at 500 Stauffer Drive, minimizing to some degree the impacts to this easterly oriented operation. However, this alignment exhibits the following disadvantages that are deemed to outweigh its advantages:

- Similar to Alignment W1, it does not fully meet traffic operations, transit or servicing objectives due to distance from planned communities north of Stauffer Drive;
- Due to the width of the Blair Creek crossing, it would impose the largest impact to Natural Heritage Features including wetlands, regulated Species at Risk habitat, streams and fish habitat (2 crossings), wildlife habitat, groundwater recharge areas (including surface/groundwater interactions). As the study progressed, based on discussions with GRCA and MNR, it is expected that the window/gap in the Provincially Significant Wetland area within the Blair Creek corridor within which this alignment is situated will disappear and all vegetation communities within the corridor will be included in the PSW complex. If the PSW boundaries are reviewed, it is expected that additional “complexing” will include the heretofore unevaluated wetlands north and south of Stauffer Drive that would likely have to be drained and filled to construct Alignment C2;
- The B&B operation will still be somewhat adversely affected (noise impacts) by the Strasburg Road alignment to the west and the extension of Robert Ferrie Drive to the

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21 MNR staff have reviewed the information in the draft ESR for the Roseville Swamp – Cedar Creek provincially significant wetland complex within the study area, and have advised the Project Team that the previously unevaluated wetland north of Stauffer Drive is now considered provincially significant. GRCA has expressed interest in reviewing boundaries of this PSW in the Upper Blair Creek corridor. If the Conservation Authority provides MNR with new information, or if new information becomes available through MNR’s review of the ESR, the details of the wetland complex (e.g., boundary) may be reviewed.
north, both of which would be approximately 270 m from and downwind of the main building; and

- This option will affect the western periphery of the Cultural Heritage Landscapes at 500 Stauffer Drive (CHL 2) and on the Activa lands (CHL 7), displace a significant segment of the Reidel Drive scenic-heritage roadscape (CHL 6), and possibly displace the house at 271 Reidel Drive (CHL 1), depending on the ultimate grading requirements at this location.

Based on the foregoing disadvantages, the Project Team recommends that **Alignment C2 not be adopted as the Technically Preferred Alignment**.

**East Alignments (E2, E3, E4)**

North of Stauffer Drive, Alignments E2, E3 and E4 share the same advantages and disadvantages because they are coincident. The Project Team recognizes that these alignments would be the most disruptive to the B&B business and Cultural Heritage Landscape (CHL 2) at 500 Stauffer Drive. In addition, they are closest to the farm pond at 500 Stauffer Drive, a dug pond that supports a localized aquatic terrestrial ecosystem, and will sever the internal connection between the house and the woodlot in the northeast corner of the property.

However, the alignment north of Stauffer Drive:

- Will result in the least impacts to agricultural operations in terms of severances (including the farm at 500 Stauffer Drive) and take the least prime agricultural land out of production;
- Is considered the most effective alignment from a traffic operation, transit, and municipal servicing perspective because it is the closest to existing and approved/planned communities;
- Is the least expensive from capital cost, operations and maintenance perspectives; and
- Would be most compatible with Regional and City long range planning policy directions (no intrusion into the Countryside area).

The remainder of the discussion here focuses on the East alignments south of Stauffer Drive.

**Alignment E2** – is favoured by the Region of Waterloo because it would result in the least intrusion on the Countryside area; is optimal from a traffic operation, transit, and municipal servicing perspective (since it uses the existing Reidel Drive corridor and is the closest to OMB approved development in Doon South Phase 2); and is economical compared to other East alignment alternatives, since it does not require lengthy extensions of Blair Creek Drive and its associated watermain and sanitary services (refer to September 6, 2011 letter to City of Kitchener in Appendix B).

However, there are two primary considerations by the Project Team that overrode these advantages:

- From a Natural Heritage perspective, although the travelled portion of the existing Reidel Drive corridor is already disturbed, the imposition of the wider footprint required to implement the Strasburg Road Extension will result in impacts to adjacent features that are more significant than those affected by an alignment further west in the Blair Creek corridor. These impacts include:
displacement of wetland buffers at the Blair Creek crossing that represent important amphibian and other wildlife habitat;

- displacement of a vegetation species at risk (butternut tree) on the west side of Reidel Drive, which would result in Endangered Species Act permitting requirements in addition to those associated with crossing Jefferson Salamander regulated habitat for all alignments crossing the Blair Creek corridor; and

- potential displacement of a large Black Walnut specimen on the east side of Reidel Drive and wildlife habitat in the cultural woodlot associated with the residence at 271 Reidel Drive on the west side.

- From a Cultural Heritage perspective, there was considerable interest from some members of the Project Team in taking advantage of the opportunity to preserve as much of the Reidel Drive scenic-heritage roadscape (CHL 3 and CHL 6) as possible, with a view to incorporation of the road corridor in the Doon South Community Trail network. In addition, there is an interest in preserving the cultural heritage landscape (CHL 2) at 271 Reidel Drive to the greatest degree possible. Alignment E2 could result in the displacement of the house at this location.

Based on these considerations, the Project Team recommends that Alignment E2 not be adopted as the Technically Preferred Alignment.

Alignment E3 – is of concern to the Region of Waterloo for the reasons cited above for Alignment C2 (and for Alignment C1 during the alignments screening stage), since it is not optimal from a traffic, transit and municipal servicing perspective, and results in an intrusion into the Countryside area. Further, as indicated above in the description of the alignments screening process, there is a concern with the proximity and configuration of the staggered Strasburg Road-New Dundee Road-Cameron Road intersection legs with respect to possible adverse impacts to traffic operations in the New Dundee Road corridor (addition of a side friction/conflict point).

However, Alignment E3 would require the shortest crossing of the Blair Creek corridor and is the most advantageous from a Natural Heritage perspective. It would also result in the fewest proximity impacts (noise; encroachment on CHL 2) to the tenant-occupied residence at 271 Reidel Drive of any of the East alignments.

Alignment E4 – substantially achieves the natural and cultural heritage objectives of moving off the Reidel Drive corridor, and is preferable to Alignment E3 with respect to eliminating the traffic operations concerns at the New Dundee Road/Cameron Road intersection. However, its crossing of the Blair Creek corridor would create marginally greater impacts than that of Alignment E3.

Based on the foregoing considerations, the Project Team is recommending that a hybrid of Alignments E3 and E4, referred to Alignment E4 Modified, be adopted as the Technically Preferred Alignment. Alignment E4 Modified incorporates Alignment E4 to Stauffer Drive, uses the Alignment E3 crossing point of the Blair Creek corridor, and returns to the Alignment E4 corridor near the future Blair Creek Drive intersection, as shown in Figure 4.7.
Figure 4.7: Alignment E4 Modified in Relation to Alignments E3 and E4
4.4.1.4 Summary Rationale for Technically Preferred Alignment

The Technically Preferred Alignment (Alignment E4 Modified) identified during Stage 1 of the comparative assessment of alignments is shown in Figure 4.8.

**Figure 4.8: Stage 1 Technically Preferred Alignment (E4 Modified)**
The Project Team concluded that Alignment E4 Modified represents an acceptable balance of advantages and disadvantages across the spectrum of evaluation criteria and should be adopted as the Technically Preferred Alignment.

The summary rationale for selection of Alignment E4 Modified is as follows:

- It is adequate for meeting traffic operations, transit, and servicing requirements.
- It represents the shortest crossing of the Blair Creek corridor, minimizing impacts to natural heritage features, including wetlands, streams and fish habitat, groundwater resources, and wildlife.
- It exhibits relatively high overall conformance with Region of Waterloo and City of Kitchener planning policies, including an acceptable level of intrusion on the Protected Countryside; and impacts to agricultural resources/operations.
- It results in an acceptable balance of impacts to and preservation of cultural heritage resources and provides opportunity to enhance the scenic heritage road and trail network in the Doon South Community.
- It has the second lowest capital cost and private property requirements.

Table 4.6 presents a graphic summary of how Alignment E4 Modified compares with the other alignments, exhibiting the preferred attributes of Alignments E3 and E4.

### Table 4.6: Summary Comparison of Alignment Alternatives

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<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>ALIGNMENT ALTERNATIVE</th>
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<tbody>
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<td></td>
<td>EAST</td>
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<td></td>
<td>E2</td>
</tr>
<tr>
<td>Natural Environment</td>
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<td>Socio-Economic Environment</td>
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<td>Cultural Environment</td>
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<tr>
<td>Transportation/Utilities</td>
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<td>Financial/Technical</td>
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</table>

The Stage 1 Technically Preferred Alignment (E4 Modified) and Draft ESR were presented to the city’s Planning and Strategic Initiatives (PSI) Committee on May 7, 2012. The committee...
resolved to receive the Draft ESR and refer it to the November 27, 2012, and to release the report for public review and comment immediately, with comments to be provided to the City's Project Manager by September 26, 2012. The May – September 2012 Draft ESR review period is referred to in this ESR as the Additional Consultation Stage.

4.4.2 Comparative Assessment and Evaluation of Alternatives – Stage 2

Based on input received during the Additional Consultation Stage (May - September 2012), including comments and information received from the public, regulatory agencies and interested/affected parties, as well as city Council, Council determined that additional work was warranted to identify the Technically Preferred Alignment.

There were five significant influences on the comparative assessment process after the Draft ESR was released in May 2012:

6. Council heard, first hand, significant public support for the owner of 500 Stauffer Drive.

7. In December 2012, City Council passed a Notice of Intention to designate 500 Stauffer Drive under the Ontario Heritage Act and subsequently (March 2013) passed By-Law 2013-026 designating the property under Part IV of the Act (refer to Appendix B.).

8. An additional alignment alternative (referred to as Alignment W2 Modified) was introduced for consideration by landowners in the study area (Developers’ Group Alignment) (refer to Section 4.4.2.1).

9. The Ministry of Natural Resources clarified its position on crossing Jefferson Salamander regulated area (suggesting that there will be significant challenges for the City in meeting the legal tests that provide the authority for the Minister to issue a permit under the Endangered Species Act 2007, with respect to mitigating impacts and providing overall benefit for the species) (refer to August 30, 2012 MNR correspondence in Appendix B).

10. The Regional Municipality of Waterloo expressed concerns regarding timing for the proposed regional trunk watermain in the Strasburg Road allowance and its connectivity to existing watermains in Doon South; and identified the need to investigate an alternative route into Doon South to serve imminent development and to implement changes being recommended in the Region’s Water Distribution Master Plan.

These changes resulted in the need to revisit the previous alignment assessment, including conducting a review of the Evaluation Criteria used in the assessment.

City staff presented the proposed approach for the supplementary work program to the Planning and Strategic Initiatives Committee at a special meeting convened on November 27, 2012 (refer to Report INS-12-084 in Appendix B). Council unanimously approved staff and committee recommendations related to the additional work at its regular meeting on December 17, 2012, which effectively initiated work in Stage 2 of the comparative assessment of alignment alternatives.

4.4.2.1 Alignments Retained for Stage 2 Comparative Assessment

The Strasburg Road Extension alignments retained for comparative assessment in Stage 2 are shown in Figure 4.9 and included the five short-listed alternatives from Stage 1 (Alignments E1, E2, E3, E4, C2 and W1), the Technically Preferred Alignment from Stage 1 (Alignment E4 Modified), and the Developers’ Group Alignment (W2 Modified).
Figure 4.9: Alignments Retained for Stage 2 Comparative Assessment
4.4.2.2 Review of Evaluation Criteria

Based on public and agency comments received during the Additional Consultation Stage, the Project Team proposed revisions to the Evaluation Criteria, which were presented to Council through a workshop on February 4, 2013. The objective of the workshop was to receive input from members of Council for their preferences with respect to the scope and importance of the various evaluation criteria. Once a consensus from Council as a whole was reached on the Evaluation Criteria and the associated importance, this information was communicated back to the Project Team. On February 22, 2013, the Project Team finalized the revised Evaluation Criteria taking into consideration the input from Council.

Table 4.7 presents the Evaluation Criteria used for completing the Stage 2 comparative assessment of the alignment alternatives. Criteria that are new or modified from those used in the Stage 1 (2011) assessment of alignment alternatives are identified as such. The basic differences between the original and revised criteria are related to how the factors are broken out within factor groups and/or the introduction of new or modified indicators/measures (red text).

**Table 4.7: Evaluation Criteria Used for Stage 2 Comparative Assessment**

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<thead>
<tr>
<th>FACTOR GROUP/FACTOR</th>
<th>INDICATOR/MEASURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. NATURAL ENVIRONMENT</td>
<td></td>
</tr>
<tr>
<td>1A. Terrestrial Ecosystems</td>
<td></td>
</tr>
<tr>
<td>▪ Wetlands</td>
<td>- Encroachment on PSWs or other wetlands (area; classification/quality, relative extent in relation to entire complex)</td>
</tr>
<tr>
<td>▪ Designated Environmentally Sensitive Policy Areas / Areas of Natural and Scientific Interest</td>
<td>- Encroachment on ESPAs/ANSIs (area; relative extent in relation to entire designated area)</td>
</tr>
<tr>
<td>▪ Vegetation communities</td>
<td>- Encroachment on vegetation communities (area, type, quality, composition, relative extent; and potential for mortality, stress, composition change)</td>
</tr>
</tbody>
</table>
| ▪ Wildlife habitat | - Encroachment on and/or reduction of interior habitat (area; fragmentation)  
                          - Effects on wildlife movement corridors or corridors between critical habitat features (e.g., upland/breeding ponds) (number of crossings)  
                          - Degree of potential increases in animal-vehicle conflicts |
| 1B. Aquatic Ecosystems |                |
| ▪ Watercourses providing fish habitat (including food/shelter) | - Number of watercourse crossings, sensitivity of fish/fish habitat and thermal regime (warm, cool or cold water)  
                                                                  - Extent (area) and function of riparian habitat removed  
                                                                  - Extent and type of fish habitat (in-stream) altered/displaced at watercourse, including importance to aquatic ecosystem (e.g., spawning, nursery areas) |
| ▪ Water quality, thermal regime and baseflow | - Encroachment on headwater areas (1st or 2nd Order Streams) (area)  
                                                 - Degree of interference with known groundwater discharge areas that contribute to creek baseflow |
<table>
<thead>
<tr>
<th>FACTOR GROUP/FACTOR</th>
<th>INDICATOR/MEASURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Effects on surface drainage/flood plain contributions to fish habitat</td>
</tr>
<tr>
<td>1C. Groundwater Resources</td>
<td></td>
</tr>
<tr>
<td>▪ Groundwater recharge areas</td>
<td>- Encroachment on significant groundwater recharge areas (Regional Recharge Area) (removal/disruption of function - area; depth)</td>
</tr>
<tr>
<td>▪ Groundwater quality</td>
<td>- Potential for impacts to vulnerable areas (area)</td>
</tr>
<tr>
<td>▪ Shallow groundwater movement</td>
<td>- Potential for interference with existing flow patterns (baseflow) relative to proximity to surface water and significant groundwater discharge areas</td>
</tr>
<tr>
<td>1D. Surface Drainage</td>
<td></td>
</tr>
<tr>
<td>▪ Watercourses; drainage catchments</td>
<td>- Need for diversion/channelization of Blair Creek (length) and catchment area impacts (area)</td>
</tr>
<tr>
<td>▪ Flood plain function</td>
<td>- Impact to regulatory flood plain of Blair Creek (including need for GRCA work permit)</td>
</tr>
<tr>
<td>▪ Stormwater management</td>
<td>- Changes (+/-) to Blair Creek flood plain hydrologic function</td>
</tr>
<tr>
<td>▪ Stormwater management</td>
<td>- Opportunities to enhance roadway stormwater management measures, including coordination with/use of adjacent development facilities</td>
</tr>
<tr>
<td>1E. Species at Risk Permits [NEW]</td>
<td></td>
</tr>
<tr>
<td>▪ Vegetation Species at Risk</td>
<td>- Effects on vegetation SAR or species of local/regional significance (type, number, quality)</td>
</tr>
<tr>
<td>▪ Wildlife Species at Risk</td>
<td>- Effects on terrestrial SAR or species of local/regional significance (type, area of critical habitat; breeding timing windows)</td>
</tr>
<tr>
<td>▪ Aquatic Species at Risk</td>
<td>- Effects on aquatic Species at Risk or species of local/regional significance (type, length)</td>
</tr>
<tr>
<td>▪ Species at Risk permits required for construction</td>
<td>- Permit requirement (yes, no); probability of obtaining permit(s) (high, medium, low); degree of associated risk to project implementation</td>
</tr>
<tr>
<td>2. SOCIO-ECONOMIC ENVIRONMENT</td>
<td></td>
</tr>
<tr>
<td>2A. Land Use Policy [MODIFIED]</td>
<td></td>
</tr>
<tr>
<td>▪ Land use/resource designations and policies</td>
<td>- Degree of compatibility with Provincial, Regional and City growth/development goals/objectives (high, medium, low)</td>
</tr>
<tr>
<td>2B. Existing and Approved Land Use [MODIFIED]</td>
<td></td>
</tr>
<tr>
<td>▪ Agricultural operations (physical resource consumption; facility resource consumption; operational impacts)</td>
<td>- Prime agricultural land out of production (Class 1-3; specialty crop) (area)</td>
</tr>
<tr>
<td>▪ Other business operations (500 Stauffer Drive)</td>
<td>- Total farm properties affected (number; type; area; severances)</td>
</tr>
<tr>
<td>▪ Approved development proposals (Plan of Subdivision 30T-08203)</td>
<td>- Farm infrastructure displaced (type, number, area)</td>
</tr>
<tr>
<td>▪ Approved development proposals (Plan of Subdivision 30T-08203)</td>
<td>- Business infrastructure/employees displaced (type; number)</td>
</tr>
<tr>
<td>▪ Approved development proposals (Plan of Subdivision 30T-08203)</td>
<td>- Changes (+/-) in business exposure/viability</td>
</tr>
<tr>
<td>▪ Approved development proposals (Plan of Subdivision 30T-08203)</td>
<td>- Impacts on approved development lands (area; exposure/viability)</td>
</tr>
<tr>
<td>FACTOR GROUP/FACTOR</td>
<td>INDICATOR/MEASURE</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>lands</td>
<td></td>
</tr>
<tr>
<td><strong>2C. Communities</strong></td>
<td></td>
</tr>
</tbody>
</table>
| ▪ Impacts to individual properties/communities | - Encroachment on individual properties (number/area)  
- Influence in defining proposed community areas (high, medium, low) |
| ▪ Community connectivity (cultural/social linkages) | - Physical changes (+/-) to established community connectors (trails/roads)  
- Changes to delivery of community services (emergency; school transportation) |
| ▪ Recreational opportunities | - Changes (+/-) in community access to recreational/interpretive areas |
| **2D. Noise** |
| ▪ Noise sensitive areas | - Noise sensitive receivers experiencing increases (5 dB ranges) in sound levels over pre-existing conditions  
- Noise sensitive receivers experiencing resultant absolute noise levels over 60 dBA |
| **3. CULTURAL ENVIRONMENT** |
| **3A. Archaeological Resources** |
| ▪ Known archaeological sites | - Number/type/significance of direct/indirect impacts to registered archaeological sites |
| **3B. Built Heritage [MODIFIED]** |
| ▪ Built Heritage Features | - Number/type/significance of direct/indirect impacts to above ground heritage resources (based on presence of above ground cultural heritage features identified or designated by the City of Kitchener as having heritage value or interest, or identified during EA field studies); probability of obtaining required regulatory permits; and the degree of associated risk to project implementation |
| **3C. Cultural Heritage Landscapes [MODIFIED]** |
| Cultural Heritage Landscapes | - Number/type/significance of direct/indirect impacts to historic; scenic-heritage roads, farm complexes, etc.) |
| **4. TRANSPORTATION/MUNICIPAL SERVICES AND UTILITIES** |
| **4A. Transportation Network/Infrastructure** |
| ▪ Transportation network | - Relieve future demand on Homer Watson Boulevard, Huron Road and Fischer Hallman Road  
- Provision of Doon South Community access (Robert Ferrie Drive; Blair Creek Drive)  
- Potential impacts to local roads/intersections  
- Compatibility with RMOW New Dundee Road proposals |
| ▪ Traffic operations | - Road safety and accessibility (sight distance; turning movements) |
| ▪ Transportation policy initiatives | - Capability to support municipal policy initiatives (transit, active transportation, roundabouts) |
### 4B. Municipal Services and Utilities

- **Municipal services**
  - Opportunities for connections to existing services
  - Provision of standard cross-section location for services
  - Provision of continuous services

- **Utilities (existing and proposed plant)**
  - Degree of exposure of utilities and/or utility conflicts with road design

### 5. FINANCIAL/TECHNICAL

#### 5A. Financial

- **Cost**
  - Estimated capital cost ($) (excluding mitigation/overall benefit for Species at Risk)
  - Property requirements (number, area) and ease of acquisition
  - Extraordinary operations and maintenance requirements/costs (e.g., differences in the number of valves and water treatment requirements; collector road maintenance)
  - Species at Risk mitigation/overall benefit (broken out from other capital costs. Overall benefit costs not quantified at this time)

#### 5B. Technical

- **Roadway geometric design requirements**
  - Conformance to TAC and City of Kitchener/RMOW standards

- **Structural/foundation/pavement design requirements**
  - Conformance to TAC and City of Kitchener standards
  - Requirements for pavement depth and/or foundation footprint, based on soil conditions
  - Structural requirements relative to capital cost and long term maintenance requirements

- **Topographic; earth balance**
  - Potential for excessive borrow quantity or excessive off-site disposal of earth material (volume)
  - Requirements for excessive (steep) grades (length)
  - Ability to maintain positive drainage, in combination with number of suitable drainage outlets and established Blair Creek subwatershed strategy

- **Constructability**
  - Adequate access to corridor
  - Potential conflicts with existing infrastructure (other than utilities)
  - Provision of standard horizontal and vertical clearance requirements
  - Extraordinary staging requirements

### 4.4.2.3 Detailed Comparative Assessment of Alignment Alternatives – Stage 2

A comparative assessment was completed by the Project Team for the seven (7) alignments identified in Section 4.4.2.2, using the revised Evaluation Criteria.

The Consultant Team revised the Stage 1 detailed evaluation matrices. The revised matrices are presented in Appendix C.3. As agreed with the Project Team and Council, the alignment
alternatives were also scored by the Consultant Team by assigning a score of 10 to the alignment that best met the project objectives or would create the fewest adverse impacts, and indexing the remaining alignments against the preferred alternative for each Factor (maximum score of 10; minimum score of 1). Factor scores were averaged to arrive at a normalized score for each Factor Group, because there are a different number of factors in each Factor Group. Based on Project Team opinion, and subsequent input on Council with respect to the relative importance of the individual Evaluation Criteria, no numerical weightings were attached to the criteria.

The results of the detailed assessment were provided to the Project Team in the form of reference documents in mid-March 2013. A Project Team workshop was held on March 27, 2013, wherein the detailed assessment was presented to the Project Team by various Consultant Team discipline specialists to ensure that all Project Team members gained a full appreciation of the potential advantages and disadvantages associated with the alignment alternatives. The identified advantages and disadvantages were then scored by the full Project Team, using the Consultant Team scoring summary as the base reference point, and a consensus-building discussion ensued to select the New Technically Preferred Alignment (TPA).

The summary comparative assessment of alignment alternatives, including the final scoring of the alternatives by the Project Team, is presented in Table 4.8.
### Table 4.8: Summary Comparative Assessment of Alignment Alternatives – Stage 2

<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>ALIGNMENT ALTERNATIVE</th>
<th>EAST</th>
<th>CENTRAL</th>
<th>WEST</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E2</td>
<td>E3</td>
<td>E4</td>
<td>E4 Modified</td>
</tr>
<tr>
<td>1. NATURAL ENVIRONMENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1A. Terrestrial Ecosystems</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>1B. Aquatic Ecosystems</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1C. Groundwater Resources</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>1D. Surface Drainage</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>1E. Species at Risk Permits</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Natural Environment Score</strong></td>
<td><strong>5.20</strong></td>
<td><strong>5.80</strong></td>
<td><strong>5.80</strong></td>
<td><strong>6.60</strong></td>
</tr>
<tr>
<td>Natural Environment Summary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• W1 is the preferred option with respect to potential impacts to natural heritage features (terrestrial/aquatic) because it avoids crossings of the Blair Creek corridor (including the significant woodlot at the west end, wetlands (including Provincially Significant Wetland), Species at Risk (SAR) regulated habitat, regulated floodplain area, and the locally sensitive groundwater recharge/discharge area. It overlies the Regional recharge area and a small portion of a Wellhead Protection Area (Level 4), it will not interfere with an active well and is the furthest alignment from areas identified as a future Regional groundwater source zone. It would also create less of a barrier to wildlife movement because it does not cross contiguous natural features associated with the creek corridor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• E2 and C2 are the least preferred due to large (E2), or multiple crossings (C2) which result in higher impacts to wetlands, aquatic habitat, wildlife passage, and SAR habitat. E2 does not overlie either the Regional or local groundwater recharge areas, or fall within a WPA, but the crossings will impact local recharge discharge conditions and is close to an active well.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• W2 Modified and E4 Modified have the smallest crossings of the Blair Creek corridor which minimizes impacts to natural heritage features. W2 Modified has a smaller crossing but is closer to high quality wetland communities. These smaller crossings decrease groundwater impacts relative to other alignments; however, W2 Modified overlies both the Regional and local recharge zones, and still requires crossings of the PSW and has higher impacts than W1.</td>
<td></td>
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</tr>
<tr>
<td>• E3 and E4 have lower impacts to natural heritage features than E2 and C2 due to narrower crossings of the Blair Creek corridor. E3 is preferred to E4 in this regard. These alternatives are similar to E2 from a groundwater perspective.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• W1 is preferred from a Species at Risk Permit perspective as it avoids regulated habitat for the Jefferson Salamander. All other alternatives would necessitate securing a permit from MNR. C2 is considered worst from this perspective as it would also eliminate high quality potential habitat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. SOCIO–ECONOMIC ENVIRONMENT

<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>ALIGNMENT ALTERNATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EAST</td>
</tr>
<tr>
<td></td>
<td>E2</td>
</tr>
<tr>
<td>2A. Land Use Policy</td>
<td>10</td>
</tr>
<tr>
<td>2B. Existing and Approved Land Use</td>
<td>6</td>
</tr>
<tr>
<td>2C. Communities</td>
<td>9</td>
</tr>
<tr>
<td>2D. Noise</td>
<td>2</td>
</tr>
<tr>
<td>Socio-Economic Environment Score</td>
<td>6.75</td>
</tr>
</tbody>
</table>

Socio-Economic Environment Summary

- With respect to land use policy, significant weight was attached to compatibility with the Region of Waterloo’s Countryside Line and the City of Kitchener’s urban-rural boundary, and the potential for the new Strasburg Road alignment to create pressure for westerly expansion of the urban envelope into the protected countryside. Alignment E2 exhibits the highest degree of compatibility with land use policies since it is closest to the existing boundary, but is not much different than Alignments E4/E4 Modified. Alignments E3 and C2 exhibit similar degrees of compatibility, while Alignments W2 Modified and W1 exhibit a low degree of compatibility (potential for relatively significant to very significant relocation of the urban envelope).
- Alignment E2 imposes the least impacts to prime agricultural lands and agricultural operations, and is the preferred option. However, the East alignments impose the most impacts on the B&B business at 500 Stauffer Drive. Conversely, Alignment W1 imposes the least impacts on the B&B business at 500 Stauffer Drive, but would result in the greatest impacts to agricultural resources and operations. Potential impacts to the planned development at the northeast corner of Reidel Drive and New Dundee Road are not considered to be significant or different across the alignments. Alignment C2 represents the best balance of impacts to existing and approved future land use.
- Background noise will increase in the study area due to natural growth in traffic. W1 is the preferred option acoustically (only one sensitive receptor would experience significant noise increases), but there are few receptors in the study area. Key receptors are the residences at 500 Stauffer Drive and 271 Reidel Drive, and Alignments E2 and E4/E4 Modified would create the most significant impacts to these locations.
- Overall, Alignment E4 or Alignment E4 Modified is the preferred alternative from a socio-economic perspective.
### 3. CULTURAL ENVIRONMENT

<table>
<thead>
<tr>
<th>Evaluation Factor</th>
<th>Alignment Alternative</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A. Archaeological Resources</td>
<td>E2, E3, E4, E4 Modified</td>
<td>2.67</td>
</tr>
<tr>
<td>3B. Built Heritage</td>
<td>E2, E3, E4, E4 Modified</td>
<td>4.33</td>
</tr>
<tr>
<td>2C. Cultural Heritage Landscapes</td>
<td>C2</td>
<td>3.00</td>
</tr>
</tbody>
</table>

**Cultural Environment Score**

- **W1** is the preferred option with respect to potential impacts to archaeological resources because it avoids the most areas with indicated archaeological potential near the Blair Creek corridor. **E2** is the least preferred option because of its high impact to features indicating archaeological potential (e.g., watercourses, identified archaeological sites) and areas of indicated archaeological potential (300 m proximity to primary, secondary, or past watercourses and identified archaeological sites). **C2** impacts on the largest area of indicated archaeological potential; however, it impacts fewer features indicating archaeological potential than **E2**.

- **W1** is the preferred option with respect to potential impacts to cultural heritage resources because it avoids all four heritage roadscapes, the farm complex located on the existing Reidel Drive corridor, and minimizes impacts to CHL 7 and the designated heritage resource at CHL 2, which are located north of Stauffer Drive.

- **W2 Modified** is the next preferred option given that it avoids the four identified heritage roadscapes, and minimizes impacts to CHL 1, CHL 2 and CHL 7 (impacts are limited to the disruption of fields).

- **C2** will result in lower impacts to CHL 2, a designated heritage resource, and to CHL 3 and CHL 4, scenic-heritage roadscapes. It will, however, negatively impact CHL 5 and CHL 6 through full and partial removal, and disrupt significant views associated with CHL 1.

- **E2, E4 and E4 Modified** are the least preferred options given their disruption to landscape elements and associated views to and from CHL 2; disruption to landscape elements associated with CHL 1; and disruption to roadscapes at CHL 3, CHL 4 and CHL 5. Further, **E2** will result in removal of CHL 6.

- Alignments **C2, W1 and W2 Modified** will result in the extension of connector roads through the southern fields associated with CHL 1, and the northern fields associated with CHL 2 and CHL 7. The Robert Ferry Drive extension, in particular, has the potential to disrupt cultivated fields and hedgerows associated with CHL 2, as well as obstruct significant views from the farmstead to the woodlot and fields.
### 4. TRANSPORTATION/MUNICIPAL SERVICES AND UTILITIES

<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>EAST</th>
<th>CENTRAL</th>
<th>WEST</th>
<th>WEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A. Network/Infrastructure</td>
<td>E2: 10</td>
<td>E3: 7</td>
<td>E4: 9</td>
<td>E4 Modified: 9</td>
</tr>
<tr>
<td>4B. Municipal Services and Utilities</td>
<td>Services &amp; Utilities Score</td>
<td>10.00</td>
<td>6.50</td>
<td>9.00</td>
</tr>
</tbody>
</table>

**Transportation/Utilities Summary**

- E2 is the preferred option with respect to compliance with transportation/municipal services policies, and also shows the highest projected use for passenger vehicle and public transit usage. The use of existing Reidel Drive makes this preferred from a servicing perspective as well.
- E4, E4 Modified and C2 are moderate options in these regards due to partial use of the existing Reidel Drive corridor with E4 being slightly higher than C2 because its alignment north of Stauffer Drive is more consistent with transportation/municipal services policy. E4 Modified requires additional length of watermain compared to E4, and is therefore scored slightly lower than E4 for the Municipal Services/Utilities factor.
- E3 and W1 and W2 Modified are the least preferred options since their distance from existing infrastructure reduces projected usage by passenger vehicles and transit users and reduces demand/connectivity for services/utilities, while increasing new infrastructure requirements. They also create the need for a staggered crossing of New Dundee Road via an additional intersection not required by the other alignments which meet New Dundee Road at the existing intersection of Reidel Road and New Dundee Road. E3 provides just a minimal acceptable spacing between the existing and new intersections, while W2 Modified and W1 provide reasonable spacing, but all three cause north-south flowing traffic to "jog" east-west across New Dundee Road, increasing volume and local traffic operations delay in the New Dundee Road corridor.
### 5. FINANCIAL/TECHNICAL

<table>
<thead>
<tr>
<th>EVALUATION FACTOR</th>
<th>EAST</th>
<th>CENTRAL</th>
<th>WEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2</td>
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<td></td>
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<tr>
<td>E3</td>
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<td></td>
<td></td>
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<tr>
<td>E4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E4 Modified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W2 Modified</td>
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</tbody>
</table>

#### 5A. Financial

<table>
<thead>
<tr>
<th></th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E4 Modified</th>
<th>C2</th>
<th>W1</th>
<th>W2 Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
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<td>7</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>3</td>
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</table>

#### 5B. Technical

<table>
<thead>
<tr>
<th></th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E4 Modified</th>
<th>C2</th>
<th>W1</th>
<th>W2 Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
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<td>7</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>

**Financial/Technical Score**

- **E4 Modified** is the preferred option from a financial perspective, with the lowest capital and operational costs, followed closely by **E4**. Alignments **E3**, **C2** and **E2** have higher capital and operational costs. **W1** and **W2 Modified** have the highest capital and operational costs, with **W2 Modified** the least preferred option financially.

- The cost of mitigation for Jefferson Salamander habitat varies, ranging from 0% to 2.5% of overall capital costs. **W1** has no such mitigation costs (i.e., complete avoidance of the regulated area), and **E2** has the highest mitigation cost, since its alignment has the longest crossing of the Jefferson Salamander regulated area. The cost of mitigation does not affect the ranking of the overall capital costs.

- Although all options are technically feasible, **W1** is the easiest to construct from a technical perspective due to the avoidance of large crossing structures and of wetland areas, as well as reduced vegetation clearing requirements. **C2** and **E2** are the least preferred options due to their respective requirements for multiple watercourse crossing bridge structures and multiple span bridge structures. **C2** is scored slightly higher than **E2** due to its simplified road geometry.
Table 4.9 presents the principal advantages and disadvantage of the seven alignment alternatives under consideration.

### Table 4.9: Principal Advantages and Disadvantages of Alignment Alternatives

<table>
<thead>
<tr>
<th>Alignment Alternative</th>
<th>Principal Advantages</th>
<th>Principal Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2</td>
<td>• Least intrusive to Protected Countryside/Agricultural area</td>
<td>• High impact to natural heritage features (longest crossing of Blair Creek corridor)</td>
</tr>
<tr>
<td></td>
<td>• Least impact to agricultural lands and operations</td>
<td>• Crosses regulated SAR habitat and poses significant challenges associated with obtaining an Endangered Species Act permit</td>
</tr>
<tr>
<td></td>
<td>• Most effective in meeting traffic, transit, and municipal servicing objectives</td>
<td>• Most significant impacts to resident and bed and breakfast business at 500 Stauffer Drive</td>
</tr>
<tr>
<td></td>
<td>• Lowest private property requirements</td>
<td>• High impact to cultural heritage features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Two directly impacted sensitive noise receptors</td>
</tr>
<tr>
<td>E3</td>
<td>• Low impacts to natural heritage features</td>
<td>• Crosses regulated SAR habitat and poses significant challenges associated with obtaining an Endangered Species Act permit</td>
</tr>
<tr>
<td></td>
<td>• Shortest crossing of Blair Creek corridor</td>
<td>• Intrusive to Protected Countryside south of Stauffer Drive</td>
</tr>
<tr>
<td></td>
<td>• Low impacts to cultural heritage features (farmscapes, roadscapes)</td>
<td>• Most significant impacts to resident and bed and breakfast business at 500 Stauffer Drive (coincident with E2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Two directly impacted sensitive noise receptors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not optimal for providing transit service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Greatest traffic operations concerns</td>
</tr>
<tr>
<td>E4</td>
<td>• Relatively high overall conformance with Official Plan policies; acceptable level of intrusion on Protected Countryside and impacts to agricultural</td>
<td>• Crosses regulated SAR habitat and poses significant challenges associated with obtaining an Endangered Species Act permit</td>
</tr>
<tr>
<td></td>
<td>• Effective in meeting traffic, transit, and municipal servicing objectives</td>
<td>• Most significant impacts to resident and bed and breakfast business at 500 Stauffer Drive (coincident with E2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Two directly impacted sensitive noise receptors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not optimal for providing transit service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Greatest traffic operations concerns</td>
</tr>
<tr>
<td>Alignment Alternative</td>
<td>Principal Advantages</td>
<td>Principal Disadvantages</td>
</tr>
<tr>
<td>-----------------------</td>
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<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td>• Provides opportunity to enhance scenic heritage road and trail network</td>
<td>500 Stauffer Drive (coincident with E2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Two directly impacted sensitive noise receptors</td>
</tr>
<tr>
<td>E4 Modified</td>
<td>• Shortest crossing of Blair Creek corridor, limiting impacts to natural heritage features, including wetlands, groundwater, surface water and fish habitat</td>
<td>• Crosses regulated SAR habitat and poses significant challenges associated with obtaining an Endangered Species Act permit</td>
</tr>
<tr>
<td></td>
<td>• Relatively high overall conformance with Official Plan policies; acceptable level of intrusion on Protected Countryside and impacts to agricultural resources/operations</td>
<td>• Most significant impacts to resident and bed and breakfast business at 500 Stauffer Drive (coincident with E2)</td>
</tr>
<tr>
<td></td>
<td>• Effective in meeting traffic, transit, and municipal servicing objectives</td>
<td>• Most significant impacts to cultural heritage features</td>
</tr>
<tr>
<td></td>
<td>• Provides opportunity to enhance scenic heritage road and trail network</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Lowest capital cost</td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>• Most equitable property impacts north of Stauffer Drive</td>
<td>• High impact to natural heritage features (multiple crossings of Blair Creek corridor)</td>
</tr>
<tr>
<td></td>
<td>• Effective in meeting traffic, transit, and municipal servicing objectives</td>
<td>• Crosses regulated SAR habitat and poses significant challenges associated with obtaining an Endangered Species Act permit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Intrusive to Protected Countryside north of Stauffer Drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Two directly affected sensitive noise receptors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High impact to cultural heritage features</td>
</tr>
<tr>
<td>Alignment Alternative</td>
<td>Principal Advantages</td>
<td>Principal Disadvantages</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------------</td>
<td>-------------------------</td>
</tr>
</tbody>
</table>
| W1                    | • Avoids natural heritage features, including wetlands, forests, streams and fish habitat, wildlife passage areas, groundwater recharge areas, regulated floodplain  
  • Avoids regulated SAR habitat and significant challenges associated with obtaining an Endangered Species Act permit  
  • Avoids cultural heritage features (farmscapes, roadscapes)  
  • Lowest noise impacts  
  • Best spacing of any New Dundee Road intersection option not at the existing Reidel Drive-Cameron Road location  
  • Most constructible | • Least compatible with land use policy objectives (most intrusive to Protected Countryside/Agricultural area)  
  • Highest impact to agricultural lands/operations  
  • Requires the most private property  
  • Lease effective in meeting traffic, transit, and municipal servicing objectives  
  • Highest capital cost |
| W2 Modified           | • Limited impacts to aquatic ecosystem  
  • Limited impacts to cultural heritage features (farmscapes, roadscapes)  
  • Low noise impacts | • Proximity to sensitive woodland and wetland communities at upper end of Blair Creek corridor  
  • Crosses regulated SAR habitat and poses significant challenges associated with obtaining an Endangered Species Act permit  
  • Lower degree of effectiveness in meeting traffic, transit, and municipal servicing objectives than East and Central alternatives  
  • High capital cost |
4.4.2.4 Selection of Technically Preferred Alignment – Stage 2

Table 4.10 presents the final scoring summary for the alignment alternatives.

**Table 4.10: Final Scoring Summary**

<table>
<thead>
<tr>
<th>Component</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E4 Mod</th>
<th>C2</th>
<th>W1</th>
<th>W2 Mod</th>
</tr>
</thead>
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<tr>
<td><strong>1. NATURAL ENVIRONMENT</strong></td>
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<tr>
<td>1A. Terrestrial Ecosystems</td>
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<td>6</td>
<td>6</td>
<td>7</td>
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<td>7</td>
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<tr>
<td>1B. Aquatic Ecosystems</td>
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<td>5</td>
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<td>1C. Groundwater Resources</td>
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<td>7</td>
<td>9</td>
<td>3</td>
<td>10</td>
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<td>1D. Surface Drainage</td>
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<td>1E. Species at Risk Permits</td>
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<td>5.80</td>
<td>6.60</td>
<td>4.00</td>
<td>10.00</td>
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<td>2A. Land Use Policy</td>
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<td>2B. Existing and Approved Land Use</td>
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<td>6</td>
<td>6</td>
<td>10</td>
<td>7</td>
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<tr>
<td>2C. Communities</td>
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<td>8</td>
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<td>10</td>
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<td>4</td>
<td>8</td>
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<td>2D. Noise</td>
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<td>Socio-Economic Environment Score</td>
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<td><strong>3. CULTURAL ENVIRONMENT</strong></td>
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<td>3A. Archaeological Resources</td>
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<td>4</td>
<td>4</td>
<td>4</td>
<td>10</td>
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<td>3B. Built Heritage</td>
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<td>2</td>
<td>4</td>
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<td>10</td>
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<tr>
<td>2C. Cultural Heritage Landscapes</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>4</td>
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<td>Cultural Environment Score</td>
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<td>4.33</td>
<td>3.00</td>
<td>4.00</td>
<td>5.00</td>
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<tr>
<td><strong>4. TRANSPORTATION/MUNICIPAL SERVICES AND UTILITIES</strong></td>
<td></td>
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<tr>
<td>4A. Transportation Network/Infrastructure</td>
<td>10</td>
<td>7</td>
<td>9</td>
<td>9</td>
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<td>5</td>
<td>6</td>
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<td>4B. Municipal Services and Utilities</td>
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<tr>
<td>Transportation/Municipal Services &amp; Utilities Score</td>
<td>10.00</td>
<td>6.50</td>
<td>9.00</td>
<td>8.50</td>
<td>8.00</td>
<td>4.50</td>
<td>5.50</td>
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<tr>
<td><strong>5. FINANCIAL/TECHNICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5A. Financial</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5B. Technical</td>
<td>5</td>
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<td>7</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Financial/Technical Score</td>
<td>5.00</td>
<td>7.00</td>
<td>8.00</td>
<td>9.00</td>
<td>6.00</td>
<td>7.00</td>
<td>5.00</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td>29.62</td>
<td>29.38</td>
<td>32.80</td>
<td>35.10</td>
<td>29.50</td>
<td>37.00</td>
<td>30.53</td>
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<td><strong>RANK</strong></td>
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<td>7</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>4</td>
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<tr>
<td>% BEHIND FIRST RANKED ALIGNMENT</td>
<td>20</td>
<td>21</td>
<td>11</td>
<td>5</td>
<td>20</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>
Alignment W1 received the highest scores from the Project Team. It represents an acceptable balance of advantages and disadvantages across the spectrum of evaluation criteria and is being carried forward for presentation to stakeholders as the New Technically Preferred Alignment.

Following is the principal rationale for selection of Alignment W1 as the New Technically Preferred Alignment:

- Avoids natural heritage features, including wetlands, forests, streams and fish habitat, wildlife passage areas, groundwater recharge areas, regulated floodplain
- Avoids regulated SAR habitat and significant challenges associated with obtaining an Endangered Species Act permit
- Results in the least significant impacts to owner-occupied residence and bed and breakfast business at 500 Stauffer Drive
- Results in the lowest noise impacts
- Avoids cultural heritage features (roadscapes); limited impacts to other cultural heritage features (farm complexes)
- Provides the desired spacing between the new intersection on New Dundee Road and the existing Reidel Drive-Cameron Road intersection
- Is physically the easiest option to construct

Notwithstanding the advantages of Alignment W1, the Project Team still has concerns over the potential cumulative effects of this alignment on natural heritage features and agricultural resources associated with the anticipated pressure to relocate the west limit of the City’s urban boundary to match the new Strasburg Road alignment.

The Technically Preferred Alignment selected by the Project Team during Stage 2 of the comparative assessment was presented to and approved by the City’s Planning and Strategic Initiatives Committee at a special meeting on May 22, 2013 and was subsequently ratified by Council at its regular meeting on June 10, 2013.

Figure 4.10 shows the New Technically Preferred Alignment (Alignment W1) in isolation from the other alignment alternatives.

Moving forward, it is important to note that at its June 10, 2013 meeting Council also determined that, although conceptual alignments for the future extensions of Robert Ferrie Drive and Blair Creek Drive to intersect with the Strasburg Road Extension had to be accounted for in the comparative assessment of the Strasburg Road alignments, the exact alignments of these two collector roads will be identified through separate future studies. In this regard, Council formally resolved the following:

“That if a new alignment for Robert Ferrie Drive is to be determined through an Official Plan Amendment and Plan of Subdivision process, it is the preference of the City of Kitchener to require documentation and rigor that an Environmental Study Report requires to justify the new alignment.”

“That the alignment for Blair Creek Drive Extension from Reidel Drive westerly to the point of intersection with Strasburg Road Extension - South Section Alignment W1 (Blair Creek Drive Extension) be determined through the Municipal Engineers Association Municipal Class Environmental Assessment for Municipal Road Projects (Class EA process).”
Figure 4.18: New Technically Preferred Alignment (Alignment W1)
4.5 Refinements of the Technically Preferred Alignment

4.5.1 Refinements to Alignment W1

Upon selection of Alignment W1 as the TPA, the Project Team met with representatives of the directly affected landowners to discuss refinements to the alignment, with consideration of the following objectives:

- Maximize the use of the existing city-owned property at the north limit.
- Reduce overlap of the design over multiple properties.
- Provide greater distance to (buffer) natural heritage features in the Blair Creek corridor, including the Jefferson Salamander regulated habitat.

Three refinement options were developed and presented to the landowners. These alignments follow the same design criteria used to develop all of the short-listed alignments, and match closely with the proposed geometric design elements used for Alignment W1, such as curve radius and profile grades.

The refinement options are described below in terms of the shift from the Alignment W1 curve locations, with Curve 1 being the southernmost curve at Sta. 8+800, Curve 2 located at Sta. 9+500 and Curve 3 at Sta. 10+400.

- Red Alignment – 49 m westerly shift of the alignment at Curve 2; 155 m easterly shift of the alignment at Curve 3;
- Blue Alignment – 78 m westerly shift of the alignment at Curve 2; 90 m easterly shift of the alignment at Curve 3;
- Yellow Alignment – 62 m westerly shift of the alignment at Curve 2; 150 m easterly shift of the alignment at Curve 3.

The red option maximizes the use of the city-owned corridor at the northerly limits, whereas the Blue and Yellow options were developed to minimize the shift in the TPA. This option also provides an acceptable buffer at the west end of the Blair Creek corridor (which addresses MNR’s comments with respect to minimizing indirect impacts to regulated Jefferson Salamander habitat), as the basic road right-of-way (exclusive of grading requirements) will be a minimum of 30 m from the woodlot.

It was agreed that the Red alignment refinement to Alignment W1 should be adopted, and further refined at the south limits, such that the basic 30 m right-of-way does not straddle the lot lines, and is instead contained within the property limits of the land to the west of the lot line, as agreed with the landowner’s representative.

Figure 4.11 shows the aforementioned alignment refinement options and the final red alignment (compared to Alignment W1 in green) that was carried forward for development of the Preliminary Design scheme, which is presented in Chapter 5 of this ESR.
Figure 4.19: Technically Preferred Alignment Refinement Options
5.0 DESCRIPTION OF RECOMMENDED DESIGN

5.1 Features of Recommended Roadway Design

5.1.1 Road Geometry and Cross-Section

Alignment W1 was selected as the Technically Preferred Alignment (TPA), and has been further refined as discussed in Section 4.5.1. A preliminary design was completed for the refined TPA, developed according to the Design Criteria presented in Section 4.1, and includes the following key design parameters:

- Road Classification: four-lane urban secondary arterial road (30 m right-of-way) with 3.5 m lane widths, and 7.5 m boulevard widths, including 3.0 m multi-use paths on each side, and 0.5 m curb and gutter widths.
- Design Speed = 70 km/h
- Posted Speed = 60 km/h
- Stopping Site Distance = 110 m
- Minimum Horizontal Radius = 200 m
- Minimum Vertical Curve (Crest) K = 25
- Minimum Vertical Curve (Sag) K = 25
- Maximum Grade = 5.0%
- Minimum Grade = 0.5%
- Maximum Superelevation = 4.0%

The preliminary design for the refined TPA is provided in Appendix E, including plan-over-profile drawings, and property requirements. The proposed Typical Cross-Section is shown in Figure 5.1, with additional details provided in Appendix E.

Road Right-of-Way and Easement Requirements

The City will acquire a 30 m basic right-of-way, with 15 m taken from each side of the centerline. Beyond this basic right-of-way, grading and drainage easements have been identified for the side slopes required to match existing grade, ditches, culverts, and ponds.

These easements will be permanent wherever there is a critical drainage feature that affects the function of the road, such as ditches, culverts and ponds; wherever the road side slopes are visible to the road users and require regular maintenance due to the visibility to the road users (i.e., cut slopes); and/or where alteration of the slopes may affect the road structure (i.e., fill embankments). These easements are also identified to be permanent wherever the overall function of the land will change, such as steepening agricultural lands.

At other locations, where the grading is not critical to the operation of the road and drainage features, or does not significantly alter the land use, the easements will be temporary, and in place for the construction period only.

Right-of-way and easement requirements will be finalized for the purposes of property acquisition during the Detail Design phase.
5.1.2 New Intersections and Local Road Network Changes

5.1.2.1 New Intersections

A signal warrant analysis using the future traffic volumes has been conducted for all the new intersections, and has confirmed that signal control will be required at Robert Ferrie Drive, Blair Creek Drive and New Dundee Road upon opening of the Strasburg Road extension. The traffic signal warrant analysis is found in Appendix D.1 (A) Traffic Report.

Initial roundabout screenings have also been conducted at these new intersections (refer to Appendix D.1 B) Roundabout Screening Analysis). The results from the initial screenings indicate that a roundabout may be an attractive option at Strasburg Road/Robert Ferrie Drive and Strasburg Road/Blair Creek Drive, although a signal control at these two intersections would have a lower total life-cycle cost when taking into account the implementation cost and a 20-year injury collision cost. In both cases, the roundabout option has a slightly higher life-cycle cost than a signal control configuration by a ratio of less than 1.1. As a result, the City may wish to consider implementing a roundabout at these two intersections. Initial design details of these two roundabouts will be reviewed during the Detail Design phase. As alluded to in Section 4.4.2.2, City of Kitchener Council has resolved that the alignment for the extension of Robert Ferrie Drive, and its intersection with Strasburg Road, are subject to further planning studies, which are currently under way. Similarly, the final location of the Blair Creek Drive alignment and its intersection with Strasburg Road will be subject to a separate environmental assessment.

A roundabout screening was conducted for the new ‘T’-intersection at New Dundee Road and Strasburg Road to compare the roundabout option with the signalization option. The roundabout option has a slightly higher life-cycle cost than a signal control by a ratio of less than 1.05. Given the planning level of the analysis, this is not considered a significant difference and, as a result, the City may wish to consider implementing a roundabout at this intersection, so an Intersection Control Study is recommended. The Strasburg Road/New Dundee Preliminary Design scheme has been developed incorporating the roundabout option (refer to design plates in Appendix E).

Since New Dundee Road falls under the jurisdiction of the Region of Waterloo, the feasibility of implementing a roundabout at this intersection will be the subject of further discussions with the Region and will be considered in more detail. Final design details of this roundabout would need to be reviewed during the Detail Design phase. The implementation of a roundabout at New Dundee Road is also subject to Regional Municipality of Waterloo council approval (refer to commitments to additional investigations in the regard in Section 6.3.1).

Since the connection of Strasburg Road to New Dundee Road will result in increased traffic through the intersection of New Dundee Road and Cameron Road, some plan for mitigation of the existing substandard sight distances at the New Dundee Road/Cameron Road intersection should be agreed upon before opening of the Strasburg Road intersection at New Dundee Road.

5.1.2.2 Local Road Network Changes

Implementation of the Strasburg Road Extension will or may be accompanied by changes to local road network, including:

- the closure of Stauffer Drive between Tilt Drive and Reidel Drive as part of the Scenic Roads Community Trail Network (as described in Section 3.4.2);
• the anticipated closure of Reidel Drive to vehicular traffic between New Dundee Road and Blair Creek Drive (the implications of such a closure will be determined during the comparative assessment of alternatives as part of the Blair Creek Drive Extension Class EA study); and

• the possible closure of the south end of Caryndale Drive (approximately 400 m) associated with the LVH development proposal in that area.

These changes have been accounted for in determining property access requirements associated with the Preliminary Design scheme (refer to Section 5.1.6) and potential socio-economic effects of the proposed road design (refer to Section 5.2.6). Further assessment of these changes will be required, particularly in relation to the delivery of emergency response services.
Figure 5.1: Proposed Typical Cross-Section
5.1.3 Drainage and Stormwater Management

A Drainage and Stormwater Management Report has been prepared, and included in Appendix D.8. Key recommendations are summarized in this section.

5.1.3.1 Crossing Culverts and Ditches

Seven (7) new crossing culverts will be required under the proposed Strasburg Road Extension. In addition, two (2) crossing culverts will be constructed/extended as required under New Dundee Road. A preliminary sizing for the crossing culverts is included in Table 5.1 and the location of the culverts is shown on the design plates in Appendix E.

The preliminary design of the crossing culverts was based on the following criteria, where feasible:

- Provide 1.0 m freeboard under the 25-Year storm event, if feasible;
- No overtopping of Strasburg Road under the 100-Year storm event;
- Ensure that the proposed Strasburg Road works do not cause significant impacts on the existing flood elevations upstream or downstream of the road extension. The GRCA requires that the proposed flood elevations should be reduced or maintained compared to the existing flood elevations (based on the refined original hydraulic model).

Since the existing HEC-RAS model obtained from GRCA does not extend into the area of the proposed Strasburg Road Extension, it was decided to utilize the Culvert Master hydraulic model to calculate the preliminary culvert sizes. The final crossing culvert sizes/type and invert elevations will be determined during the Detail Design phase of the project.

### Table 5.1: Overview of the Recommended Crossing Structures

<table>
<thead>
<tr>
<th>Crossing Structure ID</th>
<th>Approx. Station</th>
<th>Flow Direction</th>
<th>Size (Mm)/Type</th>
<th>Approximate Catchment Area (Ha)</th>
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<tbody>
<tr>
<td>C1 (New Dundee)</td>
<td>0+305</td>
<td>North to South</td>
<td>600 CSP</td>
<td>5.30</td>
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<td>C2 (New Dundee)</td>
<td>0+500</td>
<td>North to South</td>
<td>525 CSP</td>
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<td>C3 (Strasburg)</td>
<td>8+020</td>
<td>East to West</td>
<td>610 x 960 Elliptical Concrete</td>
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<td>1.14</td>
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<td>C5 (Strasburg)</td>
<td>8+597</td>
<td>West to East</td>
<td>Twin 660 x 910 CSPA</td>
<td>12.17</td>
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<td>Twin 900 CSP</td>
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<td>10+467</td>
<td>Balancing Culvert</td>
<td>600 CSP</td>
<td></td>
</tr>
</tbody>
</table>

Ditches will be provided along the toe of slope in fill sections, where required, to convey overland sheet flows to the crossing culvert locations.

Interceptor ditches are proposed along the back of the boulevard in cut locations to ensure any overland sheet flows from the cut slopes do not flow over the proposed multi-use trail. These
Interceptor ditches will not be provided at sensitive locations, where land impacts are to be minimized.

5.1.3.2  Roadway/Pavement Drainage

The storm sewer systems draining the pavement for the proposed roadway configuration are to be designed in general to convey peak flows generated under the 10-Year storm event, while at sag points, the overland flow from the roadway will be captured and the sewer outlet as well as the catch basins at the sag points should be designed to convey peak flows generated under the 100-Year storm event. The major drainage system for the roadway is to be designed to convey overland flow to the adjacent watercourses via the roadway without flooding the adjacent properties. Table 5.2 summarizes the proposed storm sewer sections along the proposed road extension.

**Table 5.2: Proposed Storm Sewer System along the Proposed Strasburg Road Extension**

<table>
<thead>
<tr>
<th>Storm Sewer System ID</th>
<th>From Station</th>
<th>To Station</th>
<th>Drainage Area (Ha)</th>
<th>Preliminary Pipe Size Range (Mm)</th>
<th>Sewer Outlet Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>System 1a (Along New Dundee Road)</td>
<td>0+170</td>
<td>0+600</td>
<td>0.86</td>
<td>300-450</td>
<td>2 outlets located at Stations 0+300 and 0+340 (along New Dundee Road)</td>
</tr>
<tr>
<td>System 1b (Along Strasburg Road)</td>
<td>7+980</td>
<td>8+280</td>
<td>0.90</td>
<td>300-375</td>
<td>Connect to storm sewer along New Dundee Road</td>
</tr>
<tr>
<td>System 2</td>
<td>8+280</td>
<td>8+890</td>
<td>1.83</td>
<td>300-525</td>
<td>Station 8+590</td>
</tr>
<tr>
<td>System 3</td>
<td>8+890</td>
<td>10+180</td>
<td>3.86</td>
<td>300-750</td>
<td>Station 9+990</td>
</tr>
<tr>
<td>System 4</td>
<td>10+180</td>
<td>10+538</td>
<td>1.02</td>
<td>300-450</td>
<td>Connects to storm sewer network of Strasburg Road North Section</td>
</tr>
</tbody>
</table>

5.1.3.3  Stormwater Quantity Control

Catchment areas that are located within the Upper Blair Creek watershed require flow quantity control. Storage facilities will be designed to control post-development flow rates generated from the Strasburg Road Extension to match the target flow rates for different storm events, as identified in the Upper Blair Creek Functional Drainage Study Final Report (Stantec, March 2009).

Catchment areas that are located within the Strasburg Creek watershed require flow quantity control as well. Storage facilities will be designed to control post-development flow rates generated from the Strasburg Road Extension to match pre-development flow rates for different storm events.

A review of external SWM ponds was undertaken to establish the potential to retrofit these facilities to provide SWM control of roadway flows. However, it was concluded that these SWM ponds are located in areas that do not allow control/treatment of the Strasburg Road drainage.

In total, three (3) SWM ponds are recommended to be installed to achieve the flow quantity control targets. Since the catchment areas discharging to the proposed SWM ponds are smaller than 5 ha, further investigation will be required during the Detail Design phase of the project to ensure an efficient pond design and a sustainable permanent pool of water. A preliminary pond design was completed for each of the recommended SWM ponds that would serve the following road sections:
• Proposed 0.32 ha pond block (Pond 1) on the northwest corner of New Dundee Road and Strasburg Road Extension to serve the approximately 330 m of New Dundee Road, as well as Strasburg Road between Stations 7+980 and 8+280. Pond 1 will serve a catchment area of 1.76 ha and will discharge to the proposed crossing culvert C1. This culvert was identified during a site walk with GRCA staff and outlets to an existing natural depression south of New Dundee Road;

• Proposed 0.32 ha pond block (Pond 2) west of Strasburg Road at approximately Station 8+600 to service approximately 610 m of Strasburg Road from Station 8+280 to Station 8+890. Pond 2 will serve a catchment area of 1.83 ha and will discharge to the proposed crossing culvert C5; and

• Proposed 0.57 ha pond block (Pond 3) east of Strasburg Road at approximately Station 9+990 to service approximately 1,290 m of Strasburg Road from Station 8+890 to Station 10+180. Pond 3 will serve a catchment area of 3.86 ha and will discharge to the depression area located east of the Strasburg Road Extension at approximately Station 10+000.

It should be noted that the roadway section between Stations 10+180 and 10+538 does not require quantity control measures, as it was accounted for while completing Detail Design of the North Section of the Strasburg Road Extension.

5.1.3.4 Stormwater Quality Control

The Grand River Conservation Authority requires water quality controls commensurate with the maximum downstream habitat type; hence, Enhanced Protection (Level 1) is required for the entire study limits.

The stormwater management strategy related to water quality control is summarized as follows:

• Proposed 0.32 ha pond block (Pond 1) will provide Level 1 enhanced protection for New Dundee Road, as well as Strasburg Road between Stations 7+980 and 8+280.

• Proposed 0.32 ha pond block (Pond 2) will provide Level 1 enhanced protection for Strasburg Road between Stations 8+280 and 8+890.

• Proposed 0.57 ha pond block (Pond 3) will provide Level 1 enhanced protection for Strasburg Road between Stations 8+890 and 10+180.

• Strasburg Road between Stations 10+180 and 10+538 does not require quality control measures as it was accounted for while completing the Detail Design of the North Section of the Strasburg Road Extension.

It has to be noted that the recommended sizes of the aforementioned pond blocks were increased by 40% to account for the required infiltration cells that will be constructed as part of the pond design.

5.1.4 Municipal Services and Utilities

The City of Kitchener’s standard 30 m secondary arterial urban cross-section is proposed for the Strasburg Road Extension, matching into the same cross-section proposed for the road north of the Class EA study area, and will provide a standard location within the new road corridor for each utility, including Kitchener-Wilmot Hydro, Kitchener Gas, Bell, Rogers Cable, and Region of Waterloo watermain (see Section 5.1.7 for further discussion on the Region’s watermain).
Kitchener-Wilmot Hydro also provides roadway illumination, which will be required for the urban cross-section.

In addition, the City provides sanitary sewer and local watermain services, and may install this infrastructure along the new road corridor along the standard offset, if required.

5.1.5 Vegetative Screening and Buffering Plans

The normal complement of roadside plantings will be included in the roadway corridor, per City of Kitchener standards. In addition, two locations have been identified for requiring vegetative screen and buffering along the new road alignment. The house west of the proposed roundabout at the new Strasburg Road/New Dundee Road intersection requires tree and shrub planting as a buffer in the right-of-way limit to assist in mitigating aesthetic impacts, including protection from headlight glare. This will provide a visual screen of the new road and slope embankments from the property owner’s vantage point. The homestead to be protected is located on lands lower than the new roadway, requiring a full vegetative screening along the west side of the proposed road and roundabout right-of-way limit. Proposed plantings include a mix of both deciduous and coniferous trees, with areas of mass shrub planting. Possible species for consideration are: Sugar Maple, American Basswood, Red Oak, Quaking Aspen, Black Spruce, Eastern White Pine, Common Chokecherry, Snowberry and Staghorn Sumac.

The second location where vegetative buffering will be introduced is along the road segment immediately west of the woodlot at the west end of the Blair Creek corridor, including the hedgerows directly north of the woodlot. Treatment at this location will be implemented to protect the ecological functions of the woodlot and hedgerows. Shrub and tree planting along the road will assist new edge vegetation to establish and provide a buffer for the woodlot trees and hedgerows next to the proposed road alignment. Buffer planting to intercept salt spray should include native salt tolerant species such as Eastern Red Cedar, Staghorn Sumac, Snowberry and Common Elderberry. Additional plantings to consider include Chokecherry, Black Spruce, Sugar Maple, American Basswood and Eastern Hop-hornbeam. The conceptual buffer planting configurations are shown in Appendix E Design Plates.

5.1.6 Property Access

Planned and potential changes to the local road network in the vicinity of the Strasburg Road Extension are described in Section 5.1.2. These changes mean that existing access to properties at 500 Stauffer Drive and 271 Reidel Drive from the north will be restricted. Access to these properties from the south will still occur from Reidel Road and Stauffer Drive, but via future Blair Creek Drive, either from the east through the Doon South Community or from the west via New Dundee Road and Strasburg Road (as opposed to directly north on Reidel Road from New Dundee Road). Potential changes to the local road network, and related access to 500 Stauffer Drive and 271 Reidel Drive, will be addressed further during the Robert Ferrie Drive Extension planning study, the Blair Creek Drive environmental assessment, and the Strasburg Road Extension Detail Design phase. Until such time, existing access will be retained.

Field accesses will be introduced to maintain agricultural operations, and will be confirmed during Detail Design based on the requirements of the adjacent landowners and the agricultural operators working their lands (refer also to Section 5.2.6 Land Use).

5.1.7 Regional Watermain

The Region of Waterloo has undertaken investigations to update that 2009 water distribution optimization study for Pressure Zones Kit 2W and Kit 4, including determining a preferred route.
for the Regional Transmission Watermain through Doon South to Cambridge. The Region’s preferred route for the watermain was shown publicly at the April 24, 2013 Strasburg Road Extension PIC in relation to the road extension alternatives under consideration (refer to Appendix A5 in this ESR). The Region’s most recent study documentation provided to the Strasburg Road Extension Project Team (Technical Memorandum (“TM”) No. 1, June 21, 2013), which included a new comprehensive evaluation of other possible watermain alignments suggested by landowners in the area, confirmed the April 2013 preferred alignment for a 450 mm watermain (Alternative 1: Feedermain along Easterly Route), which is located in the Groh Drive corridor in Doon South Phase 2 and then runs easterly along the Blair Creek Drive corridor.

TM No. 1 also shows a ‘local watermain” situated in the Strasburg Road Extension TPA (Alignment W1) corridor from the north end of the Strasburg Road Extension Class EA study area to the possible future intersection of the Blair Creek Drive Extension, and from there easterly along the possible future Blair Creek Drive corridor into Zone Kit 4 to connect with the regional watermain at Groh Drive.

With the plans shown in TM No. 1, the Region is suggesting that Zone 4 in Doon South can be serviced by a 300 mm watermain using the Strasburg Road Extension corridor (including the Blair Creek Drive Extension west of Reidel Drive). Therefore, a 300 mm watermain has been included along the Strasburg Road Extension from the north limit of the Class EA study up to the assumed future intersection of Blair Creek Drive. It is assumed that the Blair Creek Drive Extension Class EA will include consideration of accommodating a watermain in the road right-of-way. It was originally intended that a 600 mm diameter watermain extend from the terminus of the future 600 mm watermain proposed north of the Strasburg Road Extension Class EA study area, southerly to the intersection of future Blair Creek Drive and Strasburg Road, and continue east along future Blair Creek Drive as a 450 mm diameter Regional watermain, as per OMB Approved plan 30T-08203. As such, the City will be discussing with the Region the proposed cost-sharing for the new watermain.

5.2 Potential Environmental Effects, Proposed Mitigation and Commitments to Further Work

The following sections of the ESR present a description of the potential environmental condition changes associated with Preliminary Design scheme; proposed environmental protection/mitigation measures to reduce or eliminate adverse effects; and commitments to additional investigations.

5.2.1 Fish and Fish Habitat

Alignment W1 is deemed the Technically Preferred Alignment and is the optimal crossing of the Blair Creek system as there are no permanent or intermittent watercourses that are directly crossed by this alignment.

While there is no in-water works proposed, the proposed works for the roadway could include other construction activities near receiving drainages/waterbodies, such as earth excavation/grading, excess material storage, equipment maintenance activities and wastewater management, which may result in indirect impacts to Blair Creek if the appropriate protection measures are not implemented. Potential effects include impairment of water quality, and fish kills or destruction of habitat due to spills (e.g., chemical or sediment) resulting in short term population decline.

Potential effects to fish and fish habitat that are applicable to the proposed works include:
• Discharge of sediment to a drainage/watercourse from earth/spoil stockpiles, grading and excavation activities associated with the road, resulting in the impairment of water quality and/or physical damage to habitat;

• Release of fuel, oil, grease contaminants from mobile equipment resulting in unacceptable contaminant concentrations in the receiving watercourse/waterbody;

• Change to sensitive life stages/process (i.e., spawning) if near-water works are not timed appropriately.

As there are no watercourses that will be crossed directly, the potential for impacts to fish habitat is considered to be low.

Recommended environmental design and construction mitigation measures to avoid and/or minimize potential impacts to the aquatic environment and surface water for consideration in future phases of the project include:

• Design and implement an appropriate Erosion and Sediment Control Plan (ESCP) for both the construction and operations phases to prevent erosion of exposed soils and delivery of sediment to the drainages contributing baseflow to Blair Creek in accordance with GRCA’s best practice requirements, including:
  o Limiting the size and duration of disturbed areas (practise 3Rs – retain, reduce, revegetate), including conducting work in a continuous fashion to minimize the duration of potential impacts and limiting the area of disturbance to a manageable area, and stabilization/re-vegetation of exposed soils immediately following construction;
  o Identification of, and appropriate phasing of work in, critical and non-critical management areas;
  o Appropriate seasonal controls, including winter shutdown protection, as required;
  o Strategic use of vegetation buffers between work areas and natural areas (i.e., at west end of Blair Creek corridor).

• During construction, install and maintain the most appropriate erosion and sediment control measures for the work area, such as straw bale flow checks, heavy duty silt fence barriers, and temporary rock flow checks, to prevent erosion of exposed soils and migration of sediment to watercourses. Routinely inspect sediment and erosion control structures, including after storms, and repair as required. The structures will be cleaned out when accumulated sediment reaches half the design height.

• If required, implement timing restrictions during construction for near-water work to protect sensitive life stages of fish, as identified by MNR (coldwater – in-stream window July 1 to September 15).

• Store, handle and dispose of all excess materials in a manner that prevents their entry to drainages/watercourses.

• Operate, maintain and store all equipment and materials (e.g., fuel, lubricants) in a manner that prevents the entry of any deleterious substances to drainages/watercourses.
• Design permanent drainage and stormwater management systems to mimic overland drainage patterns and control/maintain runoff quality/quantity contribution to watercourse features.

• Store, handle and dispose of all excess materials by storing, handling and disposing of all materials generated during site preparation, construction and operations to prevent their entry into watercourses.
  o Place temporary stockpiles of material a minimum of 30 m away from watercourses and ensure material is stabilized to prevent sediment laden runoff from entry into watercourses.
  o Prepare a spill/emergency response plan for construction and operations.

• Equipment re-fuelling will take place no closer than 30 m from any watercourse to prevent water contamination due to accidental fuel spills.

• Manage dewatering and concrete effluent, where applicable, from excavations to prevent release of contaminated water to receiving watercourses.
  o Direct dewatering effluent to temporary settling basins, filter bags and energy discharge diffusers, as required.
  o Capture and transport concrete effluent off-site for disposal.

• Prohibit/limit construction access to watercourses/watercourse banks.

An environmental monitoring plan to assess pre-construction conditions and the mitigation measures for protection of aquatic and surface water resources will be prepared in future phases of the project. A groundwater and surface water monitoring program will be developed to the satisfaction of the City, GRCA and the Region with a minimum of 2 years pre-construction monitoring.

Monitoring during construction is anticipated to focus on:

• Routine inspections of temporary erosion and sediment control measures to ensure they are operating effectively to prevent any release of sediment-laden runoff to Blair Creek.

• Monitoring of treatment systems for any dewatering and/or concrete effluent to avoid any release of contaminated water to receiving watercourses.

• Compliance monitoring of best management practices related to refuelling and excess materials storage and handling.

5.2.2 Vegetation Communities

The Technically Preferred Alignment (TPA) for the extension of Strasburg Road from north of Stauffer Drive to New Dundee Road will have impacts to culturally impacted vegetation communities present within the study area. However, it passes to the west of the existing natural communities (forest and wetlands) associated with the woodlot and Blair Creek corridor, including the PSW, and avoids removals for these communities.

Removals have been categorized by cultural vegetation communities (meadows, thickets, plantations, woodlots), forest vegetation communities, and hedgerows.
The principal direct impact consists of the removals associated with construction. For the TPA, this will result in 0.86 ha of vegetation removals, consisting of 0.33 ha of cultural vegetation and 0.53 ha of hedgerow.

The cultural vegetation removals are of limited ecological significance due to the previously disturbed nature of the communities. Hedgerow removals are of minor significance from a vegetation standpoint due to the general absence of significant trees.

In order to minimize the potential for negative impacts to vegetation communities along the new Strasburg Road Extension, the following general mitigation measures are recommended:

- Design and implement an appropriate ESCP, as described in Section 5.2.1.
- Re-stabilize and re-vegetate exposed surfaces as soon as possible, using native vegetation seed mixes and plantings (as per design drawings).
- Clearly delineate vegetation clearing (grading and working easement) limits on both construction drawings and in the field, and confirm with the Contractor in the field prior to clearing and grading. Equipment storage/maintenance, materials stockpiling and other construction activities will not be permitted in these zones.
- Prepare and implement a Vegetation Management/Tree Protection Plan. Vegetation that does not require removal for the purposes of the construction will be protected through the installation and maintenance of temporary vegetation protection measures (e.g., temporary fencing).
- Trees to be removed will be felled into the construction zone (and away from other, protected vegetation) to avoid disturbance to vegetation not scheduled for removal.
- Vegetation grubbing will be restricted to the required activity zone. Where possible, tree stumps will be cut flush to the ground and grubbing will be avoided to minimize soil disturbance, particularly in erosion prone areas.
- Cut and grubbed material will be disposed of through chipping. Where possible, cut material may be piled and re-used for wildlife habitat or in edge treatments. This material will help retain soil moisture and prevent weed spread.
- Undertake tree management activities as required for both driver safety and health of the balance of vegetation units that will be encroached on (i.e., removal of hazard trees within a defined Hazard Zone on the new edge of the unit). The edges of cleared areas will be specifically reviewed and damaged trees will be checked and treated, or removed. Hazard and windthrow susceptible trees will be identified and removed. These provisions relate to the directly affected hedgerows (no forest edges are directly affected).
- Unnecessary traffic, dumping and storage of materials over tree roots will be avoided. As outlined for aquatic resources above, the contractor will develop an appropriate product handling; spills prevention and management plan prior to construction that will be in place on site, along with required equipment and materials throughout construction. All spills will be immediately controlled and reported to the authorities having jurisdiction and the City's representative (Contract Administrator – refer to Section 6.2 Monitoring). Vehicle maintenance and refuelling will be carried out at the maintenance areas in the works yards or at commercial garages, whenever possible. Refuelling should not be permitted within 30 m of any forest, wetland or watercourse, or the top-of-bank areas.
5.2.3 Wildlife

Impacts to wildlife habitat and communities are categorized as short term construction related impacts, and long term operational related impacts.

Short term or construction related impacts are anticipated as a result of grading, vegetation removal, installation of roads and associated structures, equipment/vehicle movement and general construction activity. The majority of these impacts are predicted where construction occurs within or in close proximity to existing habitat, linkages, or corridors.

Proposed mitigation includes minimizing the construction footprint and extent of habitat removed; the implementation of construction limits (defined on plan, and physical demarcation in the field); installation of erosion and sediment control fencing; adherence to timing windows; and oversight by an environmental monitor to ensure mitigation is working effectively. It is anticipated that the construction footprint will be refined during Detail Design through the completion of site-specific field studies.

Proposed mitigation should, at minimum, include:

- Ensure that silt/sediment control fencing is installed to adequately prevent the overland transport of silt and sediment into habitat to be retained (both terrestrial and aquatic).
- Restore disturbed areas immediately after construction with native and non-invasive species.
- Adhere to timing windows as per the Migratory Bird Convention Act (MBCA) and for other sensitive wildlife periods, such as amphibian breeding/migration. Adherence to MBCA timing windows and timing windows for sensitive amphibian breeding/movement periods for the removal of vegetation and for works in close proximity to retained habitat will serve to prevent disruptions to breeding individuals, nests, eggs and fledglings that may be in close proximity to the construction area.
- Clearly delineate/mark construction area and ensure that no accidental encroachment occurs into natural areas.
- Retain an on-site environmental monitor who is trained for site-specific occurrences of potential SAR or other wildlife species to provide timely responses to any problems related to impacts to wildlife.

The Migratory Birds Convention Act bans persons from disturbing, destroying or taking a nest, egg, or nest shelter of a migratory bird and bans all activities that are harmful to migratory birds, their eggs or their nests. In this regard, all tree removal, vegetation clearing and disturbance should not be undertaken during bird nesting season. Typically this occurs in mid-May and may extend until the end of July, and in some cases, into August. If vegetation clearing during the nesting season is unavoidable, it should be preceded by a nest survey to confirm that active nests will not be affected and a vegetation buffer must be retained around each active nest. Further, if any clearing during the breeding bird season is proposed, it is recommended that consultation with the Canadian Wildlife Service occur in order to ensure a project is in compliance with the MBCA.

Long term or operations related impacts are also expected to include indirect effects that occur in areas adjacent to the road footprint. Operations effects include the potential for a ‘barrier effect’ created by the new road crossing of or a reduced connectivity of the natural heritage system, potential increase for animal-vehicle conflicts, wildlife habitat degradation or indirect
habitat impacts (salt spray, noise, light, litter, etc.), and the potential for cumulative effects as a result of other development proposed in the project area.

Potential mitigation measures to reduce such impacts include:

1. Educate drivers regarding the potential for wildlife in the area (e.g., wildlife crossing signs). Measures to maintain connectivity or include potential wildlife crossing signage in a north to south direction across the larger landscape (currently under agricultural use) should be considered, as large mammals (deer, coyote) are known to move through this area as part of their local range.

2. Ensure new vegetation community edges and/or roadside edges are planted with species that will serve to buffer the interior habitats from salt spray.

3. Develop a salt management plan for sensitive areas.

4. Minimize area of disturbance by selection of the shortest crossing of the natural heritage system, thereby minimizing the extent of indirect habitat/edge habitat degradation (this is currently built into the proposed TPA).

5. Restore vegetation community edges and disturbed areas with native and non-invasive vegetation species.

6. Limit mowing and herbicide applications at roadsides.

7. Manage stormwater drainage to provide treatment and maintenance of flow patterns to avoid sedimentation and erosion in retained vegetation communities and aquatic habitat.

8. Use directional lighting and design the roadway to minimize noise and vibration.

9. Ensure pre-development surface and groundwater drainage patterns are retained, particularly where wetlands, vernal pools and other natural features that contain features or functions sensitive to water level fluctuations/hydroperiods may be affected.

10. Protect, restore and create new habitat where feasible.

11. Development of a stewardship plan for preservation of adjacent natural heritage areas.

Jefferson Salamander Habitat – the proposed Strasburg Road Extension alignment avoids direct encroachment on Jefferson Salamander habitat regulated by the Ministry of Natural Resources by circumventing it to the west. MNR has requested that the project proposals also demonstrate best efforts in avoiding indirect impacts on the regulated area. This will be achieved through implementation of the mitigation measures above that are oriented to avoiding/minimizing indirect effects by maintaining wetlands, woodlots, hydrologic regimes and water quality in the regulated areas east of the proposed Strasburg Road Extension alignment. As a result, the need for a permit under the Endangered Species Act, 2007 for this species may be avoided (subject to screening by the MNR during the Detail Design phase).

Proposed mitigation will be incorporated in future project phases, as outlined above, for all wildlife species. However, any mitigation specific to Species at Risk will be developed in consultation with the MNR. Cumulative effects on wildlife habitat and communities are anticipated in areas where future development will abut the identified buffers/setbacks to the communities in combination with the road operational effects. Cumulative effects are difficult to identify at this time, based on uncertainties as to retention of the Countryside Line at its current...
location. Notwithstanding, the TPA minimizes impacts on the most sensitive habitat in the project area, and avoids direct impacts to the regulated Jefferson Salamander habitat. To minimize the road effects in a long term development scenario, the mitigation recommendations herein are intended to maintain connectivity, prevent a barrier effect, and to minimize indirect habitat decline. Any further development plans (including the potential for residential or other development) will need to be screened by the Ministry of Natural Resources to ensure protection of the SAR habitat and would be required to adhere to the Endangered Species Act.

Further work commitments include monitoring of the mitigation measures during the operations phase for effectiveness, and for an adaptive response (refer also to Section 6.2 Monitoring). This is recommended for effectiveness of edge or salt management plans and the health of retained wildlife habitat and communities (which may be assessed through vegetation community monitoring or other monitoring tools). Effectiveness monitoring should also serve to direct and inform any stewardship activities.

5.2.4 Groundwater

The lands west of Reidel Drive have been identified as Regional Recharge Areas and are important in terms of providing recharge to the Strasburg and Ayr wells and contributing baseflow to Blair Creek.

Although the Region has no immediate plans to develop additional groundwater supplies in this area, it remains a target area for future water supply with respect to the Long Term Water Strategy. Therefore, the groundwater resources in the area also require consideration for protection for this reason.

As a result, and following review of the study area data, potential impacts to groundwater quality and quantity associated with the project have been identified, as follows:

- Development can restrict recharge to the underlying aquifer systems, which can result in a reduction of groundwater flows to municipal water supply wells and local baseflow to Blair Creek.

- The long term cumulative loading of road salt could have consequences for water quality in the underlying aquifers. This not only has the potential to impact existing groundwater users and the surface water quality of the Blair Creek drainage system, but could affect a future potential water supply option for the Region.

The selected TPA is has been designed to avoid intersecting wetland areas, which are deemed the most sensitive local recharge/discharge areas within the study area. Minor water interception issues may be associated with the identified recharge area and ultimately with discharge to Blair Creek, although no significant concerns are anticipated. The regional level aquifers are not identified as being directly connected to the shallow overburden, although areas where the aquitard is thin or discontinuous may be present.

It is understood that the existing farm pond at 500 Stauffer Drive is spring-fed and is likely hydraulically connected to the owner’s personal supply well via the shallow aquifer. This is consistent with MOE water well records that identify a shallow overburden well in the area. As the TPA does not pass in close proximity to this well, it is not considered at risk due to the project.

While the area crossed by the new roadway is a mixed recharge/discharge zone, the majority of impacts would be expected to discharge into Blair Creek and the PSW, with a small portion of impacted surface water also infiltrating on a seasonal basis to the upper groundwater.
thickness and types of overburden between the surface and regional bedrock aquifer are such that direct impacts to the bedrock are unlikely.

It is understood that salt spray from vehicle movement in the road corridor can be expected to extend up to 30 m either side of the roadway. This may result in some limited salt loading for the headwaters for Blair Creek, in particular the forest community, depending upon prevailing winds, which are typically towards these receivers (from the northwest) during the winter months. A more important issue would be management of road run-off during melt periods to ensure that it is not directed to an infiltration zone that is directly hydraulically connected to the wetland or creek. This has been addressed through the Drainage and Stormwater Management plan (refer to Section 5.1.3), as runoff from the paved surface of the road will be directed into stormwater management ponds (or grassed ditches in the case runoff to the New Dundee Road corridor) that will be designed to minimize impacts, as appropriate.

Mitigation measures include minimizing the use of low permeability cover within the recharge zone. The additional impervious surface represented by the Strasburg Road Extension itself is relatively small (3.84 ha22) (<1% of the total study area). Therefore, this will not significantly affect the overall groundwater recharge capacity of the area. Further, salt loading will be controlled in accordance with the Region of Waterloo’s reasonable use criteria, including application of the Region’s Screening Criteria for Salt Management during design of the roadway and stormwater management plan.

During construction, environmental protection and mitigation to protect groundwater resources will include implementation of standard construction practices, conformance with MOE requirements identified/prescribed during the Detail Design permitting process (should a Permit to Take Water be required), and additional control measures that may be identified through the initiation of site-specific adaptive management assessments in the field.

Measures will be incorporated to ensure that any groundwater encountered during construction is maintained, filtered, and released will be implemented in general accordance with OPSS 518. Groundwater quality protection also translates into ensuring that proper spills management procedures are in place during construction (and during operation).

With respect to post-construction monitoring, it is suggested that, as there are no anticipated impacts to water supply wells, and no creek crossings are to be incorporated, monitoring of shallow groundwater wells should not be necessary. However, given the high profile of this project within the community, consideration should be given to obtaining pre-construction water quality and quantity baseline information for potable water sources at 500 Stauffer Drive and 271 Reidel Drive; developing/implementing a construction phase Complaint Protocol in response to water well quantity/quality concerns; and engaging in appropriate environmental groundwater effects monitoring after construction at these locations to ensure that there are no adverse impacts attributable to the project.

If impacts to the residential wells are noted, typical mitigation would be the decommissioning of the existing shallow wells and re-installation of newer ones screened in the bedrock aquifer by licensed well drillers in accordance with provincial regulations. It is noted that this would also result in a reduction of risk for other potential drinking water quality impacts unrelated to the roadworks (i.e., agricultural impacts, microbiological impacts).

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22 Excludes Robert Ferrie Drive and Blair Creek Drive impervious surfaces.
5.2.5 Contaminated Property

Although no evidence was noted during the site inspections and data review that contaminated sources are present within the preferred alignment, it is possible that fuel tanks (underground and/or above ground) could be present, or were formerly present, at the older properties such as the three farms located on Stauffer Drive, Reidel Drive and New Dundee Road.

While the potential for adverse environmental impacts within the study area is considered low, no further environmental work is recommended at this time, as the TPA for the Strasburg Road Extension does not encroach on the developed areas of the farm properties. If the design alignment ultimately does change, such that it is located in closer proximity to the developed portions of the rural properties, Phase I ESAs should be conducted as part of the Detail Design works to confirm the lack of potential contaminated sources.

5.2.6 Land Use

Existing Land Use

The proposed alignment, including adjacent stormwater management facilities, will displace 11.2 ha of prime (Class 1-3) agricultural land and create severances of the property at 500 Stauffer Drive and the Activa lands west of Reidel Drive. The severances will affect farming operations on these parcels with respect to internal access/circulation. In addition, external access to these lands will be affected by the following possible changes to the local road network described in Section 5.1:

- The anticipated closure of Reidel Drive to vehicular traffic between New Dundee Road and Blair Creek Drive;
- The possible closure of the south end of Caryndale Drive (approximately 400 m); and
- The closure of Stauffer Drive between Tilt Drive and Reidel Drive as part of the Scenic Roads Community Trail Network.

Access for agricultural operations on the Grambian/Stonefield lands (west side of Reidel) may also be affected by the closure of Reidel Drive at New Dundee Drive.

SLI has consulted the two farm operators who currently provide custom planting and harvesting services on the lands under consideration (Mark Hermann – 500 Stauffer Drive lands, except northwest corner; Brian Domm Farms Ltd. – Activa and Stonefield lands, plus northwest corner of 500 Stauffer Drive) to discuss potential effects/constraints and possible alternative access provisions.

Farm at 500 Stauffer Drive – Part of the farm will be severed from the main buildings and primary access. The roadway will require acquisition of 0.7 ha; and a 6.1 ha parcel will remain in the northwest corner of the property. Both the remainder (west) and the main (east) farm parcels are considered to be viable operating units in terms of size and configuration. The agricultural fields at 500 Stauffer Drive are currently accessed via Reidel Drive to a single access point on Stauffer Drive west of the main driveway to the property; all fields on the property are then accessed via internal circulation routes.

Land tillage and planting and spraying of crops are done in April and May annually. Crop harvesting and subsequent discing of the land are done in October and November. The widest pieces of equipment travelling to site (east farm) on the road network are the planter and combine (4.9 m); the 10.7 m wide header is transported to site, mounted there, and moved via
internal circulation routes. Forty-foot long double trailer loads are moved off the site during harvesting.

The existing main access can be retained with the proposed changes to the local road network, but some travel along Strasburg Road and Blair Creek Drive will be required. The land severed is actually farmed by the operator working the Activa lands to the west, so the operator working the east part of the farm will not experience disruption to internal circulation routes (i.e., will not have to cross Strasburg Road to the west farm). New Strasburg Road could also accommodate the movement of agricultural equipment to this site, with the equipment generally occupying two lanes, but this is a less desirable option from traffic operations and safety perspectives. If this access route is used, a field entrance would require an appropriately sized break in the concrete curb (recommended 25 - 30 ft/7.6 - 9.1 m).

**Activa Lands** – The roadway, including adjacent stormwater management facilities, will require 10.5 ha from the Activa holdings west of Reidel Drive. These lands will be severed into three parcels by the Strasburg Road Extension – 60.2 ha and 26.8 ha parcels to the west and a 36.1 ha parcel to the east of the road.

The existing access to the Activa lands at the west end of Stauffer Drive (east remainder parcel) can be retained with the proposed changes to the local road network, except that some travel along New Dundee Road, Strasburg Road and Blair Creek Drive will be required (current access is via Roseville Road-Cameron Road-Reidel Drive-Stauffer Drive). Access to the Activa lands west of Strasburg Road from the west, via Fischer-Hallman Road, is not practical. Strasburg Road will accommodate the movement of agricultural equipment to these Activa lands, with the equipment generally occupying two lanes, but this is not desirable from the operator’s perspective. The recommended alternative involves installing field entrances and moving between the east and west farms by crossing Strasburg Road. Access to the southern parcel on the west side is also possible from New Dundee Road, but this is also not desirable from traffic operations and safety perspectives, since New Dundee Road will be serving larger volumes of traffic than Strasburg Road.

Movement of agricultural equipment will occur over most of the farming season (spring-summer-fall) on an annual basis, since crops include winter wheat that is harvested in mid-summer. The equipment used on this site is larger than that used at the 500 Stauffer Drive farm (6.9 m wide combine; 15.9 m long transport trailers for crop movement; 23.2 m long combine/header transported to site, with 12.2 m wide header mounted at site), and field entrances should be designed accordingly. This would involve placing the field entrances directly opposite each other on the longest tangent section available and providing 7.6 m and 15.2 m breaks in the curb and fence lines respectively. The fence lines can be secured using cable equipped with a padlock and appropriately marked with flagging.

**Grambian/Stonefield Lands** – The triangular portion of the Grambian/Stonefield lands immediately southwest of the existing Reidel Drive and Stauffer Drive intersection is currently accessed via Reidel Drive, opposite the access to the Activa lands on the east side of Reidel. Access to the main farm parcel south of Blair Creek is via a field entrance north of 271 Reidel Drive. These accesses should remain intact with the proposed local road network. New field accesses will be required to cross Strasburg Road from the Grambian/Stonefield lands to the Activa lands west of Strasburg Road, unless access to the Activa parcel is available around Strasburg Road at the northwest periphery.

Figure 5.2 illustrates the severed parcels, as well as the existing and potential future field entrance locations.
Figure 5.2: Existing and Potential Agricultural Field Entrance Locations
Residence/Bed & Breakfast at 500 Stauffer Drive – Existing vehicular access to the residence and B&B operation at 500 Stauffer Drive via local roads will be altered through the closure of the south end of Caryndale Drive, Stauffer Drive between Tilt Drive and Reidel Drive, and Reidel Drive between New Dundee and Blair Creek Drive. The existing access point to the property will be maintained, but network access will only be available from the south, via New Dundee Road-Strasburg Road-future Blair Creek Drive-Reidel Drive. The existing driveway will not be altered. City staff have assessed this route as being adequate for delivery of emergency services.

The B&B and house are not expected to experience significant adverse effects (aesthetics/visual intrusion and increased noise levels) due to the proximity of the new roadway, which is approximately 485 m from the house at its closest point, and screening provided by local topography. The roadway is generally not within the viewshed of the most sensitive areas of the property, and the forecast noise increase will not be perceptible (1 dBA increase in future daytime (0700h – 2300h) equivalent sound levels (16hr L eq) – refer to Section 5.2.7 of this ESR).

Residence at 271 Reidel Drive – Vehicular access to the tenant occupied residence at 271 Reidel Drive will be modified with the closure of Reidel Drive between Blair Creek Drive and New Dundee Road. Access to the house will be maintained in the same manner as that described for 500 Stauffer Drive.

Further assessment of the changes to the local road network will be required, particularly in relation to the delivery of emergency response services to 500 Stauffer Drive and 271 Reidel Drive.

Communities

The Strasburg Road Extension in the City of Kitchener Municipal Plan has been used to define the western boundary of the Doon South Community, and planning for the community to date has been premised on that alignment, with provisions for adopting the alignment emerging from this Class EA study. The alignment proposed in this study differs from that shown in the Municipal Plan, and has the potential to redefine the Doon South Community boundary, by relocating it to the west, onto lands currently designated for agricultural uses by the City and the Region of Waterloo. The proposed alignment may also influence redefinition of the Countryside Line and the Brigadoon Community Plan north of Stauffer Drive.

The redefinition of community boundaries is outside the scope of this EA study. However, the proposed Strasburg Road alignment may become a consideration in OMB deliberations regarding the Regional Official Plan appeal and future land use decisions, which are also outside the scope of this EA.

5.2.7 Noise

The Technically Preferred Alignment is a slightly modified Alignment W1. The traffic volumes for the TPA are similar to those for Alternative W1 in Table 1 of Appendix D.4. Changes of at least 20% in traffic volumes are required for a 1dB change in the sound level, so minor future deviations in traffic volumes will not affect the results of this analysis.

Table 5.3, below, summarizes the sound level increases that can be expected as a result of the implementing the TPA. The Points of Reception (POR) are shown in Figure 3.14.
Table 5.3: Technically Preferred Alignment Sound Levels and Impacts Summary

<table>
<thead>
<tr>
<th>Point of Reception</th>
<th>Guideline Sound Level (dB Leq)</th>
<th>With Project Sound Level (dB Leq)</th>
<th>Impact (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POR1 – Hearthwood Drive</td>
<td>45</td>
<td>43</td>
<td>0</td>
</tr>
<tr>
<td>POR2 – 500 Stauffer Drive</td>
<td>45</td>
<td>46</td>
<td>1</td>
</tr>
<tr>
<td>POR3 – 271 Reidel Drive</td>
<td>45</td>
<td>47</td>
<td>2</td>
</tr>
<tr>
<td>POR4 – Cameron Road</td>
<td>55</td>
<td>60</td>
<td>5</td>
</tr>
<tr>
<td>POR5 – New Dundee Road</td>
<td>57</td>
<td>60</td>
<td>3</td>
</tr>
</tbody>
</table>

As the technically-preferred alignment does not itself generate a 5 dB impact at any of the receptors evaluated, noise control measures are not warranted. The design of Strasburg Road can continue without the consideration of noise control measures.

Construction Noise Review

The MOE and other agencies and municipalities in Ontario do not place receiver based restrictions on construction noise. Instead, all construction equipment used should adhere to the source-based guidelines as published by MOE in its publication NPC-115 “Construction Equipment”.

Chapter 450, Article 6 of the City of Kitchener’s Municipal Code restricts construction activity from 7:00PM one day to 7:00AM the next day. If construction activity is expected to occur outside of these prescribed periods, a bylaw exemption will be required.

Blasting is not expected to be required for the construction of this roadway and so particularly high vibration levels are not expected during construction.

5.2.8 Air Quality

The assessment of air quality impacts associated with the Technically Preferred Alignment was conducted by RWDI AIR Inc. and used dispersion modelling techniques to predict local air quality conditions at sensitive receptor locations near the project area. The air quality contaminants that have been assessed are identified in Section 3.4.4 Air Quality.

The assessment considered the impact of future contributions of the project to the local air quality in the study area. Future changes in emissions will be the result of both added traffic capacity due to the new connecting road, along with regulated improvements in vehicle exhaust emissions and gradual change over of the fleet, as older vehicles are replaced by newer, lower-emission vehicles. The details of the impact assessment are included in Appendix D.5 of this ESR.

The Strasburg Road Extension project area is currently a rural-use area, but the area is shown in the City of Kitchener’s Growth Management Plan to have areas with proposed subdivisions waiting for approval surrounding it. There are also several existing residences located close to the project area. A total of 5 discrete receptors (representing the existing residences) and 10 profile receptors (intended to represent future receptors) were modelled in this study to determine the future impacts to air quality of the project.
Table 5.4 presents the maximum predicted cumulative concentrations of the contaminants of interest for the Strasburg Road Extension. The cumulative concentrations, for all modelled contaminants and averaging periods, were less than their respective thresholds. Although the maximum predicted PM$_{10}$ concentration was approaching its respective threshold, the portion due to the proposed undertaking was much less than the ambient background concentration, which was estimated from the published PM$_{2.5}$/PM$_{10}$ due to the unavailability of actual monitoring data. The only other exception is benzene over an annual averaging period, and this is the result of a background concentration that already exceeds the threshold, as the predicted contribution from the project to the overall cumulative concentration (background plus predicted impact) is very small (<1.1%).
### Table 5.4: Maximum Predicted Concentrations ($\mu g/m^3$) for the 2031 Future-Build Scenario

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Averaging Period</th>
<th>Most Impacted Receiver</th>
<th>Predicted Conc.</th>
<th>Background Conc.[1]</th>
<th>Combined Conc.</th>
<th>Threshold</th>
<th>Source of Threshold Value</th>
<th>% of Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>1 hr</td>
<td>R4</td>
<td>410</td>
<td>434</td>
<td>844</td>
<td>36,200</td>
<td>AAQC</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>8 hr</td>
<td>R4</td>
<td>229</td>
<td>434</td>
<td>663</td>
<td>15,700</td>
<td>AAQC</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>1 hr</td>
<td>R4</td>
<td>111</td>
<td>43.2</td>
<td>154.2</td>
<td>400</td>
<td>AAQC</td>
<td>39%</td>
</tr>
<tr>
<td>NO₂</td>
<td>24 hr</td>
<td>R4</td>
<td>11.5</td>
<td>43.2</td>
<td>54.7</td>
<td>200</td>
<td>AAQC</td>
<td>27%</td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>24 hr</td>
<td>R3</td>
<td>2.1</td>
<td>17.2</td>
<td>19.3</td>
<td>30</td>
<td>CWS</td>
<td>64%</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>24 hr</td>
<td>R3</td>
<td>6.74</td>
<td>32</td>
<td>38.7</td>
<td>50</td>
<td>AAQC</td>
<td>77%</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>24 hr</td>
<td>R4</td>
<td>0.03</td>
<td>5.20</td>
<td>5.23</td>
<td>65</td>
<td>AAQC</td>
<td>8%</td>
</tr>
<tr>
<td>Acetaldehyde</td>
<td>24 hr</td>
<td>R4</td>
<td>0.02</td>
<td>2.55</td>
<td>2.57</td>
<td>500</td>
<td>AAQC</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>30 min</td>
<td>R4</td>
<td>0.28</td>
<td>7.54</td>
<td>7.82</td>
<td>500</td>
<td>AAQC</td>
<td>1.6%</td>
</tr>
<tr>
<td>Benzene</td>
<td>Annual</td>
<td>R3</td>
<td>0.015</td>
<td>1.35</td>
<td>1.37</td>
<td>0.45</td>
<td>AAQC</td>
<td>304%</td>
</tr>
<tr>
<td>1,3-Butadiene</td>
<td>Annual</td>
<td>R3</td>
<td>0.0028</td>
<td>0.1250</td>
<td>0.1278</td>
<td>2</td>
<td>AAQC</td>
<td>6.4%</td>
</tr>
<tr>
<td>Acrolein</td>
<td>24 hr</td>
<td>R4</td>
<td>0.0017</td>
<td>0.1190</td>
<td>0.1207</td>
<td>0.4</td>
<td>AAQC</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>1 hr</td>
<td>R4</td>
<td>0.0164</td>
<td>0.1190</td>
<td>0.1354</td>
<td>4.5</td>
<td>AAQC</td>
<td>3%</td>
</tr>
</tbody>
</table>

Note:
[1] 1-hr, ½-hour, and 24-hour background concentrations were based on mean 90th percentile values over the most recent available 5-year period. Annual background values used 24-hour background concentrations as a conservative approach where annual data were not available.

[2] 8-hr predicted CO concentration is calculated from 1-hr predicted concentration using a published conversion factor (Ontario Regulation 419/05, 17(1)). 8-Hr CO background value 1-Hour CO value as a conservative approach as 8-Hour CO data was not available.

[3] 30-minute acetaldehyde concentration is calculated from 1-hr predicted concentration using a published conversion factor (Ontario Regulation 419/05, 17(1)).

Construction phase impacts were not included in the dispersion modelling analysis, but were addressed qualitatively in the assessment. It is recommended that, in order to minimize potential air quality impacts during construction, the construction tendering process should include requirements for implementation of an emissions management plan.

Overall, it is expected that the proposed project will not cause any air quality thresholds to be exceeded.

#### 5.2.9 Built Heritage Features

No buildings or significant landscape features will be removed as a direct result of construction of the Technically Preferred Alignment. It is expected that the identified cultural heritage resources can be conserved provided that appropriate follow-up studies, which includes photographic documentation, are undertaken during detailed planning for the technically preferred alignment and in advance of construction.

The following table (Table 5.5) will consider the impacts of the TPA on identified cultural heritage resources, based on the Ministry of Tourism and Culture document entitled Screening for Impacts to Built Heritage and Cultural Heritage Landscapes (September 2010):
## Table 5.5: Analysis of Impacts of the TPA on Identified Cultural Heritage Resources

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description of Potential Impacts</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHL 1 Farm Complex</strong></td>
<td>The farmhouse, outbuildings, agricultural landscape and associated character-defining attributes at 271 Reidel Drive will not be impacted by this alignment.</td>
<td>No further recommendations.</td>
</tr>
</tbody>
</table>
| **CHL 2 Farm Complex**   | The farmhouse and outbuildings at 500 Stauffer Drive and associated character-defining elements will not be negatively impacted by this alignment. However, the alignment will negatively impact the following heritage attribute through disruption:  
  - The cultivated fields, including their rolling topography.                                                                                                                                              | The identified impacts to CHL 2, a designated heritage resource, will not compromise the overall heritage integrity and character of this resource.  
While the TPA will be disrupting the cultivated fields, it should be noted that the TPA has been refined to cross part of the northwest corner of the property at the narrowest section of the property.  
As a result, land to be taken from CHL 2 is minimized, resulting in overall minimal disruption to the property. To mitigate this impact, photographic documentation of the fields is recommended. |
| **CHL 3 Roadscape**      | This scenic-heritage road and associated heritage attributes will not be negatively impacted by this alignment.                                                                                                                                                                        | No further recommendations.                                                                                                                                                                                                                                           |
| **CHL 4 Roadscape**      | This scenic-heritage road and associated heritage attributes will not be negatively impacted by this alignment.                                                                                                                                                                        | No further recommendations.                                                                                                                                                                                                                                           |
| **CHL 5 Roadscape**      | This scenic-heritage road and associated heritage attributes will not be negatively impacted by this alignment.                                                                                                                                                                        | No further recommendations.                                                                                                                                                                                                                                           |
| **CHL 6 Roadscape**      | This scenic-heritage road and associated heritage attributes will not be negatively impacted by this alignment.                                                                                                                                                                        | No further recommendations.                                                                                                                                                                                                                                           |
Table 5.2.10

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description of Potential Impacts</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHL 7</td>
<td>This alignment will negatively impact the following heritage attributes through disruption: • The cultivated fields.</td>
<td>The identified impacts to CHL 7 are not considered to be significant given that this resource does not have a high level of heritage integrity as an intact agricultural landscape, particularly in comparison to the adjacent property at CHL 2. No further recommendations.</td>
</tr>
</tbody>
</table>

Recommendations

The Strasburg Road Extension may have a variety of impacts upon built heritage resources and cultural heritage landscapes. Impacts can include: direct impacts that result in the loss of resources through demolition or alteration, or the displacement of resources through relocation; and indirect impacts that result in the disruption of resources by introducing physical, visual, audible or atmospheric elements that are not in keeping with the resources and/or their setting.

Based on the results of background research and data collection, field survey, and analysis of impacts of the undertaking, the following recommendations have been developed.

1. Road construction should be suitably planned in a manner that avoids any identified, above ground, cultural heritage resource.

2. Indirect impacts to CHL 2 are expected through disruption to the cultivated fields located in the northwest corner of the property. As such, the cultivated fields should be subject to photographic documentation and compilation of a cultural heritage documentation report by a qualified heritage consultant during Detail Design and in advance of construction activities. Following completion, the report should be filed with heritage planning staff at the City of Kitchener.

3. This report should be presented to the Municipal Heritage Committee and cultural heritage planning staff for comment, and approval by the Director of Planning at the City of Kitchener.

5.2.10 Archaeological Resources

The archaeological and historical context was analyzed to help determine the archaeological potential of the study area.

Section 1.3.1 of the MTC Standards and Guidelines for Consultant Archaeologists lists characteristics that indicate where archaeological resources are most likely to be found, and archaeological potential is confirmed when one or more features of archaeological potential are present. Accordingly, the Strasburg Road Extension study area meets the following criteria used for determining archaeological potential:

- Previously registered archaeological sites (i.e., AiHc-22);
- Water sources: primary, secondary, or ancient water sources (i.e., Blair Creek);
- Early Euro-Canadian settlement (i.e., pioneer homestead); and
- Early historical transportation route (i.e., New Dundee Road).

These criteria characterize the study area as having potential for the identification of Aboriginal and Euro-Canadian archaeological resources.
Archaeological Potential Model

Archaeological potential models are developed as tools to assist land use planners and policy makers in evaluating the threat to archaeological resources that might occur through proposed land-development projects. Since the majority of archaeological sites have not yet been documented or registered with the OASD, the only alternative is to use archaeological science to partition the landscape into zones that exhibit archaeological potential versus those that do not. The result is an archaeological potential map against which the footprint of proposed development alternatives can be evaluated.

Using the information from known archaeological sites and historic features, GIS mapping was reviewed to determine if archaeological potential is present within the study area. The mapping of archaeological site potential confirmed that the study area exhibits archaeological potential. Archaeological potential mapping is presented in Figure 6 in Appendix D.7 of this ESR.

Conclusions

The Stage 1 Archaeological Assessment was conducted to assist with the Strasburg Road Extension EA. The background research determined that seven archaeological sites have been registered within 1 km of the study area. A review of the general physiography and local nineteenth century land use of the study area suggested that it has potential for the identification of Aboriginal and Euro-Canadian archaeological sites.

An archaeological potential model was produced to corroborate the results of the background study. The potential model supports the conclusions of the background research and suggests that the study area contains archaeological potential.

Recommendations

In light of the results of the background research and archaeological potential modeling undertaken for the Stage 1 Archaeological Assessment of the Strasburg Road Extension study area, ASI makes the following recommendations:

- Archaeological potential exists in the Strasburg Road Extension study area. All previously undisturbed lands that will be affected by the project will require a Stage 2 Archaeological Assessment (Property Survey), which must be conducted in accordance with Sections 2.1.1 and 2.1.2 of the MTC 2011 Standards and Guidelines for Consultant Archaeologists. The Stage 2 assessment must involve a combination of pedestrian survey of all ploughable lands and test pit survey for the remainder.

- Pedestrian survey involves systematically walking over freshly ploughed and weathered agricultural lands; and

- Test pit survey involves the systematic excavation of small test pits at 5 m intervals and can be conducted only in areas where ploughing is not feasible.

Notwithstanding the results and recommendations presented in this study, ASI notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.
Advice on Compliance with Legislation

ASI advises compliance with the following legislation:

- The Stage 1 report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development;

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

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

5.3 Summary of Project Mitigation and Monitoring Requirements

Table 5.6 summarizes the environmental factor-specific issues, potential impacts, proposed mitigation measures, and net effects of implementing the proposed Strasburg Road Extension, as well as proposed monitoring and future additional/contingency investigations.

Table 5.6: Summary of Potential Environmental Impacts, Proposed Mitigation Measures and Commitments to Further Work

<table>
<thead>
<tr>
<th>Factor</th>
<th>Environmental Issue/Concern</th>
<th>Potential Construction/Operations Impact/Effect</th>
<th>Mitigation Measures/Net Effect</th>
<th>Monitoring/Future Work/Contingency</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL ENVIRONMENT</td>
<td></td>
<td></td>
<td>Design and implement an appropriate Erosion and Sediment Control Plan (ESCP) for both the construction and operations phases to prevent erosion of exposed soils and delivery of sediment to the drainages contributing baseflow to Blair Creek in accordance with GRCA’s best practice requirements, including:</td>
<td>Routine inspections of temporary erosion and sediment control measures to ensure they are operating effectively to prevent any release of sediment-laden runoff to Blair Creek.</td>
</tr>
<tr>
<td>Fish and Fish Habitat</td>
<td>Harmful alteration, disruption or destruction (HADD) of fish habitat</td>
<td>Discharge of sediment to a drainage/watercourse from earth/spoil stockpiles, grading and excavation activities, resulting in the impairment of water quality and/or physical damage to habitat. Release of fuel, oil, grease contaminants from mobile equipment, resulting in unacceptable contaminant concentrations in the receiving watercourse/waterbody. Change to sensitive life stages/process (i.e., spawning) if near-water works are not timed appropriately.</td>
<td>• Limiting the size and duration of disturbed areas; • Identification of, and appropriate phasing of work in, critical and non-critical management areas; • Appropriate seasonal controls, including winter shutdown protection, as required; • Strategic use of vegetation buffers between work areas and natural areas (i.e., at west end of Blair Creek corridor). • If required, implement timing restrictions during construction for near-water work to protect sensitive life stages of fish, as identified by MNR (coldwater – in-stream window July 1 to September 15). • Store, handle and dispose of all excess materials in a manner that prevents their entry to drainages/watercourses.</td>
<td>Monitoring of treatment systems for any dewatering and/or concrete effluent to avoid any release of contaminated water to receiving watercourses. Compliance monitoring of best management practices related to refuelling and excess materials storage and handling. Prepare a spill/emergency response plan for construction and operations.</td>
</tr>
<tr>
<td>Factor</td>
<td>Environmental Issue/Concern</td>
<td>Potential Construction/Operations Impact/Effect</td>
<td>Mitigation Measures/Net Effect</td>
<td>Monitoring/Future Work/Contingency</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------</td>
<td>-------------------------------------------------</td>
<td>------------------------------</td>
<td>-----------------------------------</td>
</tr>
</tbody>
</table>
| Fish and Fish Habitat (Cont'd) | | | • Operate, maintain and store all equipment and materials (e.g., fuel, lubricants) in a manner that prevents the entry of any deleterious substances to drainages/watercourses.  
• Design permanent drainage and stormwater management systems to mimic overland drainage patterns and control/maintain runoff quality/quantity contribution to watercourse features.  
• Capture and transport concrete effluent off-site for disposal.  
• Prohibit/limit construction access to watercourses/watercourse banks. | A surface water and groundwater monitoring program will be developed to the satisfaction of the City, the GRCA and the Region with a minimum of 2 years pre-construction monitoring. |
| Terrestrial Ecosystems Vegetation Communities | Both natural and culturally impacted vegetation communities (forest, cultural, and hedgerow communities) | Loss of approximately 0.86 ha of vegetation, consisting of 0.33 ha of cultural vegetation and 0.53 ha of hedgerow. | Design and implement an appropriate ESCP and spill control plan, as described in Section 5.2.1.  
Re-stabilize and re-vegetate exposed surfaces as soon as possible, using native vegetation seed mixes and plantings (as per design drawings).  
Clearly delineate vegetation clearing (grading and working easement) limits on both construction drawings and in the field. Confirm with the Contractor in the field.  
Prepare and implement a Vegetation Management/Tree Protection Plan.  
Trees to be removed will be felled into the construction zone (and away from other, protected vegetation) to avoid disturbance to vegetation not scheduled for removal.  
Vegetation grubbing will be restricted to the required activity zone and will minimize soil disturbance. Cut and grubbed material will be disposed of through chipping and re-used, where possible. | Environmental site inspections/monitoring during construction and post-construction periods to ensure environmental protection/re-vegetation measures are implemented and working and any required remedial action is undertaken.  
Plantings of woody and herbaceous vegetation will be checked in accordance with landscaping and ecological restoration plans. |
<table>
<thead>
<tr>
<th>Factor</th>
<th>Environmental Issue/Concern</th>
<th>Potential Construction/Operations Impact/Effect</th>
<th>Mitigation Measures/Net Effect</th>
<th>Monitoring/Future Work/Contingency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrestrial Ecosystems (Cont’d)</td>
<td>Vegetation Communities</td>
<td>Undertake tree management activities as required for both driver safety and health of the balance of vegetation units that will be encroached on (i.e., removal of hazard trees within a defined Hazard Zone on the new edge of the unit). Unnecessary traffic, dumping and storage of materials over tree roots will be avoided. Vehicle maintenance and refuelling will be carried out at the maintenance areas in the works yards or at commercial garages, whenever possible. Refuelling should not be permitted within 30 m of any forest, wetland or watercourse, or the top-of-bank areas.</td>
<td>The edges of cleared areas will be specifically reviewed and damaged trees will be checked and treated, or removed.</td>
<td></td>
</tr>
<tr>
<td>Wildlife</td>
<td>Wildlife habitat and communities (short term/ construction)</td>
<td>Direct impacts associated with habitat loss due to construction/grading/ vegetation removal.</td>
<td>Minimize construction footprint and the extent of habitat loss required for the road footprint through refinement of the road design at Detail Design. Restore disturbed areas as soon as possible after construction with native and non-invasive species. Adhere to timing windows for nesting/breeding birds and for other sensitive wildlife periods. All tree removal, vegetation clearing and disturbance should not be undertaken during bird nesting season (mid-May to August). Clearly delineate construction area and ensure that no accidental encroachment occurs into natural areas.</td>
<td>If vegetation clearing during the nesting season is unavoidable, it should be preceded by a nest survey to confirm that active nests will not be affected and a vegetation buffer must be retained around each active nest.</td>
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<tr>
<td>Wildlife (Cont’d)</td>
<td>Wildlife habitat and communities (long term/operational)</td>
<td>Operations effects include the potential for a 'barrier effect' created by the new road crossing of, or reduced connectivity within the natural heritage system. Potential increase for animal-vehicle conflicts, wildlife habitat degradation or indirect habitat impacts (salt spray, noise, light, litter, etc.). Potential indirect effects that occur in areas adjacent to the road footprint (e.g., Blair Creek corridor), including indirect impacts on regulated habitat for Species at Risk (Jefferson Salamander). Potential for cumulative effects as a result of other development proposed in the project area.</td>
<td>Educate drivers regarding the potential for wildlife in the area (e.g., wildlife crossing signs). Consider measures to maintain connectivity or include potential wildlife crossing signage in a north to south direction across the larger landscape. Minimize area of disturbance by selection of the shortest crossing of the natural heritage system. Protect, restore and create new habitat, where feasible, with native and non-invasive vegetation species. Ensure new vegetation community edges and/or roadside edges are planted with species that will serve to buffer the interior habitats from salt spray. Limit mowing and herbicide applications at roadsides. Use directional lighting and design the roadway to minimize noise and vibration. Ensure pre-development surface and groundwater drainage patterns are retained, particularly where wetlands, vernal pools and other natural features that contain features or functions sensitive to water level fluctuations/hydroperiods may be affected. Development of a stewardship plan for preservation of adjacent natural heritage areas. Develop a salt management plan for sensitive areas.</td>
<td>Implement longer-term vegetation community monitoring for effectiveness of habitat restoration plans, edge or salt management plans and the health of retained wildlife habitat and communities. Implement adaptive management response, as required. Effectiveness monitoring should also serve to direct and inform any stewardship activities. Provide an on-site environmental monitor who is trained for site-specific occurrences of potential SAR or other wildlife species.</td>
</tr>
<tr>
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<tr>
<td>Groundwater and Hydrogeology</td>
<td>Threats to groundwater quality and quantity</td>
<td>Development can restrict recharge to the underlying aquifer systems, which can result in a reduction of groundwater flows to municipal water supply wells and local baseflow to Blair Creek. The long term cumulative loading of road salt could have consequences for water quality in the underlying aquifers. This not only has the potential to impact existing groundwater users and the surface water quality of the Blair Creek drainage system, but could affect a future potential water supply option for the Region. Impacts to existing groundwater monitoring wells.</td>
<td>The additional impervious surface represented by the Strasburg Road Extension itself is relatively small (3.84 ha (&lt;1% of the total study area). Therefore, this will not significantly affect the overall groundwater recharge capacity of the area. Measures will be incorporated to ensure that any groundwater encountered during construction is maintained, filtered, and released will be implemented in general accordance with OPSS 518. Ensuring that proper spills management procedures are in place during construction (and during operation). Control salt loadings in accordance with RMOW reasonable use criteria, including application of the Region’s Screening Criteria for Salt Management during design of the roadway and stormwater management plan. Any RMOW monitoring wells that may be impacted will be identified prior to construction and replaced and/or decommissioned according to O. Reg. 903. Any monitoring wells that will no longer be used will be appropriately decommissioned.</td>
<td>Consideration should be given to obtaining pre-construction water quality and quantity baseline information for nearby potable water wells; implementing a construction phase Complaint Protocol in response to water well quantity/quality concerns; and engaging in appropriate environmental groundwater effects monitoring after construction at these locations to ensure that there are no adverse impacts attributable to the project. Identify existing RMOW monitoring wells potentially affected by construction.</td>
</tr>
<tr>
<td>Contaminated Property</td>
<td>Encountering contaminated soil or groundwater</td>
<td>No evidence noted that contaminated sources are present. Impacts considered low.</td>
<td>None required.</td>
<td>If the design alignment ultimately does change, such that it is located in closer proximity to the developed portions of the rural properties, Phase I ESAs should be conducted as part of Detail Design.</td>
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<tr>
<td>SOCIO-ECONOMIC ENVIRONMENT</td>
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<tr>
<td>Land Use</td>
<td>Farming operations – access and internal circulation</td>
<td>Severance of farming operations at 500 Stauffer Drive and on Activa and Grambian/Stonefield lands west of Reidel Drive. Potentially more circuitous or encumbered access routes for agricultural operators working 500 Stauffer Drive and Activa lands east and west of Reidel Drive.</td>
<td>Introduce strategically located field accesses on Activa and Grambian/Stonefield lands to facilitate movement of farm equipment across Strasburg Road. Design of Strasburg/New Dundee roundabout to accommodate large agricultural equipment.</td>
<td>Field access provisions will be confirmed during Detail Design based on the requirements of the adjacent landowners.</td>
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<td></td>
<td>Impacts to use of adjacent properties</td>
<td>Reduced enjoyment of residential properties and viability of B&amp;B operation (residence at 271 Reidel Drive; residence/bed &amp; breakfast operation at 500 Stauffer Drive; and residence at 1798 New Dundee Road). Potentially more circuitous access associated with possible changes to local road network.</td>
<td>Aesthetics/visual intrusion and increased noise levels due to the proximity of the new roadway will be limited due distance from roadway and protection afforded by local topographic relief. No mitigation proposed. Vegetative screening incorporated in the landscape plan for the roadway to protect residence at 1798 New Dundee Road from headlight glare.</td>
<td>Refinement of vegetation screening concept during Detail Design phase.</td>
</tr>
<tr>
<td>Communities</td>
<td>Redefinition of planned community boundaries</td>
<td>The Strasburg Road alignment proposed in this study differs from that shown in the Municipal Plan, and has the potential to redefine the planned Doon South Community boundary and the Region of Waterloo’s Countryside Line.</td>
<td>The TPA represents the optimum balance of impacts across a comprehensive range of assessment criteria and is deemed acceptable with respect to the potential to redefine community boundaries.</td>
<td>The proposed Strasburg Road alignment may become a consideration in OMB deliberations regarding the Regional Official Plan appeal and future land use decisions, which are outside the scope of this EA.</td>
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<td>Factor</td>
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<tr>
<td>Noise</td>
<td>Increases in ambient sound levels at adjacent noise sensitive receptors (residences)</td>
<td>The technically-preferred alignment does not itself generate a significant (5 dBA) impact at any of the receptors evaluated.</td>
<td>Noise control measures are not warranted.</td>
<td>None required.</td>
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<tr>
<td>CULTURAL ENVIRONMENT</td>
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<tr>
<td>Built Heritage and Cultural Landscapes (CHL)</td>
<td>Impacts to Built Heritage Resources and Cultural Heritage Landscapes (CHL)</td>
<td>No buildings or significant landscape features will be removed as a direct result of construction. Indirect impacts are expected to: CHL 2 (farm complex at 500 Stauffer Drive) through disruption to the cultivated fields located in the northwest corner of the property; and CHL 7 (Remnant Farm Complex) through disruption of cultivated fields.</td>
<td>None required.</td>
<td>Photographic documentation of cultivated fields at 500 Stauffer drive (CHL2) and compilation of a cultural heritage documentation report by a qualified heritage consultant during Detail Design and in advance of construction activities.</td>
</tr>
<tr>
<td>Archaeological Resources</td>
<td>Areas with potential for identification of Aboriginal and Euro-Canadian archaeological resources</td>
<td>The TPA crosses areas with potential for identification of Aboriginal and Euro-Canadian archaeological resources.</td>
<td>A Stage 2 Archaeological Assessment will be conducted on lands determined to have archaeological potential. Additional (Stage 3 and Stage 4) mitigation will be conducted, as required.</td>
<td>In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport will be immediately notified.</td>
</tr>
<tr>
<td>Factor</td>
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<td>Mitigation Measures/Net Effect</td>
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<tr>
<td>TRANSPORTATION NETWORK</td>
<td>Property Access</td>
<td>Changes to existing local road network and access at 500 Stauffer Drive, 271 Reidel Drive and Activa lands at the west end of Stauffer Drive.</td>
<td>Existing direct access to properties is retained, but may be more circuitous.</td>
<td>Conduct further assessment of, and monitor, efficiency of emergency response services delivery. Reassessment of planned Stauffer Drive closure plan (Scenic Roads Community Trail Network) in relation to property access needs.</td>
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<td></td>
<td></td>
<td>The connection of Strasburg Road to New Dundee Road will result in increased traffic through the intersection of New Dundee Road and Cameron Road, which exhibits existing sight line deficiencies, increasing the potential for collisions.</td>
<td></td>
<td>The City and RMOW are committed to investigating mitigation of the existing substandard sight distances at the New Dundee Road/Cameron Road intersection, and developing a resolution in collaboration with the Township of North Dumfries and area property owners, before opening of the Strasburg Road Intersection at New Dundee Road.</td>
</tr>
<tr>
<td>DRAINAGE AND STORMWATER MANAGEMENT</td>
<td>Impairment of Blair Creek water quality; increased runoff and erosion potential; increased concentration of flow and peak flows</td>
<td>Discharge of stormwater runoff from storm sewer outlet to Blair Creek.</td>
<td>Collection of roadway runoff by storm sewers and direction of runoff to stormwater treatment facilities (3 storm water management ponds, oil/grit separators and enhanced/grassed swales) prior to discharge to receiving watercourses. Temporary erosion and sediment controls will be implemented to reduce the risk of sedimentation delivery to and excessive erosion of drainage channels during construction.</td>
<td>Refinement of stormwater management design in Detail Design. Water quality monitoring in Blair Creek during operations phase. Monitoring of Erosion and Sediment Control Plan during construction.</td>
</tr>
<tr>
<td>Factor</td>
<td>Environmental Issue/Concern</td>
<td>Potential Construction/Operations Impact/Effect</td>
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<tr>
<td>Design conflicts</td>
<td>Conflicts between stormwater management treatment measures and other road features.</td>
<td>Interceptor ditches are proposed along the back of the boulevard in cut locations, to ensure any overland sheet flows from the cut slopes do not flow over the proposed multi-use trail.</td>
<td>Monitor for flooding and associated damage during/after storm events.</td>
<td></td>
</tr>
<tr>
<td>Need for relocation of existing services. Utility relocation and service interruptions during construction</td>
<td>In general, the standard construction sequence for completing utility relocations will be used during construction and minimal impacts to existing services or service interruptions are expected.</td>
<td>Owners of existing residential, commercial and business properties will be notified in advance by the City if utility relocation will occur. Alternative service/access arrangements will be provided to the owner. Adequate protection will be in place to ensure site safety at all times to protect the public and the owners from the construction sites.</td>
<td>Conduct additional engineering surveys and contact utility owners further to ascertain the existence and nature of their plant, and feasibility of relocation. Monitor and address service disruptions (complaint protocol). A monitoring plan will be in place to ensure safety as a first priority for the public and employees.</td>
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</table>
6.0 PROJECT IMPLEMENTATION

This section of the ESR describes the City of Kitchener’s current thinking on how and when the Strasburg Road Extension project will move forward to implementation. In addition, general commitments to additional investigations and environmental compliance and effects monitoring are described.

To inform and provide direction to Detail Design investigations, the Project Team’s understanding of approvals, permits, authorizations and clearances that must be obtained prior to construction are also identified. This includes the process for amending the Environmental Study Report, if required, in accordance with the Municipal Class EA process.

6.1 Construction Cost, Timing and Staging

The estimated cost of constructing the Strasburg Road Extension project from north of Stauffer Drive to New Dundee Road, will be in the order of $12.8 Million, as summarized below. This is a “Class C” preliminary estimate of probable costs, with an expected precision variance of -20% to +35% of the final cost values.

<table>
<thead>
<tr>
<th>Strasburg Road:</th>
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<tbody>
<tr>
<td>Roadwork</td>
<td>$4,100,000</td>
</tr>
<tr>
<td>Storm Sewers and Appurtenances</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>Storm Water Management Ponds</td>
<td>$630,000</td>
</tr>
<tr>
<td>Illumination</td>
<td>$700,000</td>
</tr>
<tr>
<td>Miscellaneous and Contingency (25% of Construction)</td>
<td>$1,657,500</td>
</tr>
<tr>
<td>Engineering and Administration (15% of Construction)</td>
<td>$994,500</td>
</tr>
<tr>
<td><strong>Sub-Total Strasburg Road</strong></td>
<td><strong>$9,282,000</strong></td>
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<table>
<thead>
<tr>
<th>New Dundee Road:</th>
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</thead>
<tbody>
<tr>
<td>Roadwork (roundabout option)</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Miscellaneous and Contingency (25% of Construction)</td>
<td>$625,000</td>
</tr>
<tr>
<td>Engineering and Administration (15% of Construction)</td>
<td>$375,000</td>
</tr>
<tr>
<td><strong>Sub-Total New Dundee Road</strong></td>
<td><strong>$3,500,000</strong></td>
</tr>
</tbody>
</table>

**GRAND TOTAL ROAD CONSTRUCTION** $12,782,000

An estimated cost for a 300 mm watermain, as identified in the Kitchener Zone 2 and 4 Optimization Study Update TM No. 1: Trunk Main Alignment (CH2M Hill, June 21, 2013), is summarized below, and would be in addition to the road construction costs. This is a “Class D” order of magnitude estimate of probable costs, with an expected precision variance of -35% to +50% of the final cost values, and included to provide a basis for budgeting and cost-sharing discussions with the Region of Waterloo. Please refer to Section 5.1.7 for further discussion on the Region’s watermain.
Strasburg Road Watermain (From North Limit of Class EA Study Area to Blair Creek Drive):

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>300mm Watermain and Appurtenances</td>
<td>$1,100,000</td>
</tr>
<tr>
<td>Miscellaneous and Contingency (25% of Construction)</td>
<td>$275,000</td>
</tr>
<tr>
<td>Engineering and Administration (15% of Construction)</td>
<td>$165,000</td>
</tr>
<tr>
<td><strong>GRAND TOTAL WATERMAIN</strong> (cost responsibility to be determined)</td>
<td><strong>$1,540,000</strong></td>
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</table>

The total cost of the project (road works and watermain) will be in the order of $14.3 Million, including both City’s and the Region’s shares.

In accordance with the City of Kitchener’s 2004 and 2009 Development Charges background studies, the Strasburg Road Extension will be fully funded through development charges. The City's 10-year Capital forecast indicates that the Strasburg Road Extension project will be initiated in 2016. However, this proposed timing may be adjusted, and is expected to be contingent upon the availability of Development Charge funding and other capital project priorities. The city’s 2014 Development Charge deliberations are expected to further inform cost, timing and staging decisions.

The cost estimate is based on the current implementation schedule, and would need to be adjusted in value should the construction be deferred.

The cost of collector road extensions to the Strasburg Road Extension (i.e., Robert Ferrie Drive and Blair Creek Drive) is not included in the foregoing estimate, as these roads will be subject to separate planning and environmental assessment processes, as described in Section 4.4.2.4. However, these road extensions might be scheduled to be constructed at the same as the Strasburg Road Extension, and funded separately.

6.2 Monitoring

As part of the City of Kitchener’s continuing commitment to environmental stewardship, comprehensive construction and post-construction monitoring programs will be instituted on this undertaking. The programs will assess the effectiveness of environmental mitigation, enhancement and compensation measures implemented to limit the net effects of the project, as well as the degree of compliance with environmental protection measures committed to during the construction period.

6.2.1 Environmental Inspection during Construction

The City of Kitchener will retain the services of a qualified Contract Administrator to oversee all aspects of construction at the field level, including supervision of all activities conducted by the Contractor selected by the City to construct the project. The Contract Administrator will be the City’s representative during construction and will be present on-site during all construction activities. All instructions to the Contractor will be issued by the Contract Administrator.

From an environmental perspective, the Contract Administrator will be responsible for retaining the appropriate specialists to ensure that all construction activities are carried out in conformity with applicable environmental legislation, regulations and industry standards, and are consistent with provisions in the Contract Documents, which will reflect the commitments contained in this ESR and those developed during the Detail Design phase of the project. The Contract Administrator will also ensure that the conditions of approval specified in site-specific permits,
approvals and authorizations secured from regulatory agencies for this project are adhered to, including documentation, reporting and on-site retention of such permits, as required.

Environmental compliance will be achieved through the establishment of an environmental inspection approach that includes the use of an Environmental Inspector operating under the direction of the Contract Administrator. The project will be subject to periodic on-site environmental inspection to ensure that the execution of the environmental component of the work is occurring as planned and to deal with any environmental problems that may develop during construction. The periodic on-site inspection will be supplemented by the support of environmental specialists retained by the Contract Administrator, as required, to assure the proper implementation of site-specific mitigation or remediation measures (e.g., monitoring of earthworks for discovery of archaeological resources).

In addition, the effectiveness of the environmental protection measures will be assessed to ensure that:

- Environmental protection measures required in the pre-construction (site preparation) phase are implemented and monitored during the construction activities (e.g., inspection for nesting migratory birds);
- Individual mitigation measures are providing the expected control and/or protection (e.g., dust and noise control);
- Composite control and/or protection provided by the mitigating measures is adequate (e.g., Erosion and Sediment Control Plan; winter shutdown);
- Deficiencies (poor installation; ineffectiveness) are corrected in an effective and timely manner; and
- Additional/enhanced mitigating measures are provided, as required, for any unanticipated environmental problems that may develop during construction, and appropriate contingency and emergency response plans are in place and being followed (e.g., spills control; discovery of archaeological artifacts/human remains or vegetation/wildlife Species at Risk; impacts to potable water wells). In addition, the City will develop and implement a strategic program to survey potentially affected potable water wells in proximity to the proposed works prior to and during construction, and will provide an alternate water supply to offset adverse effects attributable to the project in response to related concerns expressed by well owners.

To assist the Environmental Inspector and standardize the environmental inspection duties, a verification/checklist will be developed, listing all mitigation measures and commitments to be undertaken to ensure compliance with such commitments and associated requirements. Any concerns and required action will be detailed in a standard inspection report form and signed off on as the concerns are addressed or the additional work is completed.

The Environmental Inspector will have the mandate to verify that all environmental protection and mitigation/compensation measures are implemented. On behalf of the Contract Administrator, the Environmental Inspector will have the authority to direct the construction crews, through the use of field orders, to interrupt specific project activities if the proper protection measures are not in place. In the event that an environmental protection measure could be modified to better protect the environment (public and workers included), the inspector will have the authority to notify the Contract Administrator. Any such proposed interruptions or notifications will be recorded by the Environmental Inspector and promptly reported to the Contract Administrator and the City’s Project Manager. The inspector will give immediate
notification to the Contract Administrator if, in his/her opinion, the Contractor fails to take appropriate action.

The Environmental Inspector will also monitor areas outside of the road corridor (or site) that have been identified as potentially sensitive to either direct or indirect impacts of the roadway construction (e.g., private properties and downstream reaches of Blair Creek).

6.2.2 Environmental Effects Monitoring

Environmental monitoring after construction is completed normally involves follow-up inspection/assessment of significant or special mitigation measures, and may include scientific monitoring. In the period immediately following construction, the following inspection/monitoring will occur:

- Stability of new earthworks;
- Removal of all debris and excess materials as part of final site clean-up. Surplus excavated material (provided it is free of contaminated soils) will be reused during construction or transported to an environmentally suitable location.

In addition, any environmental issues and problems that have developed or remain unresolved after construction will be identified and addressed at on-site meetings between the Contractor, appropriate staff from the City and affected stakeholders (e.g., property owners, regulatory agencies), depending on the nature, extent and significance of the issue or problem.

For this project, the following longer term post-construction monitoring requirements have been established or are anticipated:

- Function of stormwater management controls/treatments;
- Health and effectiveness of landscaping/screening components and/or salt management plans, and the health of retained wildlife habitat and communities (which may be assessed through vegetation community monitoring);
- Success of ecological restoration plantings (Blair Creek corridor buffer; hedgerows);
- Long term impacts to potable water wells (500 Stauffer Drive and 271 Reidel Drive);
- Roundabout intersection(s) operation and traffic operations on New Dundee Road; and
- Local road network operations, particularly in relation to the delivery of emergency response services to 500 Stauffer Drive and 271 Reidel Drive.

6.3 Approvals Required Prior to Construction

The City of Kitchener will obtain the necessary permits and approvals for the construction, operation and maintenance of the Strasburg Road Extension project. This section of the report identifies both project-specific permits and approvals that are known to be required at this time, and those that are typically required for this type of project.

6.3.1 Municipal

The following municipal permits and approvals may be required for the construction of this project:

- City Council approvals (capital budget; tendering).
- Approval for stormwater management facilities.
• Sewer discharge approvals.
• Exemptions from Kitchener Municipal Code 450/By-Law 87-258, as amended (regarding noise) for construction activities that must be conducted outside the hours of operation permitted in the by-law.
• Region of Waterloo work permit for construction activities on New Dundee Road (required for any excavation, cut or trench; to install, construct, place, move, remove, relocate, adjust, alter, clean, maintain, test, repair, replace, improve or restore infrastructure in, over, under, across or along a Regional road).
• Region of Waterloo Council approval for implementation of the proposed Strasburg Road/New Dundee Road roundabout.

With respect to the New Dundee Road roundabout and associated operational impacts to the New Dundee Road corridor, since New Dundee road is a Regional road, the location, type of traffic control and design of the connection with Strasburg Road is subject to the approval of the Region of Waterloo. Based on the results of the Region’s roundabout screening process conducted by the Consultant Team for the new “T” intersection to compare a roundabout option with a traffic signals option, the Project Team has identified the opportunity to move forward to the next step in the Region’s process (i.e., an Intersection Control Study). Accordingly, the City will complete the following tasks in cooperation with the Region:

1. Undertake an Intersection Control Study (ICS) to complete a more detailed comparison of a roundabout to traffic signals.
2. Prepare a preliminary design of both options, including associated revisions to proposed grading, drainage and property impacts.
3. Present both options to the public for input regarding the preferred method of traffic control.
4. Region staff to document the preliminary design, assessment and consultation process in a report to be presented to the Region’s planning and works committee.
5. All other requirements of the Strasburg Road Extension Class EA must be met.
6. City and Region staff will investigate possible mitigation of the existing substandard sight distances at the New Dundee Road/Cameron Road intersection, and develop a solution in collaboration with the Township of North Dumfries and area property owners, before opening of the Strasburg Road Intersection at New Dundee Road.

6.3.2 Provincial

The following provincial permits and approvals may be required for the construction of the project:

• A Permit to Take Water (PTTW) from the MOE if dewatering for structural foundations exceeds 50,000 litres per day. The need for groundwater pumping will be re-assessed during Detail Design phase, when the culvert footing types and elevations are finalized. It is not expected that the PTTW requirement related to dewatering or diversion of flow from watercourse via mechanical means (pumping) will be required if Blair Creek is crossed with a clear span structure.
• Environmental Compliance Approvals from MOE for new sewers and stormwater management outfalls.
• Environmental Compliance Approvals from MOE for the new watermain.
• Ministry of Tourism, Culture and Sports acceptance and approval on any documentation of additional archaeological and built heritage resource investigations required to clear the corridor from further concern for this project. Accordingly, further archaeological and built heritage investigations (commencing with a Stage 2 Archaeological Assessment) will be conducted and the associated reports will be submitted to MTCS for review and acceptance prior to any ground disturbance.
• Excess waste generated on-site that requires off-site removal should be in accordance with Ontario Regulation 347 under the Environmental Protection Act that provides for the transportation and processing of hazardous and non-hazardous waste.
• Where removal of potentially contaminated soil must take place, soils will be tested for those chemicals that may have been used or dumped within the area, and will be handled in accordance with Part XV.I of the Environmental Protection Act (EPA) and Ontario Regulation 153/04, Records of Site Condition. Similarly, the quality of all fill material brought on site will meet the Ontario Regulation 153/04 requirements for the respective property use.

Based on discussion with Ministry of Natural Resources staff to date (refer to correspondence and note of meeting in Appendix B), a Section 17(2)(c) permit under the Endangered Species Act, 2007 for the alteration of Jefferson Salamander habitat can be avoided, since the TPA avoids direct encroachment on regulated habitat. The City will continue discussions with MNR Guelph District staff to confirm the acceptability of the project proposals with respect to minimizing indirect impacts on regulated habitat.

The City recognizes the dynamic nature of the Endangered Species Act with respect to habitat protection, and will continue to track changes to the legislation during the life-cycle of the project. Species that previously received individual species protection under the legislation, now also receive general habitat protection, as of June 2013, and the implications of this broader protection component will be assessed in future project phases. In this regard, the City will continue to consult MNR with respect to the definition and interpretation of general habitat description and categorization. Further, the Species at Risk in Ontario list (SARO – Ontario Regulation 230/08) is a living document and is amended periodically as a result of species assessment and re-assessments conducted by the Committee on the Status of Species at Risk in Ontario (COSSARO). The City will continue to monitor the SARO list throughout the planning and design phases of the project for any relevant updates.

6.3.3 Federal

With the changes to the TPA in 2013, and enactment of the Canadian Environmental Assessment Act, 2012, there are currently no identified federal environmental assessment or other approvals that the City must obtain for the project.

As design progresses, the City of Kitchener will continue to monitor the Strasburg Road Extension project for potential federal requirements. The most likely consideration is expected to be changes to the Species at Risk Act stemming from related updates to the Ontario Endangered Species Act.
6.3.4 Environmental Study Report Amending Procedure

The Municipal Class Environmental Assessment process includes an addendum process for proponents to make changes to a project after completion of the Environmental Study Report review stage (Phase 4).

Modifications to the design and implementation of the Strasburg Road Extension proposed in this ESR may occur due to unforeseen circumstances, including: changes in environmental conditions in the corridor that may affect anticipated project impacts and means of mitigating adverse effects; technological advancements; and funding availability. This may result in the project being inconsistent or non-compliant with commitments made in the ESR. Significant modifications to the project proposals or changes in the environmental setting that occur after the filing of the ESR will require preparation of an addendum to the ESR.

Changes to the project may also be required if there is a significant lapse of time between the filing of the ESR and the start of construction, since the proposed project and related environmental mitigation measures may no longer be valid or appropriate. If the period of time from the end of the public review period following filing of the ESR in the public record, or MOE’s denial of a Part II Order request, to the proposed commencement of construction exceeds ten (10) years, the City will be required to review the planning and design process and current environmental setting to ensure that the project and mitigation measures are still valid/appropriate. The review will also be documented in an addendum to the ESR.

The ESR Addendum will document the circumstances necessitating the changes to the project proposals, the environmental implications of the changes, and proposals to mitigate any associated negative effects. The Addendum will be filed with the ESR in the public record, and the same notification and review process and public right to request a Part II Order as described in Section 2.1.1 of this ESR will apply. Where an ESR Addendum is issued, only the project elements in the Addendum (the proposed changes to the recommended undertaking) are open for review.