Class Environmental Assessment Study
Derry Road (Regional Road 7) Transportation Corridor Improvements from Milburough Line (Regional Road 24) to McNiven Road
City of Burlington and Town of Milton – PR-2598A

Environmental Study Report
November 2010

Prepared for:

The Regional Municipality of Halton
Public Works & Engineering Services
1151 Bronte Road
Oakville, Ontario L6M 3L1

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Prepared by:

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TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

List of Tables

List of Figures

List of Appendices

EXECUTIVE SUMMARY

Environmental Assessment Study

In August 2009, Halton Region commenced a Schedule 'C' Class Environmental Assessment (Class EA) Study to identify roadway improvements required for the Derry Road (Regional Road 7) corridor from Milburough Line (Regional Road 24) to McNiven Road in the Town of Milton and City of Burlington, pursuant to the Municipal Class EA process (MEA October 2000, as amended in 2007), to the year 2021. The Environmental Assessment study addresses the roadway improvements, taking into consideration the future transportation needs within the corridor and the potential impacts on the natural, socio-economic, and cultural environments.

The Environmental Study Report

The *Environmental Study Report* (ESR) documents the planning process followed in accordance with the procedures set out under the Municipal Class Environmental Assessment (MEA October 2000, as amended in 2007) for Schedule 'C' projects. In general, the ESR documents the planning and decision-making process, including public consultation, which has been followed to arrive at the preferred design. The ESR also sets out the mitigating measures proposed to avoid or minimize environmental impacts.

Specifically, this ESR report documents:

- The background to the study;
- The need and justification for the study;
- A description of the problem;
- The studies and measures undertaken to resolve the problem;
- The planning, preliminary design, and public consultation processes followed to arrive at the preferred design;
- The principal environmental impacts of the study;
- The mitigating measures to be employed to offset the anticipated impacts; and
- The next steps required in moving forward with the detailed design of the project.

Study Background

The section of Derry Road under study extends from Milburough Line (Regional Road 24) to McNiven Road, a distance of about 1.36 kilometres in length. Derry Road is a boundary road between the Town of Milton and City of Burlington and is presently under the jurisdiction of the Regional Municipality of Halton. Derry Road is designated as a Major Arterial roadway with a designated roadway right-of-way width of 35 metres. Within the study limits of the Class Environmental Assessment, Derry Road is a two lane rural roadway with variable width

pavement (6.4 to 7.6 metres) with no major shoulders or roadside drainage ditches. The posted speed limit is 60 km/hr throughout the study corridor with stop controlled intersections at Milburough Line and McNiven Road (all-way stop). The existing right-of-way limit is 20 metres following the roadway alignment with a 10 metre offset to the south approximately midway between Milburough Line and McNiven Road.

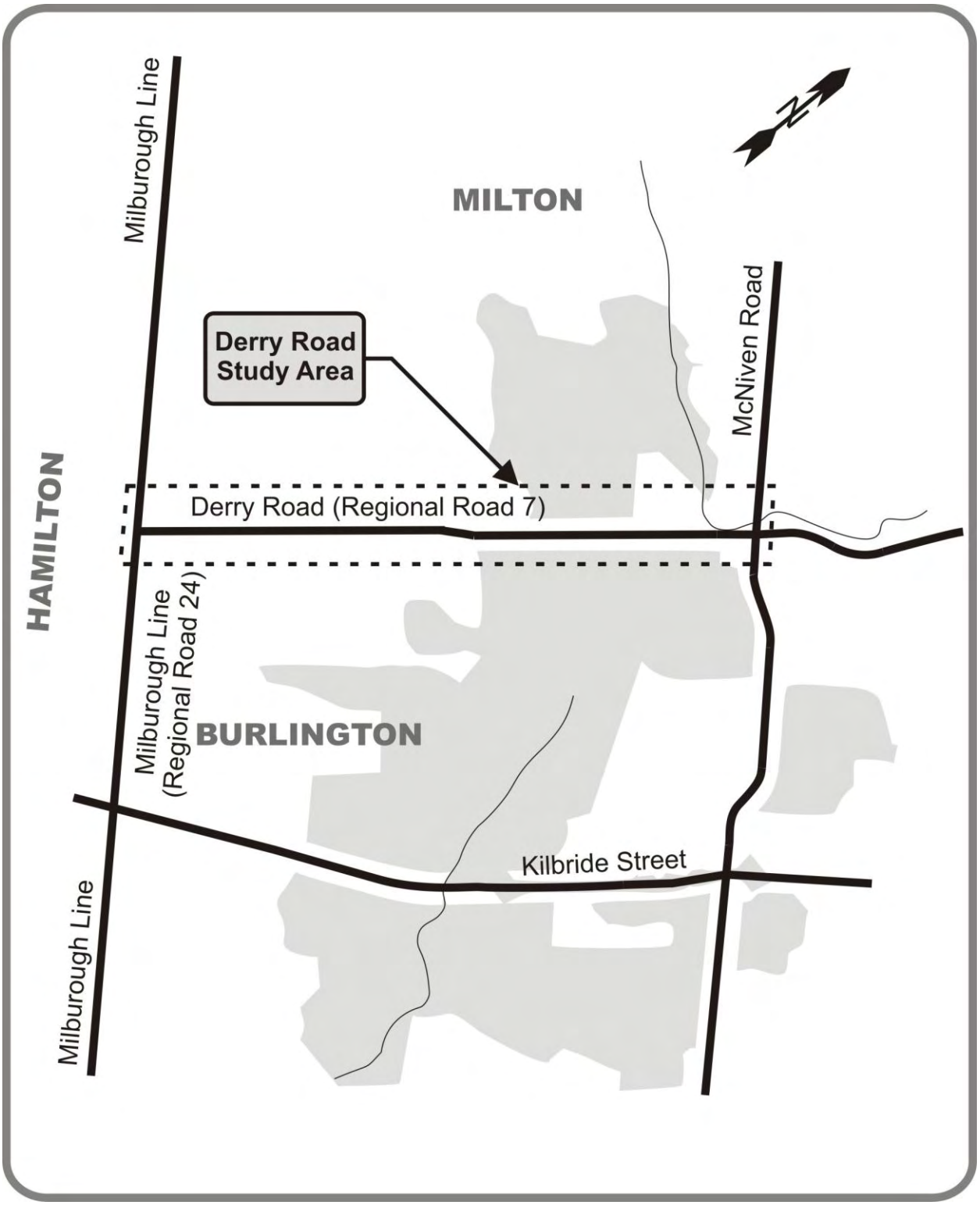
The predominant land uses within the study area include Escarpment Rural Area and Greenbelt Plan Protected Countryside Area, Agricultural Rural Area, and Prime Agricultural Area in accordance with the Halton Region Official Plan. North of Derry Road, the Town of Milton Official Plan classifies the predominant land uses as Escarpment Rural Area and Greenlands A Area. South of Derry Road, the City of Burlington Official Plan classifies the predominant land uses as Escarpment Rural Area and Greenlands (Escarpment Plan Area). The Kilbride Settlement Area (City of Burlington) is located south of Derry Road.

The need to undertake the Class Environmental Assessment Study was originally precipitated due to the issues associated with the stability of the section of Derry Road adjacent to the Bronte Creek tributary, west of McNiven Road. In 2006, the section of roadway from 120 metres west of McNiven Road to the intersection was reconstructed and the slope adjacent to the creek was stabilized to prevent the roadway from potentially collapsing into the creek. In addition, steel beam guiderail was installed to address safety issues related to the steepness of the slope and the proximity of the creek to the roadway. These measures were considered to be a “temporary fix” until a more permanent solution could be implemented.

Subsequent to the reconstruction of Derry Road adjacent to the creek, Regional Council approved the Class Environmental Assessment for Derry Road as part of the Regional Capital Budget. The Class EA was required to address a number of concerns including:

- Upgrading roadway geometrics to meet prevailing Regional standards including the roadway alignment and cross-section;
- Improving the substandard pavement structure of the roadway (the previous reconstruction by the City of Burlington in the year 2000 provided a new pavement surface and vertical alignment improvements, but did not address the existing roadway base and subbase conditions); and
- Improving the roadway and roadside drainage through enhancements to the road grades and profiles, replacement and/or addition of drainage culverts, and the provision of proper roadside ditches (including drainage improvements adjacent to the Bronte Creek tributary).

The reconstruction of this section of Derry Road is currently scheduled for 2012 under the 10-year (2010 – 2019) Capital Road Projects Budget.


Milburough Line
MILTON
McNiven Road
Derry Road
Study Area
HAMILTON
Derry Road (Regional Road 7)
Milburough Line
(Regional Road 24)
BURLINGTON
Kilbride Street
Milburough Line

Description of the Problem

Derry Road within the study area currently maintains lane and shoulder widths less than that of Regional standards and does not provide accommodation for alternate transportation modes (pedestrians and cyclists). The accommodation of drainage through the formalization of rural drainage ditches and resizing of various culverts needs to be addressed including improvements to the roadway horizontal and vertical alignments. Improvements to the roadway structure (base and subbase conditions) will also be required to meet Regional standards. Although currently in good condition, the flexible pavement section on Derry Road is generally considered to be structurally deficient to support the anticipated future traffic loadings. Due to the thin granular base/subbase of the existing pavement structure, full reconstruction of the existing pavement section is recommended.

Planning Alternatives

A number of planning alternatives were considered to address structural deficiencies and the needs of the Derry Road Transportation corridor, including the following:

1. **Do Nothing** – Do not undertake any improvements or changes within the Derry Road corridor;
2. **Improve Other Roadways** – This alternative involved improving other roadways that travel parallel or perpendicular to Derry Road such as Milburough Line, McNiven Road, Conservation Road (formerly Steeles Avenue), or Kilbride Street to accommodate future traffic volumes;
3. **Limit Future Development** (within the vicinity of the study area) – This alternative would limit or restrict future development in the area to limit traffic growth along the Derry Road corridor;
4. **Use of Travel Demand Management Measures** – This alternative is aimed at shifting travel behaviour to reduce peak hour vehicle travel demands (i.e. car-pooling, HOV lanes, flexible work hours);
5. **Implement Localized Intersection and/or Traffic Control Improvements** – This alternative involved localized intersection improvements that may include the provision of auxiliary lanes, improvements to traffic control such as the installation of traffic control signals and/or the optimization of traffic controls along the study corridor to increase efficiency of operation;
6. **Implement Geometric Roadway Improvements to Improve Safety** – This alternative included modifications to the existing roadway geometrics (i.e. horizontal and vertical roadway alignments) and roadway cross-section elements (e.g., travel lane width, median width, shoulder width, side slopes, ditches, etc.) to provide a safer roadway;

7. **Pavement Resurfacing, Rehabilitation, Repair and/or Reconstruction** – This alternative would involve a range of roadway pavement repairs ranging from full depth reconstruction of the roadway (i.e. removal and replacement of the roadway base and subbase structures) to an asphalt overlay or simple surface spot repairs within the study area corridor;
8. **Improvements to Existing Drainage Culverts and Ditches** – This alternative would include modifications or replacement of existing culverts with larger, higher capacity culverts or augmentation of existing culverts (i.e. providing additional culvert drainage capacity through installation of new culverts in the area of existing culverts) and the improvement or construction of new roadside ditches where necessary to improve overall roadside drainage. This alternative would also consider the additional benefits of improving culvert sizes to better accommodate the movement of aquatic life as part of the Bronte Creek tributary cold water fishery; and
9. **Combination of Roadway Improvement Alternatives and Other Supporting Measures** – This alternative entailed a combination of the various planning alternatives toward the goal of providing the best overall solution to the problem through addressing a range of issues within the study area.

The evaluation of the planning alternatives were based on an assessment of potential impacts as measured against a range of evaluation factors and on an assessment of how each planning alternative best addressed the *Problem Statement*.

The recommended planning solution was determined to be represented by **Alternative 9**, which includes the following general components:

- Provides geometric roadway improvements, where feasible, including adjustments to the horizontal and vertical roadway alignment to meet Regional standards;
- Provides improvements to the roadway rural cross-section through adjustments to the travel lane widths, shoulder widths, and side slopes;
- Improves the pavement structure of the roadway;
- Improves roadway and roadside drainage through enhancements to the road grades and profiles, replacement and/or addition of drainage culverts, and provision of proper roadside ditches; and
- Provides improvements or modifications to intersection traffic control where necessary to meet future traffic operational demands.

Preferred Roadway Improvement Alternative

Roadway improvement design concepts included various alternatives for the improvement of the existing two lane rural road cross-section to meet Regional road standards. In each case, a two lane rural roadway cross-section was maintained for each of the improvement alternatives.

The alternatives were then assessed and evaluated considering Technical, Socio-Economic, Natural and Cultural Environment criteria. The alternatives considered the following general concepts:

- **"Do Nothing" Alternative** – No improvements or changes would be made to solve the identified problem or opportunity—existing roadway remains in current state.

- **Alternative 1** – Maintain the current horizontal roadway alignment with a rural 2-lane road cross-section including 3.65 metre lanes and 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular).

- **Alternative 2** – Centre the roadway alignment within the existing right-of-way limits with a horizontal curve radius of 250 metres at the S-bend with a rural 2-lane road cross-section including 3.65 metre lanes and 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular).

- **Alternative 3** – Centre the roadway alignment within the existing right-of-way limits with tangent sections to separate the S-bend and a horizontal curve radius of 250 metres with a rural 2-lane road cross-section including 3.65 metre lanes and 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular).

Separate roadway improvement design concepts were also considered within the section of Derry Road extending from McNiven Road to approximately 150 metres west to improve the existing two lane road cross-section to meet Regional standards while minimizing potential impacts to the Bronte Creek tributary to the north and adjacent pond area to the south. The following two alternatives were considered as part of the Environmental Assessment process for this study:

- **Alternative 1-A** – A rural 2-lane road cross-section with 3.65 metre lanes and 1.0 metre partially paved shoulders. Guiderail protection and granular shoulder side slopes matching to the existing creek location.

- **Alternative 1-B** – An urban 2-lane road cross-section with 3.65 metre lanes and 1.0 metre paved shoulders with concrete curb and gutter. Guiderail protection and retaining walls adjacent to the Bronte Creek tributary.

The identification of the preferred alternative and its refinement was assisted by public consultation activities throughout this Environmental Assessment, including two Public Information Centres, two Technical Agency Committee (TAC) meetings, as well as a separate meeting with Conservation Halton, whereby public comments and input were received. Based on the evaluation criteria and public, stakeholder and TAC input received, the preferred alternative was identified as a combination of 2-lane rural and urban (adjacent to Bronte Creek Tributary) cross-section with 3.65 metre travel lanes throughout the length of the Study Area.

Public Consultation Process

Public consultation is a key feature of the Municipal Class Environmental Assessment planning and design process. Through an effective public participation program, the proponent can generate meaningful dialogue between the project planners and the public, allowing an exchange of ideas and the broadening of the information base, leading to better decision-making.

As part of this study, a Technical Agencies Committee (TAC) was established to provide external technical agencies with an opportunity to provide input into the Class EA process. Two meetings with the TAC group and one meeting with Conservation Halton were held during the course of the study. In addition to the TAC meetings, two Public Information Centres (PICs) were held to provide a forum and an opportunity for public input into the study. An additional Derry Road Resident Meeting was held subsequent to the second PIC to address a number of issues brought forward by the public. As a result of the input from the Technical Agencies Committee and the general public at the PICs, the following issues and concerns have been addressed as part of the study:

- Traffic Capacity, Safety and Operational Issues within the corridor;
- Roadway Geometrics;
- Drainage;
- Roadway Pavement Structure;
- Structures (retaining walls);
- Pedestrian and Cycling Facilities;
- Access to Properties;
- Property Impacts to adjacent Property Owners;
- Natural Features;
- Noise Impacts;
- Archaeological and Cultural Impacts;
- Utility Impacts; and
- Timing of Project.

Description of Preferred Design

The main features of the Preliminary Preferred Roadway Improvement Design for Derry Road (Regional Road 7) from Milburough Line (Regional Road 24) to McNiven Road include the following:

- The horizontal centreline alignment of Derry Road generally follows the existing centreline alignment;
- Widening symmetrically about the existing centreline as follows:

  - Widen mainline section of Derry Road from Milburough Line (Regional Road 24) to about 150 metres west of McNiven Road with a rural 2-lane road cross-section including 3.65 metre lanes and 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular); and
  - Widen the section of Derry Road adjacent to the Bronte Creek tributary from McNiven Road to about 150 metres west of McNiven Road with an urban 2-lane road cross-section with 3.65 metre lanes and 1.0 metre paved shoulders with concrete curb and gutter.
- Installation of guiderail protection and retaining walls as required to provide additional roadside protection for motorists and support for the road base adjacent to the Bronte Creek tributary;
- Installation of concrete mountable curb (approximately 340 metres) will be provided on the south side of Derry Road beginning about 345 metres east of the Derry Road/Milburough Line intersection to protect the existing tree line adjacent to the roadway. Storm sewer will also be installed within this section of roadway to accommodate stormwater runoff from the roadway;
- Accommodation of active transportation modes though the provision of a 1.0 metre paved shoulder within the rural and urban sections;
- Stormwater management provisions via new drainage ditches along both sides of the roadway within the rural section and the provision of concrete curb and gutter within the urban section to direct roadway runoff to adjacent roadside ditches or pond/creek areas;
- Replacement of existing roadway cross culverts with higher capacity culverts; and
- Daylighting triangles will be provided at the intersections of Derry Road with Milburough Line and McNiven Road.

Construction Schedule and Cost

Roadway improvements for Derry Road (Regional Road 7) from Milburough Line (Regional Road 24) to McNiven Road are anticipated to begin in 2012 as identified in the current 10-year Regional Capital Budget. The total estimated cost of the Preliminary Preferred Roadway Improvement Design is **$3,100,000**.

Environmental Impacts and Mitigating Measures

The preferred design has the least impact on adjacent properties, utilities and the surrounding natural, cultural, and socio-economic environments. As a result of the impact assessment conducted by the study team, as well as input received from review agencies, the following highlights the environmental impacts and mitigating measures:

Fisheries and Aquatic Ecosystems

- The main and secondary tributaries of Kilbride Creek (i.e. Bronte Creek Tributary) provide direct coolwater fish habitat. The current weir structure on the south side of Derry Road may limit fish movement into the main tributary of Kilbride Creek.

- Installation of a retaining wall adjacent to the watercourse and wetland features at the northeastern end of study area in combination with the urban cross-section will reduce the existing vegetation coverage. Potential impacts and habitat loss in the wetland and watercourse associated with the retaining wall can be addressed through additional plantings and habitat edge creation along the base of the wall. Harmful alteration to fish habitat can be reduced through appropriate construction practices and through the use of bioengineering strategies for bank stabilization.

Stormwater Management and Erosion and Sedimentation Control

- The proposed road improvements will increase the amount of impermeable surface throughout the study area. In order to control the stormwater runoff and maintain water quality, the combination of a curb and gutter collection system (where required) along with grassed swales will provide treatment and attenuation prior to reaching existing wetlands and watercourses.

- Increased erosion due to the exposure of soil is common through the construction phase, resulting in increased suspended sediments, which can have detrimental effects on the watercourse(s) if conveyed by surface water runoff. A number of temporary erosion and sedimentation control measures are detailed in the ESR document to deal with potential erosion.

Terrestrial Ecosystems and Wildlife Habitat

- There are no significant changes in the ecological form and function of the wetland and watercourse anticipated as a result of the proposed road improvements, and no rare, threatened or endangered plant species were identified directly within the proposed road improvements along Derry Road. Installation of the retaining wall at the tributary to Bronte Creek will incur minimal loss of habitat for local flora and fauna.

Noise Impacts

- The roadway improvements for Derry Road will produce insignificant noise impacts with noise levels falling within established Ministry of Environment and Ministry of Transportation Guidelines. Since the resultant daytime sound exposures in the rear yard amenity areas will be below 60 dBA, noise mitigation is not required.

Cultural Environment

- The existing Derry Road right-of-way does not retain archaeological site potential due to previous ground disturbances.

- Impacts to the cultural environment may include minor impacts to existing cultural heritage landscapes (i.e. mature tree lines) directly adjacent to the existing roadway and within the existing roadway right-of-way limits.

Socio-Economic Environment

- There are no impacts anticipated for local area uses (community/public/ institutional/facility land uses), official or other planning initiatives. During construction, it is anticipated that there will be some temporary impacts from construction activities.

Monitoring and Mitigation

The Region will ensure that the environmental protection recommendations described in the ESR document and other subsequent agency approval conditions are complied with during the construction stage. During detail design, Halton Region will work with affected utilities and agencies to confirm potential effects and mitigation measures and to obtain necessary approvals and permits. Additional details related to monitoring and mitigation measures are detailed in Section 7.0 of the ESR document.

1. INTRODUCTION

The need to undertake a Class Environmental Assessment Study for Derry Road (Regional Road 7) from Milburough Line to McNiven Road was identified as part of the 2004 Halton Transportation Master Plan.

The Halton *Regional Official Plan* (2006) outlines a long-term vision for Halton's physical form and community character. Commonly referred to as The Regional Plan, the Official Plan (OP) sets forth stated goals and objectives, describes an urban structure for accommodating growth, states the policies to be followed, and outlines the means for implementing the policies within its property tax base and other financial resources. Part IV of the Regional Plan describes *Healthy Communities Policies*, setting out the following goal for Transportation, as amended by Regional Official Plan Amendment 38 (ROPA 38):

> *"The goal for transportation is to provide a safe, convenient, accessible, affordable and efficient transportation system in Halton, while minimizing the impact on the environment and promoting energy efficiency."*

The Regional Plan further clarifies a number of Regional objectives for meeting this goal, including the following policy for transportation:

> *"Adopt a Functional Plan of Major Transportation Facilities, as shown on Map 3 and described in Table 3, for the purpose of meeting travel demands for year 2021 as well as protecting key components of the future transportation system to meet travel demands beyond year 2021."*

ROPA 38 incorporates the results of the *Sustainable Halton* process and a comprehensive review of the current Regional Official Plan. To that end, the planning horizon year was amended to 2031. In addition, 173(5.1) of ROPA 38 notes: *"173(5.1) Amend Maps 3 and 4 and Table 3 to reflect the requirements of the transportation system to meet travel demands for year 2031, upon completion of the Region's Transportation Master Plan and consistent with the appropriate recommendations of the Metrolinx Regional Transportation Plan."*

The Regional Municipality of Halton retained ***R and R Associates Inc.*** to assist the Region with the Class Environmental Assessment and Preliminary Design for Derry Road (Regional Road 7) from Milburough Line to McNiven Road in the City of Burlington and Town of Milton, Ontario.

1.1 Purpose of the Class Environmental Assessment

It is a requirement under the Regional Municipality of Halton that a Class EA study be undertaken in accordance with the Municipal Class Environmental Assessment planning and design process. The Regional Plan [OP - 173(17)] requires the environmental assessment of any Arterial Road project, to address whether there are other transportation alternatives and how the project would implement the transportation goals, objectives and policies of [The Regional Plan] and to consider, where appropriate, alternative design standards to mitigate environmental and social impact.

The Environmental Study Report (ESR) documents the planning and design process followed in accordance with the procedures set out under the Municipal Class Environmental Assessment process (MEA October 2000, as amended in 2007) for Schedule 'C' projects.

The purpose of this Class EA study is to provide an assessment of the need for transportation corridor improvements for Derry Road (Regional Road 7), within the limits of the study area, to meet the requirements of Halton Region to the year 2021. The study identifies a preferred solution that will address these needs, while providing a comprehensive, environmentally sound planning process that facilitated dialogue between stakeholders with a number of competing interests. The primary range of key consideration and issues that were addressed through the public process within the context of the study are listed below.

The ESR documents the Municipal Class Environmental Assessment planning and design process followed in accordance with the procedures set out under the Municipal Class Environmental Assessment process (MEA October 2000, as amended in 2007) for Schedule 'C' projects.

Transportation

- Integration with Overall Transportation Network
- Existing Operational Issues
- Future Corridor Travel Demands
- Existing and Proposed Access and associated Access Management
- Roadway Cross-section Considerations
- Alternate/Active Transportation Modes
- Safety

Structural

- Pavement Conditions
- Watercourse Culverts

Natural Environment

- Provincially Significant Wetlands
- Woodlands
- Creek Crossings
- Drainage and Stormwater Management
- Provincial Greenbelt Plan

Adjacent and Existing/Future Land Uses

- Residential, Commercial, and Rural
- Escarpment Rural Area
- Greenlands Area
- Future Land Use Considerations (including property requirements/restrictions)

Cultural and Social Environment

- Built Heritage Features
- Archaeology Features
- Noise Impacts
- Aesthetics

Other Features

- Existing and Future Utilities

1.2 Study Area

The study area for the Class Environmental Assessment (Class EA) Study for Derry Road (Regional Road 7) Transportation Corridor Improvements is shown in **Figure 1-1**. The section of Derry Road under study extends from Milburough Line (Regional Road 24) to McNiven Road, a distance of about 1.36 km in length. Derry Road (Regional Road 7) is a major east-west arterial road traveling along the municipal boundary between the Town of Milton to the north and the City of Burlington to the south. The western terminus of Derry Road meets Milburough Line at the City of Hamilton municipal boundary. Traveling easterly, Derry Road continues toward 407 ETR and into the Regional Municipality of Peel. The Region's Official Plan indicates a designated roadway right-of-way width of 35 metres. Currently, Derry Road is under the jurisdiction of the Regional Municipality of Halton and is designated as a "Major Arterial" roadway in accordance with the Halton Region Official Plan and Halton Region Transportation Master Plan (HTMP), 2004.

Figure 1-1 – Study Area Limits

Within the study area limits, Derry Road maintains a two lane rural road cross-section with a posted speed limit of 60 km/hr. Derry Road terminates at Milburough Line to the west via a STOP controlled intersection. The intersection of Derry Road with McNiven Road is controlled via an All-way STOP condition. The existing right-of-way limits vary around 20 metres. The presence of roadside shoulders and ditches is minimal throughout the study area limits.

The predominant land uses within the study area include *Escarpment Rural Area* and *Greenbelt Plan Protected Countryside Area*[1] and *Prime Agricultural Area*[2] in accordance with the Halton Region Official Plan. North of Derry Road, the Town of Milton Official Plan classifies the predominant land uses as *Escarpment Rural Area* and *Greenlands A Area*. South of Derry Road, the City of Burlington Official Plan classifies the predominant land uses as *Escarpment Rural Area* and *Greenlands (Escarpment Plan Area)*. The Kilbride Settlement Area (City of Burlington) is located south of Derry Road.

[1] Map 1A – Provincial Plan Areas & Land Use Designation, Halton Region Official Plan, December 16, 2009
[2] Map 1E – Prime Agricultural Areas, Halton Region Official Plan, December 16, 2009

1.3 Related Studies

A number of related studies have been completed which have significance to the Derry Road (Regional Road 7) Transportation Corridor Improvements. These studies include:

- The Regional Plan, Regional Municipality of Halton, 2006;
- Amendment No. 38 to The Regional Plan (2006) Official Plan for the Halton Planning Area, Regional Municipality of Halton, December 16, 2009;
- Town of Milton Official Plan, Town of Milton, August 2008;
- Burlington Official Plan, City of Burlington, (June 2009);
- Region of Halton Regional Transportation Master Plan, Regional Municipality of Halton, June 2004;
- PPW36-08 - Halton Region Transportation Master Plan Update (2007), Regional Municipality of Halton, March 2008;
- 2007 State of the Regional Road System Report, Regional Municipality of Halton, August 2008;
- Road Needs Study 2008 Update, Regional Municipality of Halton, August 2008; and
- Halton Region Environmentally Sensitive Area Consolidation Report, Regional Municipality of Halton, 2005.

2. STUDY PROCESS

2.1 The Class Environmental Assessment Process

2.1.1 The Municipal Class EA

The Municipal Class EA process provides a decision-making framework that enables the requirements of the EA Act to be met in an effective and traceable manner. An approved Class EA document describes the process that a proponent must follow for a class or group of undertakings in order to meet the requirements of the EA Act. Once approved, the Class EA establishes the process whereby the municipal projects, as defined in the Municipal Class EA and any subsequent modifications, can be planned designed, constructed, operated, maintained, rehabilitated and retired without having to obtain project-specific approval under the EA Act, provided the approved environmental assessment planning process is followed.

The term "Environment" is applied in a broad sense and includes the natural, social, cultural, built and economic environments. The key principles of environmental assessment planning include:

- Consultation with affected parties early into and throughout the process, such that the planning process is cooperative in nature;
- Consideration of a reasonable range of alternatives for implementing the solution;
- Identification and consideration of the effects of each alternative on affected aspects of the environment;
- Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental affects; and
- Provision of clear and complete documentation of the planning process followed, to allow "traceability" of decision-making with respect to the project.

Currently, the Municipal Class EA facilitates municipal road, water and wastewater, and transit projects through the Class EA Planning and Design process. In order to address the variability of environmental impacts for specific projects, the Municipal Class EA classifies individual projects in terms of schedules as follows:

Class EA Schedule Designation	Schedule Description	Typical Projects
A	Projects are limited in scale, have minimal adverse environmental effects and include a number of municipal maintenance and operational activities. These projects are pre-approved and may proceed to implementation without following the full class EA planning process.	Normal emergency operational and maintenance activities
A+	Projects are pre-approved; however, the public is to be advised prior to project implementation.	Normal emergency operational and maintenance activities
B	Projects have the potential for some adverse environmental effects. These projects require mandatory contact with directly affected public and relevant agencies, to ensure that they are aware of the project and that their concerns are addressed.	Improvements and minor expansions to existing facilities
C	Projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Class EA document. An Environmental Study Report (ESR) is prepared and filed for review by the public and review agencies.	Construction of new facilities and major expansions to existing facilities

2.1.2 The Class EA Planning and Design Process

The *Class EA Planning and Design Process* is a five-phase planning process approved under the EA Act by which proponents may plan municipal infrastructure projects. The process follows the five basic phases which are conducted within a framework of environmental protection, effective consultation with stakeholders including review agencies, the public, property owners, interest groups, and traceable decision-making. The five phases of the Class EA planning and design process are summarized as follows:

Phase 1 – Identify the problem (deficiency) or opportunity.

Phase 2 – Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution taking into account public and review agency input.

Phase 3 – Examine alternative methods of implementing the preferred solution, based on the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.

Phase 4 – Document, in an Environmental Study Report (ESR), a summary of the rationale and the planning, design and consultation process of the project established through Phases 1 to 3. The ESR is made available for public and agency review and comment.

Phase 5 – Complete contract drawings and documents and proceed to construction and operation along with the monitoring of construction activities and operations to ensure adherence to environmental provisions and mitigation.[3]

Based on the Region's assessment of the types of improvements that are required within the Derry Road corridor between Milburough Line and McNiven Road, the Derry Road (Regional Road 7) Transportation Corridor Improvements study was identified by the Regional Municipality of Halton as a Schedule 'C' undertaking under the Municipal Class Environmental Assessment. The work program for this study was structured to follow the first four phases of the Class EA planning and design process.

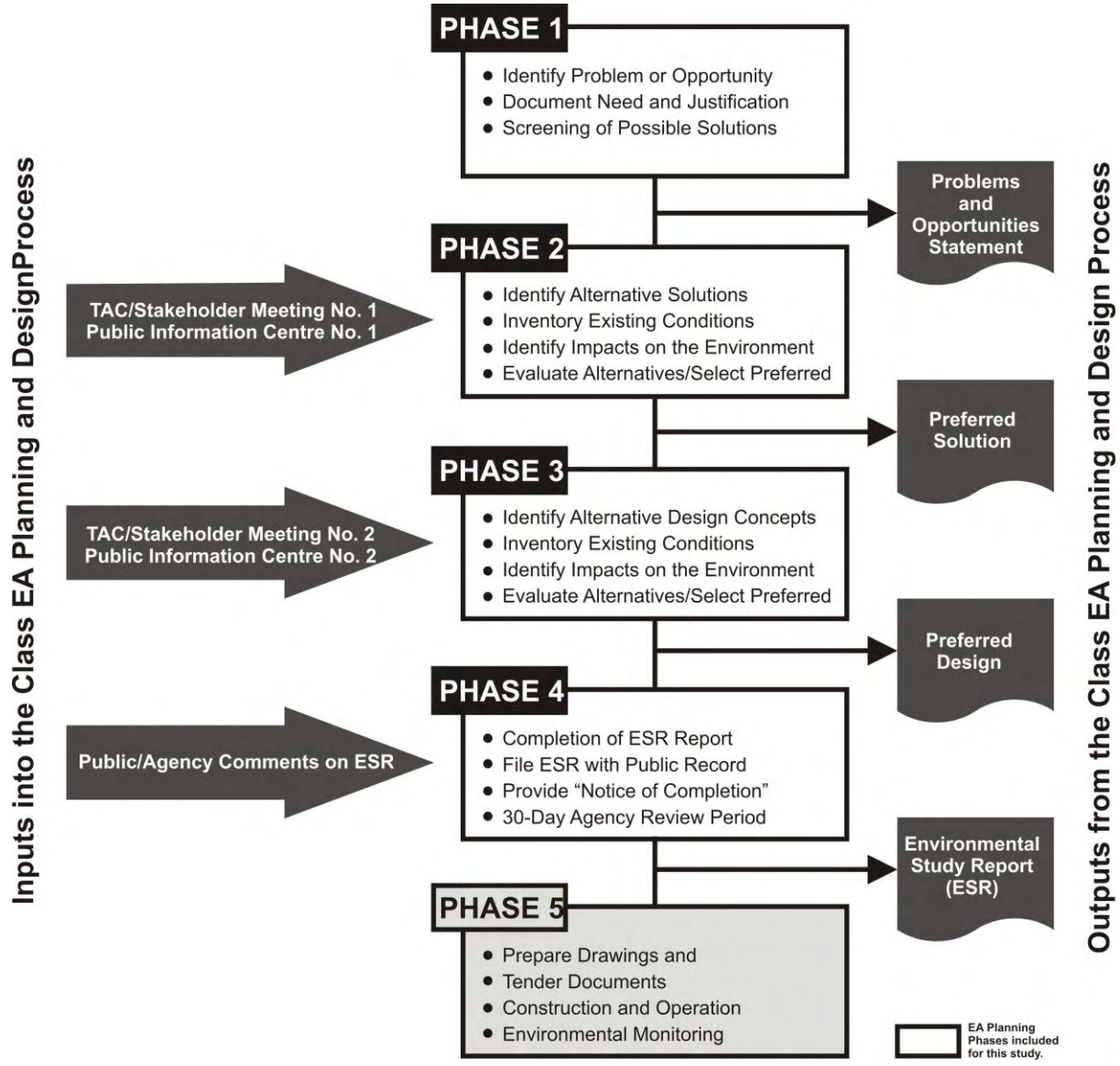
Figure 2-1 encapsulates the basic structure of the Class EA planning and design process, highlighting the phases that will be followed to complete this study. Figure 2-1 also summarizes various points in the EA process where public, Technical Agency and Stakeholder input is mandatory as well as the various outputs expected at the end of each phase.

Consistent with the Municipal Class EA, the study approach has been designed to meet the following objectives:

1. Protection of the environment (natural, social, economic and cultural environments);
2. Minimal disruption during construction to the existing residents and business owners who rely on this roadway;
3. Participation of a broad range of stakeholders in the study process to allow for sharing of ideas, education, testing of creative solutions and developing alternatives; and
4. Documentation of the study process in compliance with all phases of the Municipal Class Environmental Assessment process.

[3] Phase 5 is not included as part of this study.

Figure 2-1: Five Phase Class EA Planning and Design Process
Derry Road (Regional Road 7) Transportation Corridor Improvements



2.2 Part II Order Requests

The filing of this ESR completes the planning and preliminary design stage of the project. The ESR is placed on the public record and made available for review for a thirty (30) calendar day period. A public notice is published at the time of filing. Copies of the report are available for review and comment during normal business hours at the following locations:

Halton Region

Clerk's Department
Regional Municipality of Halton
1151 Bronte Road
Oakville, Ontario
L6M 3L1
(905) 825-6000
Monday – Friday: 8:30 a.m. - 4:30 p.m.

Town of Milton

Clerk's Department
Town of Milton
150 Mary Street
Milton, Ontario
L9T 6Z5
(905) 878-7252
Monday – Friday: 8:30 a.m. – 4:30 p.m.

Milton Public Library - Beaty Branch
945 Fourth Line
Milton, Ontario
L9T 6P8
(905) 875-2665
Tuesday – Thursday: 10:00 a.m. – 8:00 p.m.
Friday – Saturday: 10:00 a.m. – 5:00 p.m.

Milton Public Library – Main Branch
45 Bruce Street
Milton Ontario
L9T 2L5
(905) 875-2665
Tuesday – Thursday: 10:00 a.m. – 9:00 p.m.
Friday – Saturday: 10:00 a.m. – 5:00 p.m.
Sunday: 1:00 p.m. – 5:00 p.m.

City of Burlington

Burlington Public Library – Central Branch
2331 New Street
Burlington, Ontario
L7R 1J4
(905) 639-3611
Monday – Thursday: 9:00 a.m. – 9:00 p.m.
Friday: 9:00 a.m. – 6:00 p.m.
Saturday: 9:00 a.m. – 5:00 p.m.
Sunday: 1:00 p.m. – 5:00 p.m

Burlington Public Library – Brant Hills Branch
2255 Brant Street
Burlington, Ontario
L7P 5C8
(905) 335-2209
Monday – Thursday: 9:00 a.m. – 9:00 p.m.
Friday: 9:00 a.m. – 6:00 p.m.
Saturday: 9:00 a.m. – 5:00 p.m.

Burlington Public Library – Tansley Woods
1996 Itabashi Way
Burlington, Ontario
L7M 4J8
Monday – Thursday: 9:00 a.m. – 9:00 p.m.
Friday: 9:00 a.m. – 6:00 p.m.
Saturday: 9:00 a.m. – 5:00 p.m.
Sunday: 1:00 p.m. – 5:00 p.m.

Burlington Public Library – New Appleby Branch
676 Appleby Line
Burlington, Ontario
L7L 5Y1
(905) 639-6373
Tuesday, Thursday, Friday: 10:00a.m. – 6:00 p.m.
Wednesday: 10:00 p.m. – 9:00 p.m.
Saturday: 9:00 a.m. – 5:00 p.m.

Burlington Public Library – Aldershot Branch
355 Plains Road East
Burlington, Ontario
L7T 2C7
(905) 333-9995
Tuesday – Wednesday: 10:00 a.m. – 6:00 p.m.
Thursday: 10:00 a.m. – 9:00 p.m.
Friday: 10:00 a.m. – 6:00 p.m.
Saturday: 9:00 a.m. – 5:00 p.m.

Burlington Public Library – Kilbride Branch
6611 Panton Street, Kilbride School
Kilbride, Ontario
L7P 0L8
Monday & Wednesday: 6:00 p.m. – 9:00 p.m.
Saturday: 9:00 a.m. – 12:00 p.m.

Class Environmental Assessments place emphasis on both project assessment and on public and agency involvement and consultation. The process places importance on and encourages stakeholder participation throughout the process to resolve all project-related issues and concerns with the proponent. However, if concerns are raised during the public review period that cannot be resolved through discussions with the Regional Municipality of Halton, a “Part II Order” request may be submitted to the Minister of the Environment.

The Minister of the Environment determines whether or not this is necessary and the decision in this regard is final. If the Part II Order is granted, the project cannot proceed unless an Individual Environmental Assessment is prepared. The Class Environmental Assessment is subject to a formal government review and approval process and may result in a formal public hearing. Anyone wishing to request a ‘Part II Order; of this Derry Road ESR must submit a written request by the end of the forty-five (45) calendar day review period to the Minster of the Environment at the following address with a copy sent to Halton Region:

Ministry of the Environment

Attention: Minister of the Environment
12th Floor 135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5

Regional Municipality of Halton
Attention: Mr. Jeffrey Reid, C.E.T.
Senior Transportation Planner, Transportation Services
1151 Bronte Road

Oakville, Ontario
L6M 3L1

2.3 The Environmental Study Report (ESR)

This Environmental Study Report (ESR) documents the planning and design process followed to determine the recommended undertaking and the environmentally significant aspects for the Derry Road Transportation Corridor Improvements in accordance with the procedures for Schedule 'C' projects, setting out the planning and decision making process, including consultation with technical agencies and the public, which has been followed to arrive at the preferred solution. The ESR also sets out the mitigating measures proposed to avoid or minimize environmental impacts.

The ESR embodies Phase 4 of the Environmental Assessment process, documenting in a report all the activities undertaken to date through Phases 1, 2 and 3. The ESR is intended to be a traceable and easily understood record of the proponent's decision making process. The ESR generally describes the following:

- A description of the problem or opportunity and other background information;
- The rationale employed in selecting the preferred solution to the problem;
- The rationale employed in selecting the preferred design;
- A description of the environmental considerations and impacts;
- The mitigating measures which will be undertaken to minimize environmental effects;
- A description of the consultation process and an explanation of how concerns raised by the public and review agencies have been addressed in developing the project; and
- A description of the monitoring program which will be carried out during construction.

2.4 Study Schedule

The study was initiated in October 2009 through the advertised *Notice of Study Commencement*. The study scope, as defined by the Region's Terms of Reference, followed the requirements as set out in the Municipal Class Environmental Assessment process including the following timetable:

Schedule Item		Date
Notice of Study Commencement	–	October 29, 2009[4]
Technical Agencies Group Meeting No. 1	–	November 10, 2009

[4] Date of initial newspaper advertisement.

Schedule Item		Date
Public Information Centre No. 1	–	November 11, 2009
Technical Agencies Group Meeting No. 2	–	April 13, 2010
Public Information Centre No. 2	–	May 4, 2010
Derry Road Resident Meeting	–	July 13, 2010
File Environmental Study Report (ESR)	–	Fall 2010

2.5 Study Organization

The Regional Municipality of Halton retained R and R Associates Inc. to assist the Region with the Class Environmental Assessment study. The project team consisted of members from the Regional Municipality of Halton, R and R Associates, and specialized sub-consultants needed to address specific requirements for projects of this type under the Ontario Environmental Assessment Act.

The Project Team consisted of staff from:

Role	Organization and Team Member
Proponent:	**Regional Municipality of Halton** **Public Works & Engineering Services**
	Jeffrey Reid, B.A., C.I.M., C.E.T. – Project Manager **Bob Wickland, A.Sc.T., CMM III** – Design Services
Prime Consultant:	**R and R Associates Inc.**
	Rick Hein, P.Eng., PTOE, AVS – Project and Transportation Manager **Rick Goertz, P.Eng.** – Design Manager/Preliminary Design **Darrell Smith, P.Eng.** – EA Process and Quality Control/Assurance
Sub-Consultants:	**Lisa Campbell, M.Sc., CCEP –** LCA Environnemental (Natural Environment) **Brian Ellis, P.Eng.** – Ellis Engineering (Structures) **John Emeljanow, P.Eng.** – Valcoustics (Noise Assessment)

Role	Organization and Team Member
	John Lamarre, P.Eng. – Lamarre Consulting Group (Drainage and Stormwater Management)
	Caitlin Lacy, B.A., Anthropology – Archaeological Services Inc. (Archaeology)
	Rebecca Sciarra, Hons. B.A., M.A., CAHP – Archaeological Services Inc. (Built Heritage)
	Mark Popik, P.Eng. – Applied Research Associates Inc. (Geotechnical & Pavement Design)

2.6 Public and Agency Consultation

Public consultation is a key feature of the Ontario Municipal Class Environmental Assessment planning and design process. Through an effective public participation program, the proponent can generate meaningful dialogue between the project planners and the public, allowing an exchange of ideas and the broadening of the information base, leading to better decision making.

2.6.1 Notification of Study Commencement and Initial TAC/PIC Meetings

The Notice of Study Commencement for the Derry Road (Regional Road 7) Transportation Corridor Improvements Class EA was published in local newspapers on the following dates:

- October 29, 2009 and November 5, 2009 – Halton Compass; and
- October 30, 2009 and November 6, 2009 – Burlington Post and Milton Champion.

Property owners (local area residents) and external technical agencies were notified of the project by mail on October 16, 2009. Letters mailed to the residents and technical agencies included the Notice of Study Commencement and the date and location of the first Public Information Centre (PIC) and Technical Agencies Committee (TAC) meetings, respectively for each group. First Nations were also notified. Copies of the newspaper advertisement, letters sent to the residents and agencies, and a list of the agencies that were notified are contained in **Appendix A**.

Technical Agencies Committee Meeting No. 1

Technical agency representatives were requested to notify the Project Team of their interest in participating in the first “Technical Agency Committee” (TAC) meeting held on November 10, 2009 via a Fax Back Form included with the letter mailings. Responses were received from twelve (12) technical agencies prior to and following the initial mailing. Copies of the Fax Back

Forms, e-mail and letter responses received from the technical agencies are contained in **Appendix B**. A copy of the database that was maintained with respect to the external agency contacts is also provided in **Appendix B**.

2.6.2 Technical and Agency Committee (TAC) Meeting No. 1

Technical Agency Committee Meeting No. 1 was held on November 10, 2009 at Hugh Foster Hall located in the Town of Milton at 141 King Street, Milton, Ontario. The meeting was scheduled from 1:30 p.m. to 3:00 p.m. There was one representative from the City of Burlington in attendance. A representative from Conservation Halton was briefed on the Derry Road Class EA subsequent to the TAC meeting as part of a latter TAC meeting held immediately after the Derry Road Class EA meeting.

The purpose of the meeting was to review the study approach, process and organization; need for improvements, study area, and background information; study timetable; key considerations and issues, key findings to date, the problem/opportunity being addressed, alternative planning solutions and the preferred solution; evaluation factors; and the next steps in the process. The meeting also provided a forum for the technical agency representative to provide study input and note any potential concerns related to the study.

The primary issues and concerns that were raised at the meeting included:

- The City of Burlington requested some form of bike lanes be implemented along this section of Derry Road; and
- Conservation Halton expressed concerns related to any potential impacts to a tributary of Bronte Creek located near the east end of the study area, adjacent to the north side of Derry Road.

A copy of the presentation and the meeting minutes for the first TAC meeting are included in **Appendix C**.

2.6.3 Public Information Centre No. 1

The first of two scheduled public information centres (Public Information Centre No. 1) was conducted on Wednesday, November 11, 2009 from 6:30 to 9:00 p.m. at Kilbride Public School located at 6611 Panton Street in the City of Burlington, Ontario.

The Public Information Centre (PIC) notice was advertised in local newspapers on the following dates:

- October 29, 2009 and November 5, 2009 – Halton Compass; and
- October 30, 2009 and November 6, 2009 – Burlington Post and Milton Champion.

The PIC notice was also posted on the Region's web site on October 29, 2009. The First Nations were also included on the PIC mailing list. A copy of the original advertised Notice of Public Information Centre No. 1 is contained in **Appendix D**.

The information centre was organized as an informal drop-in style format with panels and background materials on display. A formal presentation was provided at 7:00 p.m. followed by a question and answer session. A copy of the meeting presentation is provided in **Appendix D**. Public participants were asked to sign an attendance register and were encouraged to review the materials on display, ask questions of the Study Team, and provide their remarks on comment sheets provided at the information centre.

The purpose of the meeting was to:

- Introduce the Study to the public and outline the purpose for undertaking this Class EA;
- Present the existing conditions within the Study Area;
- Outline the need and justification (i.e. Problem Statement) for considering geometric design improvements;
- Obtain public comments and feedback on the assessment of the alternative solutions; and
- Identify future activities to be undertaken as part of the Class EA Study.

Sign-in sheets, comment sheets and presentation materials were available at the PIC.

A handout booklet containing a small format version of the larger displays was made available to the public. Once the participants at the PIC had a chance to view the display panels and ask questions of the Study Team, they were encouraged to either fill out a comment sheet during the course of the information centre or take a comment sheet with them to fill out at a later date and return to the Regional Municipality of Halton or R and R Associates Inc. Information was gathered to assist the Regional Municipality of Halton in implementing proposed improvements to the Derry Road corridor within the study limits. With the exception of personal information, all comments were included in the Environmental Study Report (ESR) and were included as part of the public record for this project. Copies of the handout booklet and comment sheet are provided in **Appendix D**.

An attendance register was maintained at the PIC and participants were requested to sign the attendance register as they arrived. A total of nine (9) individuals signed the attendance register during the 6:30 to 9:00 p.m. drop-in session. No comment sheets were received at the conclusion of the Public Information Centre. One comment was received by e-mail subsequent to the Public Information Centre. A copy of the attendance register, the one comment received and the subsequent Region response to the comment are provided in **Appendix D**.

The first PIC was generally well received by those who attended. Those comments and concerns that were provided to the Study Team by the public during the formal presentation phase of the PIC, along with the Study Team's responses, are provided in **Appendix D**. Relevant concerns were reviewed for consideration in the evaluation and assessment of alternative solutions.

The majority of attendees were either local area residents or individuals who had a general interest in the study. The majority of discussion following the formal presentation centred on the following issues:

- The volume of perceived truck traffic using the Derry Road corridor as a possible by-pass route to local truck weigh scales;
- Drainage issues related to Bronte Creek;
- Potential property impacts and existing/future road allowance widths;
- Potential noise impacts; and
- The main reasons why Halton Region was undertaking the road improvements for this section of Derry Road.

2.6.4 Conservation Halton Meeting

A meeting with Conservation Halton was held on April 1, 2010. The meeting was held to:

- Provide an overview of the study status;
- Discuss Conservation Halton concerns as summarized in a letter from Conservation Halton dated January 4, 2010; and
- Discuss a subsequent response letter from the study team dated March 6, 2010 addressing those concerns.

A copy of the Conservation Halton letter and subsequent study team response letter is provided in **Appendix C**.

The overview presentation provided a summary of the project study area, study timetable, study Problem Statement, the key considerations and issues, alternative design concepts, evaluation factors, the preferred design alternative, and roadway cross-sections. A copy of the presentation is provided in **Appendix C**. During the course of the meeting, three alternative design concepts and the preferred design were discussed in detail, highlighting the various components of each design.

Conservation Halton stressed the long timelines typically associated with permitting approvals under the Endangered Species Act. Dry culverts were discussed as a possible mitigation measure to consider. It was noted by Conservation Halton that the installation of the retaining wall and culvert will occur within the "bank full" width area of the Bronte Creek tributary.

Additional care will be required to reduce any potential impacts to the creek during the construction phase.

Conservation Halton indicated at the meeting that the issues noted in their January 4, 2010 Letter (CH File: MPR 523) were addressed by the information provided in the study team Response Letter (March 6, 2010). Subsequent to the meeting, Conservation Halton informed the Region that Species at Risk (SAR) mapping did not indicate the presence of any species at risk in the vicinity of McNiven Road and Derry Road.

A copy of the meeting minutes is provided in **Appendix C**.

2.6.5 Notification of Second TAC/PIC Meetings

Technical Agencies Committee Meeting No. 2

External technical agencies were notified of the second Technical Agencies Committee Meeting by mail on March 23, 2010. Letters mailed to the technical agencies included the date and location of the second Technical Agencies Committee (TAC) meeting. A list of the technical agencies that were notified and a copy of the letters sent to the agencies are contained in **Appendix A**.

Technical agency representatives were requested to notify the Project Team of their interest in participating in the second "Technical Agency Committee" (TAC) meeting held on April 13, 2010 via a Fax Back Form included with the letter mailings.

Responses were received from five (5) technical agencies prior to and following the initial mailing. Copies of the Fax Back Forms and e-mail responses received from the technical agencies are contained in **Appendix B**.

Public Information Centre No. 2

The Notice for the second Public Information Centre for the Derry Road (Regional Road 7) Transportation Corridor Improvements Class EA was published in local newspapers as follows:

- April 22, 2010 and April 29, 2010 – Halton Compass
- April 23, 2010 and April 30, 2010 – Burlington Post
- April 22, 2010 and April 29, 2010 – Milton Champion

The First Nations were also included on the PIC mailing list. A copy of the newspaper advertisement is provided in **Appendix A**.

As part of the public and agency consultation for the study, Public Information Centre and Technical Agency Committee meetings were held during Phase 2 and Phase 3 of the EA process in compliance with a Schedule 'C' undertaking.

2.6.6 Technical and Agency Committee (TAC) Meeting No. 2

Technical Agency Committee Meeting No. 2 was held on April 13, 2010 at Hugh Foster Hall located in the Town of Milton at 141 King Street, Milton, Ontario. The meeting was scheduled from 3:00 p.m. to 4:00 p.m.

The purpose of the meeting was to review the study process, background and timetable; the problem/opportunity being addressed; key study considerations and issues; the Recommended Planning Solution; the development and evaluation of Alternative Design Concepts; the preliminary plan for the Preferred Alternative Design; and the next steps in the study process. The meeting also provided a forum for the technical agency representative to provide study input and note any potential concerns related to the study.

A copy of the TAC No. 2 presentation and meeting minutes are included in **Appendix C**.

2.6.7 Public Information Centre No. 2

The second of two scheduled public information centres (Public Information Centre No. 2) for the Derry Road (Regional Road 7) Transportation Corridor Improvements Class Environmental Assessment study was conducted on Tuesday, May 4, 2010 from 6:30 to 9:00 p.m. at Kilbride Public School located at 6611 Panton Street in the City of Burlington, Ontario.

The purpose of the PIC was to solicit input and comments from the general public on the study findings to date and to provide the public with an opportunity to review the study process, background and timetable; the problem/opportunity being addressed; key considerations and issues; the recommended planning solution; the development and evaluation of the Alternative Design Concepts; the Preliminary Plan for the Preferred Alternative Design including mitigating measures; and the next steps in the Environmental Assessment process.

The information centre was organized as an informal drop-in style format with panels and background materials on display. A formal presentation was provided to the PIC attendees beginning at 7:00 p.m. followed by a question and answer session. A copy of the original advertised Notice of Public Information Centre No. 2 and the formal meeting presentation is provided in **Appendix E**. Public participants were asked to sign an attendance register and encouraged to review the materials on display, ask questions of the Study Team, and provide their remarks on comment sheets provided at the information centre.

The purpose of the meeting was to present and obtain feedback on the:

- Alternate design concepts considered for the preferred solution;
- Environmental conditions fieldwork;
- Assessment of the alternative design concepts;
- Preferred design concept; and
- Identify future activities to be undertaken as part of the Class EA Study.

Sign-in sheets, comment sheets and presentation materials were available at the PIC.

Participants at the PIC were encouraged to take with them an information handout booklet. The handout booklet contained a small format version of the larger displays. Once the participants at the PIC had a chance to view the display panels and ask questions of the Study Team, they were encouraged to either fill out a comment sheet during the course of the information centre or take a comment sheet with them to fill out at a later date and return to the Regional Municipality of Halton or R and R Associates Inc. by May 21, 2010. Information was gathered to assist the Regional Municipality of Halton in implementing proposed improvements to the Derry Road corridor within the study limits. With the exception of personal information, all comments were included in the Environmental Study Report (ESR) and were included as part of the public record for this project. Copies of the handout booklet and comment sheet are provided in **Appendix E**.

An attendance register was maintained at the PIC and participants were requested to sign the attendance register as they arrived. A total of eleven (11) individuals signed the attendance register during the 6:30 to 9:00 p.m. drop-in session. No comment sheets were received at the conclusion of the Public Information Centre. A copy of the attendance register is provided in **Appendix E**.

The majority of attendees were either local area residents or individuals who had a general interest in the study. A number of concerns were raised by the public during the formal presentation and generally included the following issues:

- The simulated existing noise levels do not accurately reflect the actual noise levels;
- Derry Road, east of McNiven Road may have more traffic safety issues than the segment of Derry Road currently being studied;
- The justification for undertaking the study;
- Maintaining the “rural character” of Derry Road; and
- Investigating the feasibility of staging the construction of Derry Road by separating the section of Derry Road adjacent to the Bronte Creek tributary (west of McNiven Road) from the “mainline” section located west of the tributary area

Comments and concerns that were provided to the Study Team by the public during the formal presentation phase of the PIC, along with the Study Team's responses, are provided in **Appendix E**. Relevant concerns were reviewed for consideration in the evaluation and assessment of alternative solutions. Subsequent to the presentation, the Region committed to undertaking field measurements of the noise levels and presenting the findings at another public meeting (Refer to Section 2.6.8). In addition, the Region committed to providing the public with further information related to the remaining issues brought forward by the public during the PIC. It was noted at the time of the meeting that permission to enter resident properties would be required from the residents to place noise receptors for the noise field measurements.

2.6.8 Resident Meeting

Subsequent to the input received at the second Public Information Centre (PIC) held on May 4, 2010, a Resident Meeting was held on July 13, 2010 at 7:00 p.m. at Kilbride Public School located at 6611 Panton Street in the City of Burlington, Ontario. The meeting was held to present additional study information, including the findings of further on-site noise analyses within the Derry Road study area and to provide a forum and an opportunity for further public input into the study. A total of twenty-three (23) Derry Road residents and Regional Local Councillors were notified of the Resident Meeting by hand-delivered letters dated June 11, 2010. A copy of the letters is provided in **Appendix F**.

The Resident Meeting was organized as an informal drop-in style format with the preferred design solution on display. A formal presentation was provided to the PIC attendees beginning at 7:00 p.m. followed by a question and answer session. A copy of the formal meeting presentation is provided in **Appendix F**. Public participants were asked to sign an attendance register and encouraged to review the materials on display after the meeting and ask questions of the Study Team.

The Resident Meeting was conducted in compliance with the Municipal Class Environmental Assessment (October 2000, as amended in 2007). This meeting was considered to be in addition to the second mandatory point of contact with the public (PIC No. 2) during Phase 3 of the Class EA process for this study.

The formal presentation provided an overview and discussion of the following:

- Study Background;
- The issues raised at PIC No. 2;
- Additional detail and discussion of the issues; and
- The next steps moving forward in the Class EA process.

The issues presented and discussed at the Resident Meeting included those listed in Section 2.6.7 as part of the second Public Information Centre. The main issues are summarized as follows:

- Assessment of existing ambient noise levels in comparison to computer-modelled noise levels;
- Traffic safety issues within and outside of the study area corridor along Derry Road (Milburough Line to Guelph Line inclusive);
- The justification for undertaking the study;
- Maintaining the rural character of the roadway; and
- The potential and feasibility for construction staging.

Assessment of Existing Noise Levels

In terms of the assessment of existing noise levels, a separate noise monitoring study was conducted to measure ambient noise levels at various residential locations within the study area. The locations of the sound measurements were determined based on the previously modelled locations (10 locations) in conjunction with obtaining permission from area residents (who attended the second PIC) to enter their property to conduct the sound measurements. On-site sound measurement request forms were hand-delivered to all residents within the Derry Road study area. One location on McNiven Road was a new location. Traffic volumes on Derry Road were also obtained to calibrate the sound level measurements. Copies of the on-site sound measurement request letters and subsequent responses are provided in **Appendix F**.

The results of the ambient sound monitoring indicated that the sound levels outlined in the initial Environmental Noise Assessment Report (See Section 3.2.1 and Appendix I) were accurately predicted via simulated computer modeling and correlated very well with the existing field measured noise levels with only minor differences between the decibel (dBA) values. In each case, the difference in noise levels between the existing field measured noise levels and the predicted 2031 noise levels is less than the MTO/MOE[5] protocol of 5 dBA and therefore the consideration of noise mitigation measures was not required. All of the future noise levels were below 60 dBA. The *Halton Region Noise Abatement Policy* specifies that an equivalent of 60 dBA shall be the criteria for the consideration of retrofit or local improvement noise walls. Therefore, the consideration of noise mitigation measures was not required within the Derry Road study area.

Traffic Safety Issues

Collisions over a 5-Year period from January 2005 to December 2009 were reviewed over a 4.3 kilometre section of Derry Road, extending from Milburough Line to Guelph Line. The results of

[5] MTO/MOE – Ministry of Transportation/Ministry of Environment.

the analysis indicated that within the area east of McNiven Road, the predominant collisions were Single Motor Vehicle collisions related to icy road conditions and lack of roadside recovery areas (paved shoulders) leading to a loss of driver control within the horizontal curvature area. The Region committed to having the Region's Operations Group review this area in terms of signage and spacing to ensure that it complies with current standards. There were no other indicators, based on the available collision data, that the priority of roadway improvements within this corridor should be modified (e.g., abnormal collision patterns relating to the horizontal curve). Within the remaining corridor and intersection locations there was no clear indication, based on the available collision data, of any abnormal patterns occurring within the corridor that would not otherwise be typically expected.

Justification for Undertaking the Study

The study was originally precipitated because of the issues associated with the stability of the section of roadway adjacent to the Bronte Creek tributary. In 2006, the roadway from 120 metres west of McNiven Road to the intersection was reconstructed and the slope adjacent to the creek was stabilized to prevent the roadway from potentially collapsing into the creek. In addition, steel beam guide rail was installed to address safety issues related to the steepness of the slope and the proximity of the creek to the roadway. These measures were considered to be a "temporary fix" until a more permanent solution could be implemented.

Subsequent to the reconstruction of Derry Road adjacent to the creek, Regional Council approved the Class Environmental Assessment for Derry Road as part of the Regional Capital Budget. The Class EA was required to address a number of concerns including:

- Upgrading roadway geometrics to meet prevailing Regional standards including the roadway alignment and cross-section;
- Improving the substandard pavement structure of the roadway (previous reconstruction in the year 2000 provided new pavement surface and vertical alignment improvements but did not address existing roadway base conditions); and
- Improving roadway and roadside drainage through enhancements to the road grades and profiles, replacement and/or addition of drainage culverts, and provision of proper roadside ditches (including drainage improvements adjacent to the Bronte Creek tributary).

Rural Character of Derry Road

The "rural character" of Derry Road will be maintained with the implementation of the preferred design alternative through keeping the roadway as a rural two-lane facility (i.e. ditches), minimizing property impacts while maintaining the alignment of the roadway within the current right-of-way limits, the provision of shoulders to accommodate active transportation (pedestrians

and cyclists) for local residents, and by keeping the existing tree lines intact adjacent to the roadway.

Potential and Feasibility for Construction Staging

A number of issues were examined with the possibility of potentially separating the construction of Derry Road into two stages with Stage 1 extending from the Bronte Creek tributary to McNiven Road (Approximately 150 metre section) and Stage 2 extending from Milburough Line to west of the Bronte Creek tributary. Due to the current poor condition of the section of Derry Road adjacent to the Bronte Creek tributary it was noted that, as a minimum, this section of Derry Road should be upgraded in 2012. The recommended option was to complete the Environmental Assessment for Derry Road and provide roadway improvements adjacent to the Bronte Creek tributary (Stage 1 only). Subsequently, the Region will monitor the mainline pavement structure and inform residents in advance of any future road work.

A total of four (4) individuals signed the attendance register during the 7:00 to 8:30 p.m. drop-in session. A copy of the attendance register is provided in **Appendix F**. The majority of attendees were either local area residents or individuals who had a general interest in the study. A number of concerns were raised by the public subsequent to the formal presentation and generally included the following main issues:

- A resident noted that the number of collisions on Derry Road seem high (referring to 37 collisions indicated in the presentation). It was noted that the number of collisions is not out of the ordinary for this section of Derry Road and that the collision experience is similar to other two-lane rural roadways located within the Region;
- A resident asked if the noise levels would increase in the future. It was stated that the noise levels are expected to remain close to the existing noise levels, based on the ambient noise level studies (both field and computer modeled) and the projected future noise levels based on the projected future traffic volumes along Derry Road within the study area;
- A resident asked about the "throw away" costs discussed in the presentation (i.e. those costs that would be required to stage the project beyond a single stage of construction). The resident suggested that the throw away costs would be higher than the amount stated in the presentation. It was agreed that this could be the case and it was clarified that it was estimated to cost the initial amount for contractor mobilization (as stated in the presentation); however, the cost for the installation of a transition section (e.g., between initial and final construction stages) would represent an additional cost and would also be primarily a "throw away" cost.

Comments and concerns that were provided to the Study Team by the public after the formal presentation phase of the Resident Meeting, along with the Study Team's responses, are provided in **Appendix F**.

As a follow up to the Resident Meeting, a summary letter with the formal Resident Meeting presentation attached was mailed to the Derry Road residents within the study area. The letter provided an explanation of the undertaking, the reason for conducting the Resident Meeting including the issues presented and discussed, referencing the formal presentation. Copies of the summary letters are provided in **Appendix F**. A copy of the formal presentation, as attached to the summary letters, is also provided in **Appendix F**.

2.6.9 First Nations

As part of the EA public consultation process First Nations were contacted directly by Halton Region via a letter on October 7, 2009 to inform them of the Derry Road (Regional Road 7) Transportation Corridor Class Environmental Assessment study and to provide them with notice of the first PIC. The letter encouraged the First Nations to provide relevant comments related to the study and pertaining to any areas of potential Aboriginal uses and/or activities. The letter also enquired as to any outstanding First Nation land claims within or in proximity to the study area, or any additional First Nations that should be contacted as part of the EA process.

The following affiliate First Nations were contacted as part of the EA public consultation process:

<u>Mississaugas Nation</u>

- Alderville First Nation
- Curve Lake First Nation
- Hiawatha First Nation
- Mississaugas of Scugog Island First Nation
- Mississaugas of the New Credit First Nation

<u>Iroquois</u>

- Mohawks of Akwesashe First Nation
- Oneida Nation of the Thames
- Six Nations Haudenosaunee Confederacy Council
- Six Nations of the Grand River
- The Mohawks of the Bay of Quinte First Nation
- Wahta Mohawks First Nation

A second letter from Halton Region was sent to the First Nations on February 24, 2010 as part of the public consultation process for the Derry Road Class EA study. The letter included a copy of the Stage 1 Archaeological Assessment of the entire study corridor (Refer to **Appendix G**). The letter further noted that the archaeological assessment study indicated that there are six archaeological sites within one kilometre of the study corridor with none of these sites located immediately adjacent to Derry Road. A Stage 2 archaeological field assessment would only be recommended prior to construction activities if the construction extended beyond the disturbed roadway right-of-way limits.

The letter provided the place, date and time for the second Public Information Centre (6:30 p.m. on Tuesday, May 4, 2010 at Kilbride Public School, 6611 Panton Street, Burlington, Ontario), outlining the purpose of the PIC and encouraging the First Nations to attend the PIC or provide comments on the study. The First Nations were also informed that they would be notified when the Environmental Study Report was filed for the 45-day public review period. A copy of the correspondence letters to the First Nations is provided in **Appendix G**.

3. EXISTING CONDITIONS

3.1 Natural Environment

The Class EA process requires that the existing natural environment be evaluated to determine potential negative impacts on the existing and future features and functions of the natural environment. The natural environment components include the existing vegetation, wildlife habitat, existing drainage features, aquatic habitat, sedimentation and erosion control and special consideration for environmentally sensitive areas. The evaluation process also requires that mitigation measures are explored to minimize the impacts on the natural environment and surrounding landscape and maximize the benefits to the community.

The landscape within the study area adjacent to Derry Road, Milburough Line and McNiven Road encompasses active agricultural land uses along the southern portions of Derry Road with forested areas along the northern portion of the study area, including relatively large tracts of interior forest cover and a headwater tributary of Bronte Creek west of McNiven Road. The natural areas along the northern portion of Derry Road are part of the Lowville-Bronte Creek Escarpment Valley and Extension (NAI-9A) and provide for connectivity to a much larger contiguous natural area that extends beyond the Halton Region boundary. The flora and fauna species present in the general area include identified provincially and locally rare species.

The *Natural Sciences Report* component of the EA is required in order to determine if the proposed improvements will have any impact on the natural environment. From this perspective, the study area was reviewed in general with specific criteria evaluated for the recommended alternative including the following:

- Aquatic Habitat and Fisheries (including significant species);
- Terrestrial Features (valleylands, wetlands, significant woodlots, ANSIs, ESAs & greenlands, and significant species);
- Wildlife (birds, herpetofauna, mammals); and
- Natural Heritage System (Greenbelt Plan Area, core areas, natural corridors, potential linkages, secondary linkages, other woodlots/wetlands and potential (unevaluated) wetlands.

Supporting documents that have been consulted for relevant natural heritage data include:

- Bronte Creek Hydrology and Stream Morphology Study (BCHMS, PEIL, 2003);
- Bronte Creek Watershed Study (BCWS, Conservation Halton, 2002); and
- Halton Natural Areas Inventory (NAI) Volumes 1 and 2 (Dwyer, 2006).

The Ministry of Natural Resources and Conservation Halton were also contacted for existing natural heritage information which has been incorporated into this report.

The complete *Natural Sciences Report* is provided in **Appendix H**.

3.1.1 Physiography and Soils

The physiography of the Bronte Creek Watershed is dominated by the Niagara Escarpment which runs on a north–south axis through Halton Region and divides many of the watercourses in the area into lower and upper reaches. In terms of bedrock geology, three formations make up the watershed. The Queenston Formation, comprised of red shale, underlies the lower portion of the watershed below the escarpment and forms the scarp's lower slopes. The Cataract Group, comprised of sandstone, dolostone, and shale, overlies the Queenston Formation and is exposed on the escarpment face. The Amabel Formation, comprised of erosion resistant dolostone, overlies the other formations, forms the upper scarp face, and underlies the upper portion of the watershed above the escarpment (Conservation Halton, 2002; Dwyer, 2006; PEIL, 2003).

The majority of the study area is located within the Norfolk Sand Plain physiographic region that lies in the south-central portion of the Bronte Creek Watershed. The permeable soils (sands and silts) that make up this feature confer excellent drainage permitting extensive agricultural land usage throughout the area, such that woodlands are typically limited to low lying wetlands. Further, the permeable soils permit groundwater recharge across the feature which contributes to the coldwater habitat present in Bronte Creek (the receiving waters of Kilbride Creek). The northernmost portion of the study area in the vicinity of Kilbride Creek (near McNiven Road) is located within a Spillway physiographic region. This feature contains deep sand and gravel accumulations deposited along glacial spillways which allow groundwater discharge into Bronte Creek and the downstream reaches of Kilbride Creek (Conservation Halton, 2002).

An assessment of the soils and drainage in the study area was conducted by reviewing the relevant soils map for the area (Canada Department of Agriculture; 1971). According to the soils mapping, eight different soil types traverse the subject lands. Five of the soil types comprising the majority of the study area are moderately well to well drained sandy loams while one soil type that occurs in the central portion of the study area is imperfectly drained sandy loam. Additionally, a relatively narrow swath of very poorly drained organic mesisol extends north from Derry Road in the east central portion of the study area. Finally, variably drained loam is present on the south side of Derry Road at McNiven Road. The soils on the eastern portion of the subject lands are slightly to moderately stony and are present on complex topography with 2 to 9 percent slopes; the soils in the central portion are stone free and are present on simple topography with 0 to 2 percent slopes; and the soils on the western portion are slightly to moderately stony and are present on simple or complex topography with 2 to 5 percent slopes.

3.1.2 Aquatic Habitat and Fisheries

As noted above, a tributary of Kilbride Creek[6] traverses Derry Road in the northern portion of the study area via relatively small culverts and a portion of the main branch of Kilbride Creek travels along the northwest side of Derry Road for approximately 100 metres immediately before exiting the study area via a single span concrete structure at McNiven Road. Mapping contained in the Bronte Creek Watershed Study (Conservation Halton, 2002) displays one crossing of Derry Road by a tributary of the creek that originates southeast of the road and joins the main branch on the northwest side of the road. However, correspondence from Conservation Halton to *R and R Associates Inc.* pertaining to the Class EA study (*dated January 4, 2010; Appendix A – Natural Sciences Report*) suggests that there are two tributaries crossing Derry Road within the study area. Mapping contained in the Halton NAI (Dwyer, 2006) also displays the two crossings but shows the smaller tributary on a different alignment, south of the junction with the main tributary. The smaller tributary crossing located farther south on Derry Road appears to be associated with a large residential pond west of Derry Road and picks up roadside drainage.

3.1.2.1 Historical Data

The Bronte Creek Watershed, which includes the Kilbride Creek subwatershed, has been evaluated in several studies dating back to 1960. The Bronte Creek Watershed Study (BCWS) prepared by Conservation Halton in 2002 provided a comprehensive evaluation of the watershed and its aquatic habitat through the incorporation of historical findings as well as new data gathered from 1998 to 2001 in support of the study. In 2003, *Planning & Engineering Initiatives (PEIL)* completed the Bronte Creek Hydrology and Stream Morphology Study (BCHMS) on behalf of Conservation Halton. Following, is a discussion of the aquatic conditions present in Kilbride Creek based on a review of the 2002 and 2003 reports.

Kilbride Creek begins above the Niagara Escarpment within the Guelph Junction Provincially Significant Wetland (PSW) Complex and is fed by groundwater discharge beginning near Highway 401. Further south, the watercourse travels through the Guelph Junction Woods ESA, flows over a natural fish barrier posed by the escarpment downstream of Kilbride, and enters the Bronte Creek Valley ESA/ANSI joining Bronte Creek just upstream of the Dakota Mills Dam. Flows through the reach immediately upstream of Kilbride (in the study area) can be intermittent during periods of drought; however, flows are restored via groundwater inputs in the vicinity of the settlement (Conservation Halton, 2002; PEIL, 2003).

An instream temperature survey conducted for the BCWS at seven stations in Kilbride Creek indicated that, although the upper reaches of the watercourse exhibit warm temperatures, the groundwater inputs into the creek near Highway 401 soon result in marginal

[6] In the ESR documentation, “Kilbride Creek tributary” and “Bronte Creek tributary” refer to the same tributary crossing of Derry Road, west of McNiven Road.

coolwater/warmwater habitat conditions that extend downstream past Steeles Avenue. South of Steeles Avenue, a large online pond complex warms the temperatures in the creek until the creek reaches Kilbride where the groundwater inputs once again result in coolwater habitat that extends downstream to Bronte Creek. It was noted in the study that *"the [measured] coolwater temperature regime does not correspond with the healthy Brook Trout populations (coldwater temperature regime indicator) which characterize much of Kilbride Creek"* (Conservation Halton, 2002).

Fish community sampling was conducted at three stations in Kilbride Creek (two upstream and one downstream of the study area) for the BCWS in order to *"…qualitatively assess changes in fish community composition from the headwaters of [the creek] to [its] confluence with the main branch of Bronte Creek"* (Conservation Halton, 2002). Additionally, the data was used to evaluate changes in the fish community over time through comparison with historical studies. According to the report, the coolwater habitat present in Kilbride Creek from Bronte Creek to the escarpment supports Brook Trout, Brown Trout, and Rainbow Trout. Brook Trout were also found in the reaches upstream of the escarpment and the report indicated that the Brook Trout habitat likely extends north of Highway 401. In terms of the upper portion of the subwatershed, the report indicates that the online Burns Reservoir was stocked with Rainbow Trout until the early 1990's, supported a centrachid fishery until a near total winterkill event in 1999, and was restocked with Black Crappie, Pumpkinseed, and Largemouth Bass in 2000. The reaches upstream of the reservoir were not sampled. Forage fish species such as Rainbow Darter, Johnny Darter, White Sucker, Creek Chub, and Blacknose Dace were found throughout the watercourse. The full fish community data presented in the BCWS has been included in *Appendix B – Natural Sciences Report* for reference purposes.

According to the January 4, 2010 correspondence from Conservation Halton (*Appendix A – Natural Sciences Report*), the Ontario Ministry of Natural Resources may have concerns regarding Redside Dace (Clinostomus elongatus; S2, END), Atlantic Salmon (Salmo salar; SX, EXP), and American Eel (Anguilla rostrata; S1, END) populations in Kilbride Creek. According to the BCWS, Redside Dace was relatively common in the upper portions of the Bronte Creek Watershed until the early 1970s; however, the resident population appears to have declined and contracted since then as only three records of the species have been recorded since 1990 despite sampling at former known sites. The report indicated that, presently, Redside Dace appears to be limited to a reach of Bronte Creek and one of its tributary systems southwest of Kilbride Creek. Atlantic Salmon, which used to be abundant in the Bronte Creek Watershed, has been extirpated from Lake Ontario and its tributaries since the late 1800s (BCWS, 2002). According to the BCWS, Atlantic Salmon fry were stocked in Bronte Creek and Willoughby Creek from 1997 to 2000 in an effort to re-establish the population in the watershed. However, no indication was given as to the success of the program. The status of American Eel in the watershed is unclear as there is no discussion of the species in the BCWS. No past or present records for any of the three fish species are included in the BCWS fisheries data for Kilbride Creek (*Appendix B – Natural Sciences Report*).

Correspondence from OMNR dated June 7, 2010 (*Appendix A – Natural Sciences Report*) indicated that there are no fish species of concern within the study area. Species and their respective habitat that receive protection under the Endangered Species Act 2007 may require a permit should the proposed alternative cause harm to these species or their habitat. Fisheries data provided by Conservation Halton (2010) indicated current records (2007) of a variety of fish species immediately downstream of the study area, just east of McNiven Road. These species included the presence of Brook Trout (Salvelinus fontinalis) which is typically classified as a coldwater fish, suggesting that the temperature regime is suitable to support a population. There were no current records of aquatic species of concern within or near the study area based on the historical data provided. A copy of the historical data provided by Conservation Halton has been included in *Appendix B1 – Natural Sciences Report*.

Benthic invertebrate sampling conducted for the BCWS according to the BioMAP protocols (Griffiths, 1999) at the same three stations used for the fish community sampling indicated that the *"water quality within the subwatershed was generally non-impaired to slightly impaired"* (Conservation Halton, 2002). However, it was noted that the benthic indices used in the evaluation may not be entirely appropriate given the characteristics of the creek (low gradient, non-gravel bottom) and a reference condition approach was recommended for future monitoring. Nevertheless, the benthic study results in Kilbride Creek appeared to correlate well with the instream temperature and fish community studies as healthy, diverse fish communities such as that found in Kilbride Creek were generally found in reaches with non-impaired or slightly impaired water quality throughout the watershed (BCWS, 2002).

Overall aquatic ecosystem health in the Bronte Creek Watershed was evaluated in the BCWS (2002) using the factors outlined above as well as water chemistry, instream habitat, and riparian cover parameters. Although the majority of Kilbride Creek was rated as having high aquatic ecosystem health, a short section in the northern portion of the subwatershed and the section from Steeles Avenue downstream to the escarpment (which includes the study area) were rated as having moderate health. The warming influence of the online ponds just south of Steeles Avenue, as well as, channel alterations downstream of the ponds (upstream of the study area) were given as the reason for the reduced rating through the Derry Road area. Removal or reconfiguration of the online ponds and riparian plantings and/or natural channel design in the altered section was recommended to enhance the degraded coolwater habitat in this reach.

A fluvial geomorphological assessment of Kilbride Creek conducted for the BCHMS indicated that, although there are relatively few concerns for the creek on the whole, the section of the main branch in the study area where the watercourse bends 90 degrees and travels beside Derry Road for about 100 metres is identified as an area of concern. The report indicated that the very small distance between the creek and the road in this area increases the possibility of increased sediment and contaminant loadings into the creek. Additionally, an adjacent landowner reported increased erosion and fallen trees in this area subsequent to construction

on Derry Road in 2000. The study recommended monitoring this location for erosion to avoid loss of the narrow buffer or roadway. As well, it was recommended that the area be monitored for sedimentation accumulation. The reach of the creek upstream of the bend was given an A4 Rosgen classification in the report. This classification indicates a totally confined, well entrenched channel with slopes of 4 to 10 percent, a low width/depth ratio, gravel substrate, and bankfull flows described as step/pools with associated plunge or scour pools (USEPA, 2008). Although the study reach along Derry Road was not classified, the reach downstream of the study area was given an A5 classification indicating similar channel characteristics as the upstream reach but with sandy substrate.

Flow, sediment transport, and erosion were also studied throughout the watershed in the BCHMS. In terms of flow and sediment transport, the study found that, in general, bankfull dimensions were as expected, bedloads in the watershed are made up of many different materials, suspended solids concentrations in the creeks are relatively low, and the watercourses were transporting sediment efficiently. Further, the report indicated that as suspended sediment is being transported through the watercourses, it is not collecting on the creek beds where it could degrade aquatic habitat. It was concluded that the watercourses are in equilibrium with the current flow regimes. Results of the erosion analysis from the study indicated little bank retreat in the watercourses over the study period. However, the reach of the main branch in the study area was assigned a High Erosion Sensitivity rating while the reach immediately downstream was given a Moderate rating.

3.1.2.2 Field Assessment

The fisheries habitat and channel morphology of the main branch of Kilbride Creek (adjacent to Derry Road) was assessed during field visits conducted for this report. The smaller channel located south of the main tributary was not assessed in terms of habitat or morphology as the channel was dry and fully vegetated during the field site visits completed for this study. As well, the channel extends onto private property beyond the road allowance.

The main branch of Kilbride Creek enters the study area from the northwest, bends 90 degrees to the northeast at Derry Road, flows along the north side of the road for approximately 100 m, and exits the study area via a concrete span structure along McNiven Road approximately eight metres wide. The watercourse, which exhibits relatively uniform width in this area, flows within approximately two metres from the road edge along most of this reach but angles northward as it approaches McNiven Road (*Appendix D – Natural Sciences Report, Photographs 1 and 2*). Substrate in the channel was comprised mainly of cobble with some boulders, gravel, and sand during the site visits. The southern bank (along Derry Road) is comprised of boulders and hunks of concrete and is relatively high in comparison to the northern bank. Near McNiven Road, an approximately ten metre wide manicured floodplain area is present at the northern top of bank beyond which the ground slopes up to a manicured front yard. The entire width of the span structure at McNiven Road was wet during the 2009 and 2010 site visits suggesting the

floodplain area may be inundated during peak flow events (*Appendix D – Natural Sciences Report, Photograph 3*). The bankfull width and wetted width, measured in October of 2009, were 8.6 metres and 6.1 metres, respectively with a maximum depth of 0.22 metres. These dimensions suggest a channel that has widened as compared to the data presented in the BCHMS (2006), however, those measurements were taken upstream of the 90 degree bend in the channel. Mean flow was measured at 0.34 m/s. Within the main tributary, there do not appear to be any impediments to flow or fish movement into the upstream reaches. The culverts beneath Derry Road and the wooden weir structure maintaining the wetland pond on the southern side of Derry Road may prohibit fish movement into the smaller secondary tributary. Small fish were observed within the wetland pond south of Derry Road.

Riparian cover on the south bank is severely limited (*Appendix D – Natural Sciences Report, Photograph 1*) and is comprised mainly of weedy herbaceous species with a few small trees and shrubs close to McNiven Road. Notably, a few standing snags were observed in this area. Riparian cover on the northern bank is comprised of a narrow swath of mature trees and shrubs approximately ten metres wide, beyond which is manicured lawn. Instream cover is present in the form of boulders and coarse woody debris.

As discussed above, a tributary of Kilbride Creek joins the main channel near McNiven Road. Site visits confirmed the confluence which is represented by three culverts under Derry Road (*Appendix D – Natural Sciences Report, Photograph 4*). One relatively large culvert (800 mm diameter) appears to carry the bulk of the flow but two smaller culverts (200 mm diameter) were present as well. The culverts were perched approximately 5 to 20 centimetres above the surface of the main channel during the fall 2009 site visit; however, it is not clear if they are perched during higher flow events. Notably, a wooden weir structure has been placed at the upstream end of the culverts resulting in a relatively large pond that is located within approximately 1.5 metres of the south side of the road (*Appendix D – Natural Sciences Report, Photograph 5*). Very little riparian cover is present between the pond and Derry Road; however, trees shade the north side of the pond. Cattails (Typha sp.) dominate the upstream end of the pond.

Although the lands could not be accessed for this study, mapping contained in the BCWS and the Halton NAI (Dwyer, 2006) indicates the tributary flows through the wetland present on the south side of Derry Road. Recent correspondence from Conservation Halton (*January 4, 2010; Appendix A – Natural Sciences Report*) identifies the wetland as part of the Kilbride Swamp PSW Complex. The NAI classified the wetland as Mixed Swamp (SWM) under the Ecological Land Classification for Southern Ontario (ELC) protocols (Lee et. al., 1998). The roadside surveys conducted for this report confirmed this classification and noted birch (Betula sp.) as the dominate tree species in the wetland in association with willow (Salix sp.) and conifers. Poplar (Populus sp.), Sugar Maple (Acer saccharum var. saccharum), Green Ash (Fraxinus pennsylvanica), and Staghorn Sumac (Rhus typhina) were identified from Derry Road along the northern limit of the wetland. A roadside ditch is present in this area which may contribute to the

inputs into the main tributary of Kilbride Creek (*Appendix D – Natural Sciences Report, Photograph 6*).

The mapping contained in various sources display the tributary on different alignments. Although the lands could not be accessed, it appears based on the field site visits and 2009 aerial imagery (Google, 2009) that the alignment contained in the NAI mapping is most accurate south of Derry Road. This alignment indicates two channels that converge at the aforementioned pond; one that extends south into the wetland and another that meanders west through the wetland before bending north and crossing Derry Road. Site visits confirmed a culvert crossing in the vicinity of 1275 Derry Road, however, the contribution of roadside drainage and the upstream catchment area could not be confirmed. Cattails and Reed Canary Grass (Phalaris arundinacea) are present along the road at the downstream end of the culvert (south side of Derry Road) while Swamp Milkweed (Asclepias incarnata) and Spotted Joe-pye Weed (Eupatorium maculatum) were identified at the upstream end of the culvert where a roadside ditch is present. Upstream of the culvert, the tributary appears to be connected to a private (online) pond with abundant Common Reed (Phragmites australis). The lands upstream of the pond could not be accessed; however, it appears on aerial imagery that the channel continues northwest on a line perpendicular to Derry Road which corresponds to the alignment displayed in the mapping contained within the recent correspondence from Conservation Halton (*Appendix A – Natural Sciences Report*).

Roadside drainage is variable along Derry Road ranging from defined swales to leveled shoulders. Based on the topography of the road and variability in roadside drainage, it is difficult to determine the hydrologic surface linkage between the roadside runoff and the existing surface water hydrologic features. However, given the proximity of the wetland pond feature and the main tributary of Kilbride Creek to the road, it should be presumed that there is direct runoff from the road into both the wetland and the tributary crossing beneath Derry Road. General water quality parameters were measured during the site visits completed for this study as presented in **Table 3-1**.

Table 3-1: General Water Quality Data from the portion of the Main Branch of Kilbride Creek in the Study Area

Parameter	LCA (10/20/2009)[7]	LCA (06 03/10)
Temperature (^{o}C)	10.3	20.1
Conductivity (µS/cm)	742.4	652.3
TDS (ppm)	516.9	446.3
pH	7.05	8.11
Dissolved Oxygen (mg/L)	12.02	6.49

[7] Measurements taken approximately ten (10) metres upstream of McNiven Road.

In general, aquatic organisms require pH levels between 5 and 9, dissolved oxygen levels above 5 mg/L, conductivity levels below 1600 µS/cm, and TDS levels below 1000 ppm although fish spawning can be affected by lower levels of conductivity and TDS. The general water quality appears to fall within the preferred range for aquatic organisms despite proximity to the road.

3.1.2.3 Summary

Based on the historical data provided by Conservation Halton and the field assessments completed for this study, both the wetland system and the main tributary of Kilbride Creek appear to be productive in terms of fish habitat, provide suitable aquatic habitat for a variety of species and are not limited by surrounding land uses or existing riparian buffer. The close proximity of the main tributary to Derry Road and potential instability of the banks should be considered in the design alternatives as there may be opportunities to improve the aquatic habitat.

3.1.3 Terrestrial Ecosystems

The portion of Derry Road within the Study Area extends from Milburough Line (Regional Road 24) to McNiven Road within the City of Burlington and the Town of Milton, encompassing both natural conservation lands with mature riparian features in the northern portion of the study area and open, active agricultural areas with limited tree cover and rural residential development in the southern portion of the study area.

3.1.3.1 Historical Data

The Halton Natural Areas Inventory (2006) and the Bronte Creek Watershed Study (2002) have completed extensive evaluation and mapping of the vegetation communities throughout the Bronte Creek watershed which includes the vegetation communities within the Kilbride Creek subwatershed. The Lowville-Bronte Creek Escarpment Valley Extension (NAI-9/9A) is located within the northern portion of the study area and to the south of the study area while Calcium Pits (NAI-19) is located northwest of the study area and the Guelph Junction Woods and Extension (NAI-20) is located west of the study area, supporting the headwaters of a tributary of Kilbride Creek. The study area is specifically located within NAI 9A. As per the information provided in the Halton Natural Areas Inventory (2006) report, the vegetation communities for this area were determined based on aerial photograph interpretation. As such, the field investigations completed for this report sought to verify the vegetation community data presented in the NAI (Map Sheet BR080, 2005) based on roadside surveys.

The NAI report (2006) documented twenty-two plant communities in NAI-9. Given the proximity between NAI-9 and NAI-9A and the soils, topography and land uses, it can be presumed that there are similar vegetation types and communities in NAI-9A.

3.1.3.2 Field Assessment

Field investigations and air photo interpretation determined the geographical extent, composition, structure and function of vegetation communities on and adjacent to the study area. A review of vegetation communities presented in the Halton Natural Areas Inventory – Detailed ELC Mapping (2005) was undertaken for the study area. Air photos were also used to interpret and determine the limits and characteristics of vegetation communities found abutting Derry Road.

The wooded natural areas along Derry Road in the northern portion of the study area include several ELC polygons, specifically identified in map sheet BM080 (*Appendix B – Natural Sciences Report*). The predominant polygons adjacent to Derry Road within the study area are: Deciduous Forest, Mixed Forest, Mixed Thicket Swamp and Cultural Meadow. The field evaluations completed for this study confirmed the ELC designations that had been assigned to the various areas along Derry Road and the dominant and abundant species within these areas were documented. Along the southern portions of the study area, the vegetation consisted primarily of roadside trees and sporadic hedgerows amidst agricultural and rural residential lands. The mature roadside trees were individually identified as the road works may require selective removal of trees within the road allowance.

A roadside vegetation inventory was conducted for all lands within ten to twenty metres from the existing road in the fall of 2009 and in June of 2010 where access was possible. Private land ownership prohibited the ability to completed comprehensive surveys beyond the road allowance in most areas. No additional ecological land classification (ELC) was completed for this report as the proposed road improvements are primarily limited to the existing road footprint such that the ELC polygons identified in the historical reports are of sufficient size that they will remain intact following the road improvements. It was noted that within the wetland area south of Derry Road, there were a significant number of dead and dying trees, specifically Elm and Beech species.

An inventory of the vegetation identified during the field site visits has been included in Appendix B2 – *Natural Sciences Report* for reference purposes. A table detailing the tree species and relative sizes for those trees located within the road allowance on the southern portion of the study area has also been included in *Appendix B2 – Natural Sciences Report*. There were no federally or provincially threatened or endangered vegetation species identified within the right of way. However, Swamp White Oak (Quercus bicolor) was noted at the McNiven culvert. This species is considered regionally rare.

3.1.4 Wildlife and Wildlife Habitat

3.1.4.1 Historical Data

The BCWS Natural Heritage Report (*Appendix B – Natural Sciences Report*) lists rare species occurrences for all NAI's within Halton Region. Although flora inventories were not conducted for NAI-9A, incidental observations of local fauna were reported and a list of rare species potentially found in the vicinity of the study area were listed. Significant species identified within the area included one butterfly, two dragonflies, and the Jefferson/blue-spotted salamander complex (Ambystoma jeffersonianum-laterale) which is considered threatened provincially and nationally, however, the presence of the salamander was not noted in the correspondence received from the Ministry of Natural Resources.

The study area is divided by anthropogenic uses of rural farmland and rural residential which extend through the southern portion of the study area. The northern portion of the study area is of ecologically sensitive origin with multiple significant natural heritage features. Wildlife habitat within the northern portion of the study area is typical of undisturbed forest and interior forest habitat. The most significant habitat consists of Kilbride Creek and the associated Kilbride Creek Provincially Significant Wetlands. The natural areas surrounding the watercourses and the woodlot provide nesting and dwelling habitat for many wildlife species including birds, mammals and herpetofauna. Wildlife expected to be found within the study limits include wildlife species that exhibit a tolerance for human activity. The Fauna Inventory presented in *Appendix B1 and B2 – Natural Sciences Report* details the species of wildlife that were documented within the project limits based on the current study and historical records.

Correspondence from the Ministry of Natural Resources dated June 7, 2010 (*Appendix A – Natural Sciences Report*) indicated that there were historical records of a number of Species at Risk recorded within the study area. Species at Risk identified included the Milksnake (Lampropeltis triangulum) and Northern Bluet (Enallagma cyanthigerum). The natural heritage features recorded in the study area include the Provincially Significant Kilbride Swamp Wetland Complex. With the exception of these species, no bird, amphibian or mammal species located within the study area are considered to be of provincial or regional significance according to the Natural Heritage Information Centre (NHIC) Provincial Rankings (SRANK) and the OMNR status list.

According to the Halton Natural Areas Inventory (2006), NAI-9/9A, defined as the Lowville-Bronte Creek Escarpment Valley and Extension, provides interior forest and moderate habitat for flora and fauna, many of which are native. In terms of species richness, NAI-9/9A supports twenty species of butterflies in NAI-9 and thirty-nine species in NAI-9A, nineteen native species of dragonflies and damselflies, nineteen native herptofaunal and seventy-six species of breeding birds, including fourteen interior species. Seventeen native mammal species were

also recorded in NAI-9 and two in NAI-9A. The significant species within this area have been summarized in the NAI (2006) report (pages 58-64, *Appendix B1 – Natural Sciences Report*).

3.1.4.2 Field Assessment

Field surveys conducted in June 2010 confirmed the presence of American Toad (Bufo americanus), Western Chorus Frog (Pseudacris triseriata), and Green Frog (Rana clamitans) based on the field surveys. Western Chorus Frog (Great lakes-St. Lawrence Canadian Shield population) is classified as a Threatened species according to the COSEWIC status report. As the field inventories were initiated in the summer of 2009, the timing was late for amphibian surveys in 2009. However, amphibians were noted on the various field days and the historical data for this area was reviewed. The Marsh Monitoring Program was initiated in June of 2010 but the initial surveys confirmed that completion of the protocol would not provide additional data and the designs were such that the amphibian habitat was not being altered in terms of size or quality. As such, more extensive field data collection was not warranted.

Raccoon tracks were recorded during the site visits completed in fall of 2009 and summer of 2010. A local resident also reported a high population of muskrat in the area and noted significant muskrat roadkill although none was observed on the field site visits (Personal communication). Standing snags and tree cavities were also observed in the woodland indicating current and potential habitat for nesting birds. Although no deer were observed directly, White-tailed Deer (Odocoileus virginianus) are also utilizing the property as evidenced by their tracks in various locations. Mast and berry producers in the woodlot and thicket areas provide a food source for various mammalian and avian species.

Along the southern portion of Derry Road within the study area, the landscape transitions to agricultural uses, including active fields, mowed lawns and fallow fields. While these areas provide suitable habitat for a variety of small mammals and a variety of birds, there are no water features or wooded areas within the southern portion of the study area.

Avifaunal surveys were completed in the fall of 2009 and the spring of 2010 and included an assessment of the potential habitat along Derry Road. The surveys were limited the areas along the road in order to determine which species are actively utilizing the lands adjacent to the road and those that may be impacted by the proposed road works. The avifaunal species present in the study area are a mixture of open country and woodland species. The observed woodland species were at the edge of their habitat in the large woodlot.

Twenty-seven avian species, three herptofaunal species, and two mammalian species were observed or heard during the site visits completed for this study. The majority of species identified were ranked as common nationally, provincially, and regionally according to the Natural Heritage Information Centre (2008) and supporting documentation. The species lists presented in this report include those fauna identified on the site and on adjacent lands and

include species expected but not observed based on range and habitat availability. Additionally, historical data for the area from the Ontario Breeding Bird Atlas (OBBA), Ontario Partners in Flight (PIF), the SARO and NHIC databases, Bird Studies Canada and the Audobon Christmas Bird Count (CBC) databases is presented in the bird inventory. A search of the NHIC database confirmed historical records of rare, threatened or extirpated wildlife species within an approximately one kilometre radius of the subject lands. The NHIC database information is presented in *Appendix B – Natural Sciences Report*. The bird survey confirmed the presence of Barn Swallow, a high priority candidate due for assessment in April of 2011. Eastern Wood-Peewee is also identified as high priority candidates, while the Belted Kingfisher is classified as mid-priority. All wildlife data and historical information are presented in Appendix B for reference purposes.

Several avifaunal species identified within the study area are candidates for assessment by COSEWIC. This designation indicates that they are species of concern but require further evaluation. Of the candidate species, Eastern Wood-Pewee (Contopus virens) is a High Priority Candidates. Eastern Wood-Pewee belongs to the aerial insectivore group of birds which have undergone dramatic declines in population numbers over the last twenty years. The reason for the decline is not clear. Several aerial insectivore species were observed in the study area due to the presence of habitat that supports diverse food sources. Other woodland area-sensitive birds observed included the Veery (Catharus fuscescens). Species of interest utilizing the wetland area included the Barn Swallow (Hirundo rustica) which is a COSEWIC High Priority Candidate under review. Area-sensitive species either require a large area of suitable habitat for breeding or breed in higher densities in such areas. These species generally will not breed in what appears to be suitable habitat if it is not part of a much larger tract, irrespective of the size of their home ranges which can be quite small. The significance of area-sensitive species is that they act as indicators of the overall health of the landscape, and quality of the habitat (Environment Canada, 2007). One of the observed bird species, the Eastern Wood Peewee, has been identified by Ontario Partners in Flight (OPIF) or Bird Studies Canada (BSC) as species of conservation concern. It is important to note however, that both the OPIF and BSC rankings, in and of themselves, confer no protection under the PPS or other applicable regulations and policies. Rather, they are meant to be used as guides in identifying habitat and features that may be subject to the policies and regulations.

Partners in Flight (PIF), established in 1990 as a response to declining neotropical bird species, now includes all landbirds and PIF partnerships now extend throughout North and Central America. The PIF mission is to keep common birds common, to help species at risk, and to work in partnership for birds, habitat, and people. Assessment scores and prioritization methods are provided by the PIF Science Committee (Canada, USA, Mexico). In Canada PIF activities are coordinated by a National Working Group. In Ontario this conservation initiative began in 1995. A partnership of government and nongovernmental agencies produced a bird conservation plan for Ontario that was published in 1997 as the Ontario “Flight Plan”. Priority species lists for southern Ontario were subsequently produced by Bird Studies Canada

(Couturier, 1999). The current plan, OPIF, builds on these earlier efforts with data provided by the Canadian Wildlife Service, the Breeding Bird Survey, the Ontario Breeding Bird Atlas, Christmas Bird Counts, and others. The plan is positioned within the North American Bird Conservation Initiative (NABCI) Bird Conservation Region (BCR) planning framework where southern Ontario is identified as BCR 13. OPIF identifies 42 species that regularly breed and/or winter in ON BCR13. For each species the OPIF plan identifies a category (forest, grassland/agricultural, shrub/successional, and/or aerial insectivore), lays out reasons for concern, sets overall conservation objectives, and recommends action. The intent is to both facilitate and evaluate implementation of landbird conservation efforts in ON BCR 13.

The purpose of the Bird Studies Canada rankings is to assist municipalities in identifying natural heritage features, in particular significant wildlife habitat and significant woodlands, by using bird species that have been deemed of conservation concern. A species level of conservation concern was arrived at by a screening process through three main criteria: its range distribution and importance of a particular region to the overall range; the biological characteristics that make it vulnerable; and its habitat area requirements. Species are separated into three broad categories: forest, marsh, and open country, and within each category are four levels of conservation priority with Level 1 being the highest level of concern. All species within each category are considered to be of equal conservation importance. These conservation priorities were incorporated into OPIF.

Significant Wildlife Habitat – Four general types of significant wildlife habitat may be designated according to the PPS including: migration corridors, seasonal concentration areas, rare or specialized habitat, and habitat for species of conservation concern. The OMNR description of the four categories is presented in Appendix G (Natural Sciences Report, Section 2.5.6 - Table 3: OMNR Descriptions of Significant Wildlife Habitat). Based on the MNR defined criteria, the wetland areas, localized vernal pools and the surrounding woodland areas provide for seasonal concentration areas, habitat of species of conservation concern and animal movement corridors. However, as these features are outside of the proposed work area, the relatively impacts are deemed negligible as none of the identified features or functions will be altered.

3.1.5 Designated Natural Areas

3.1.5.1 Greenbelt and Niagara Escarpment Plans

According to Schedule 4: Natural Heritage System of the Greenbelt Plan (2005), the study area is located within the Niagara Escarpment Plan Area. All existing, expanded or new infrastructure approved under the Environmental Assessment Act is permitted within the Protected Countryside provided it meets one of two objectives contained within Policy 4.2.1.1 of the PAL. According to the Niagara Escarpment Plan (2008), Map 3 Regional Municipality of Halton, a portion is designated as Escarpment Rural Area and Area of Development Control.

Transportation facilities are permitted in the Escarpment Rural Area according to the policies contained within the Niagara Escarpment Plan.

3.1.5.2 Greenlands

ROPA 38 (Five-Year Regional Official Plan Review) identifies the Escarpment Rural Area in the study area and identifies the portion of the study area within the Protected Countryside of the Greenbelt Plan Area as Prime Agricultural Area. Additionally, the Official Plan of the Town of Milton identifies Greenlands A and Greenlands B in the study area. The Greenlands A areas appear to correspond with the main channel and portions of the tributary of Kilbride Creek while the Greenlands B area corresponds with a wetland polygon identified in the Official Plan on the south side of Derry Road. The goal of the Greenlands System is to maintain as a permanent landform of an interconnected system of natural areas and open space that will preserve areas of significant ecological value while providing, where appropriate, some opportunities for recreation. According to Table A1 in the Appendix to the Plan, transportation and utilities are permitted in Agricultural Rural Area and Greenlands B while essential transportation and utilities are permitted in Greenlands A.

3.1.5.3 Environmentally Sensitive Areas (ASAs) and Areas of Natural and Scientific Interest (ANSIs)

Halton Region designates Environmentally Sensitive Areas based on criteria contained in the ROPA 38 (Five-Year Regional Official Plan Review). There are no designated Environmentally Sensitive Areas (ESAs) in the study area. There are no ANSI's located in or adjacent to the study area (within 50 metres). It should be noted that the study area is adjacent important natural heritage and natural hazard features and is a potential candidate for the extension of Lowville-Bronte Creek Escarpment Valley Environmentally Sensitive Area.

3.1.5.4 Valleylands

There are no significant valleylands associated with the watercourses within the study area. However, topographical relief associated with the main channel of Kilbride Creek near McNiven Road appears to define a relatively small floodplain area on the north side of the watercourse. The valleylands associated with Kilbride Creek are located beyond the study area limits.

3.1.5.5 Wetlands

Figure A1 (Evaluated Wetlands in Halton) from the ROPA 38 (Five-Year Regional Official Plan Review) identifies a wetland polygon in the study area on the south side of Derry Road labeled 'Other Wetlands'. Mapping in the BCWS identifies a similar polygon designated as Locally Significant Wetland. However, recent correspondence dated January 4, 2010 from Conservation Halton (*Appendix A – Natural Sciences Report*) indicated that the study area

contains portions of the Kilbride Swamp Provincially Significant Wetland (PSW) Complex. Correspondence from MNR (dated June 7, 2010) confirmed the wetland designation.

3.1.5.6 Woodlots

The woodlands within the study area meet numerous of the criteria defined by the MNR Natural Heritage Reference Manual (2010). As such, the woodlands within the study area should be considered Significant provincially.

Figure A2 from the Appendix to the ROPA 38 (Five-Year Regional Official Plan Review) displays Derry Road west of McNiven Road as traversing a woodland greater than 0.5 hectares in size. Recent correspondence from Conservation Halton (*Appendix A – Natural Sciences Report*), indicates these woodlands have been designated as Significant Woodlands by Halton Region. Notably, the Halton NAI (2006) recommended that the woodlands be considered an extension to the Lowville-Bronte Creek Escarpment Valley ESA located south of the study area.

3.2 Social Environment

3.2.1 Noise

The Ministry of Environment (MOE) does not have noise guidelines specifically relating to the construction or widening of roadways. However, the MOE does have a protocol with the Ministry of Transportation (MTO) relating to Provincial Highway Expansions. The protocol states that the primary objective is to achieve sound exposures not exceeding 55 dBA or the preconstruction ambient sound exposure, whichever is higher, at outdoor receptor locations. In addition to the absolute sound exposure, changes are also considered. Changes of 0 to 3 dBA are considered insignificant; 4 to 5 dBA are just noticeable and considered minor; 10 dBA and above are considered significant. The MOE/MTO protocol indicates that no mitigation is required for sound exposures increases of 0 to 5 dBA. Increases in excess of 5 dBA require investigation into the feasibility of effective noise mitigation. (For example, to be implemented, a sound barrier must be shown to provide at least 5 dBA of attenuation).

The Regional Municipality of Halton's Noise Abatement Policy for Regional Roads indicates that for local improvement or retrofit noise walls, a daytime sound exposure of 60 dBA is the objective for outdoor amenity areas.

An environmental noise assessment study was carried out as part of this Class EA process to determine the existing and projected future noise levels at a number of property locations adjacent to Derry Road within the study area. Details on the noise assessment study are provided in **Section 7.3.3**. The complete environmental noise assessment report is provided in **Appendix I**.

3.2.2 Community/Recreation

Currently, there are no community centres, facilities or recreational parks/open space areas located within or adjacent to the study area.

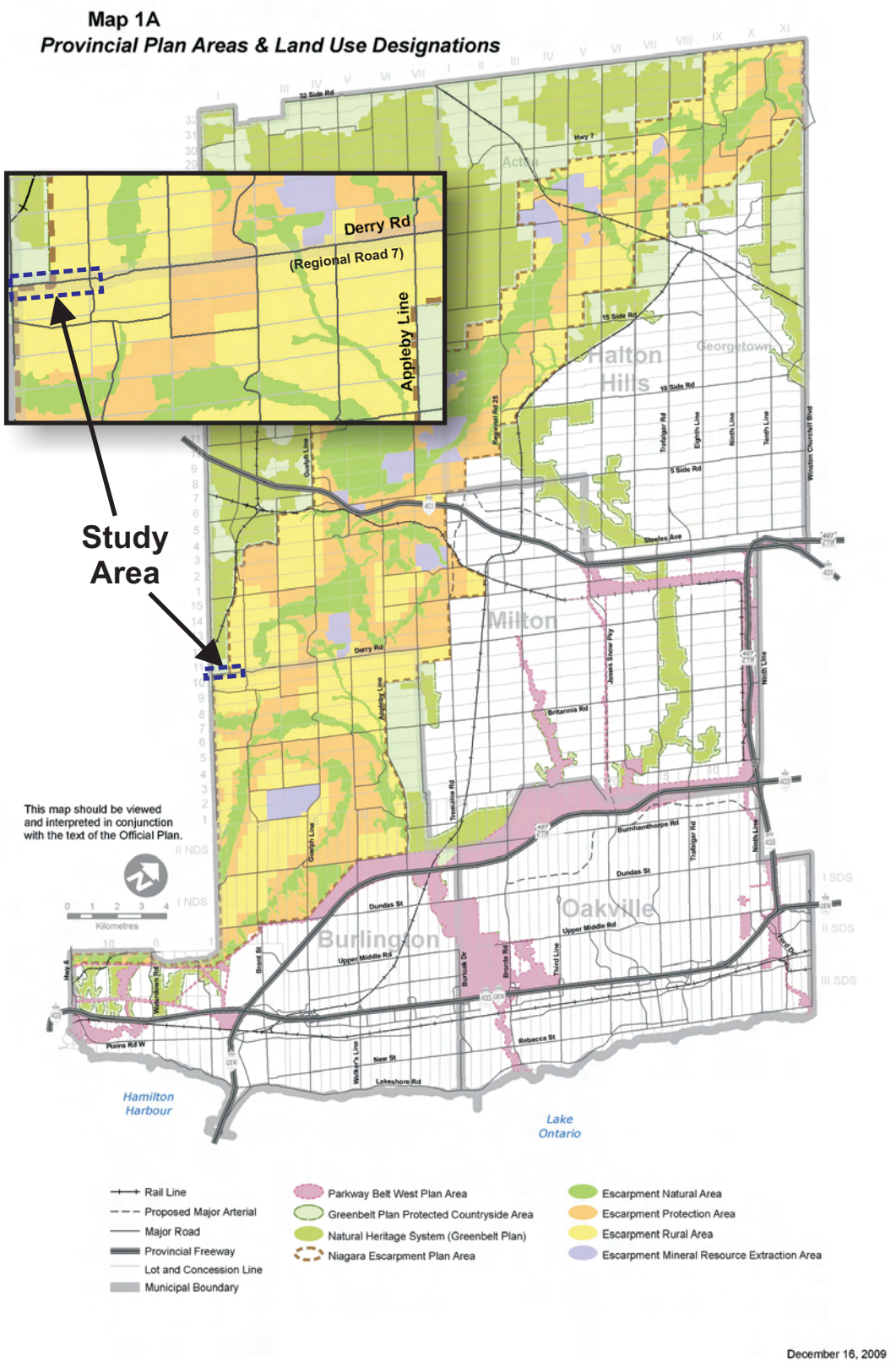
3.3 Economic Environment

3.3.1 Land Use

The study area lies within Halton Region, Town of Milton, and City of Burlington Official Plan areas. Derry Road is a municipal boundary road, traversing through and adjacent to several distinct Provincial Plan and municipal land use designations. The following land use designations, shown by jurisdiction, currently form part of the Official Plans for Halton Region, the Town of Milton and the City of Burlington.

Province of Ontario

For the most part, the areas north of Derry Road, beyond the study area, are designated by the Province of Ontario as “Greenbelt Plan Protected Countryside Area”. The Provincial land use designation is illustrated in “Map 1A” of ROPA 38 (December 16, 2009), reproduced herein as **Figure 3-1**.



NTS

Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-1

PROVINCIAL AND REGIONAL LAND USE DESIGNATIONS (MAP 1A)

November 2010

Halton Region

The areas adjacent to the Derry Road study area include natural heritage system features designated as "Agricultural Rural Area", "Key Features within Natural Heritage System", and "Remaining Natural Heritage System". Derry Road traverses through an identified "Mineral Resource Area" and "Prime Agricultural Area". The Regional land use designations are illustrated in "Map 1E", "Map 1F" and "Map 1G" of ROPA 38 (December 16, 2009), reproduced herein as **Figures 3-2, 3-3,** and **3-4**.

Town of Milton

The area north of Derry Road, adjacent to the study area, lies within the Town of Milton (Nelson Rural District). Land Use designations north of Derry Road include "Escarpment Rural Area" and "Greenlands A Area". The Town of Milton land use designations are illustrated in "Schedule A" and "Schedule D1" of the Town of Milton Official Plan (August 2008), reproduced herein as **Figures 3-5** and **3-6**.

City of Burlington

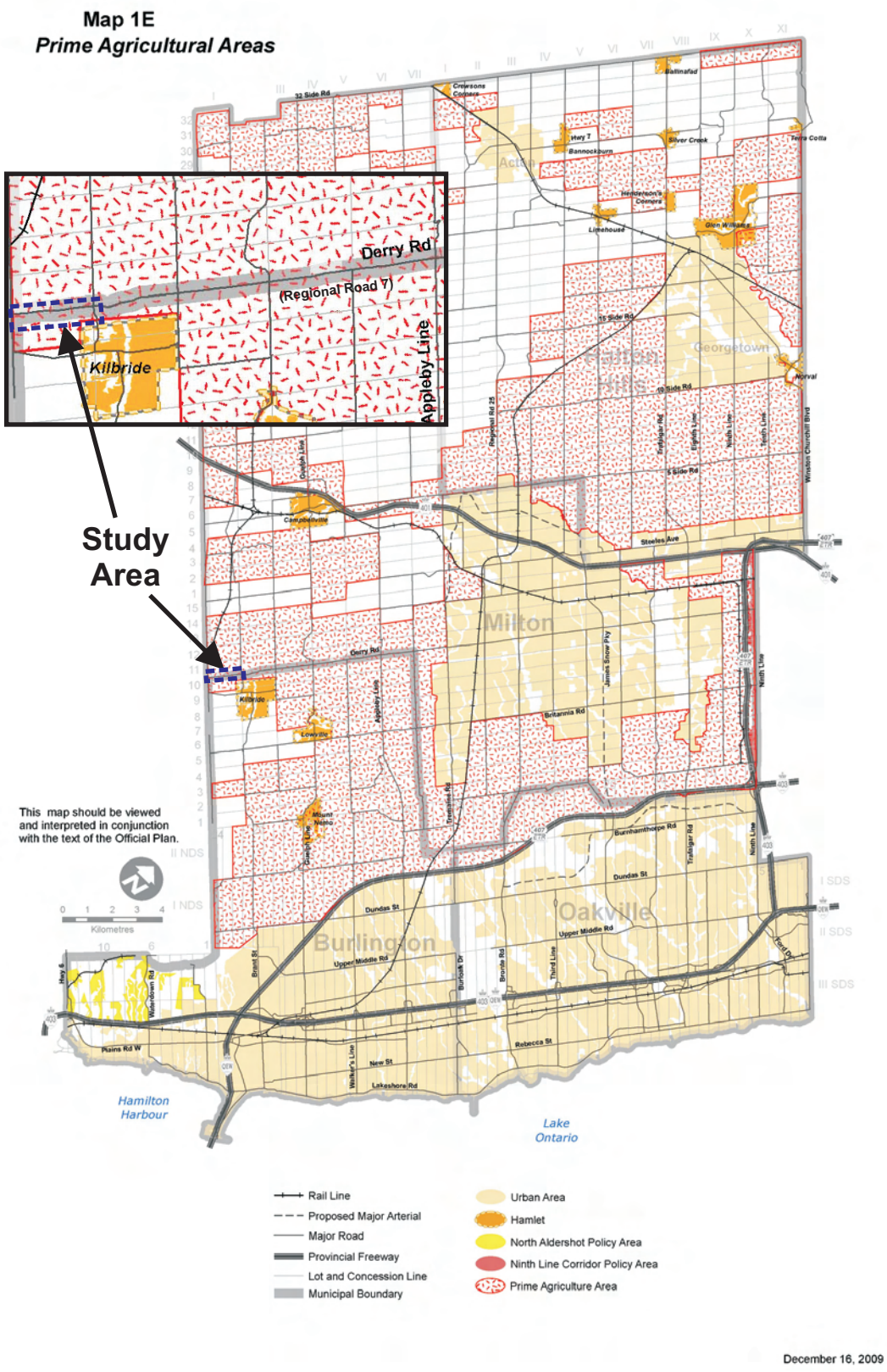
The area south of Derry Road, adjacent to the study area, lies within the City of Burlington. The Kilbride Settlement Area is situated southeast of the study area, contained within rural lands. Land Use designations south of Derry Road include "Greenlands (Escarpment Plan Area)" and "Escarpment Rural Area". The City of Burlington land use designations are illustrated in "Schedule C" of the City of Burlington Official Plan (December 2008), reproduced herein as **Figure 3-7**.

3.3.2 Existing Commercial Uses

There is an existing wholesale greenhouse operation at #1101 Derry Road located on the north side of Derry Road (Sandenall Greenhouses).

3.3.3 Potential Future Development

Currently, there are two designated agricultural rural area land use designations toward the west end of the study area on the north and south sides of Derry Road. Future development is not anticipated within the study area as the remaining lands are presently designated "Natural Heritage System" under the Halton Region Official Plan.



Halton REGION

NTS

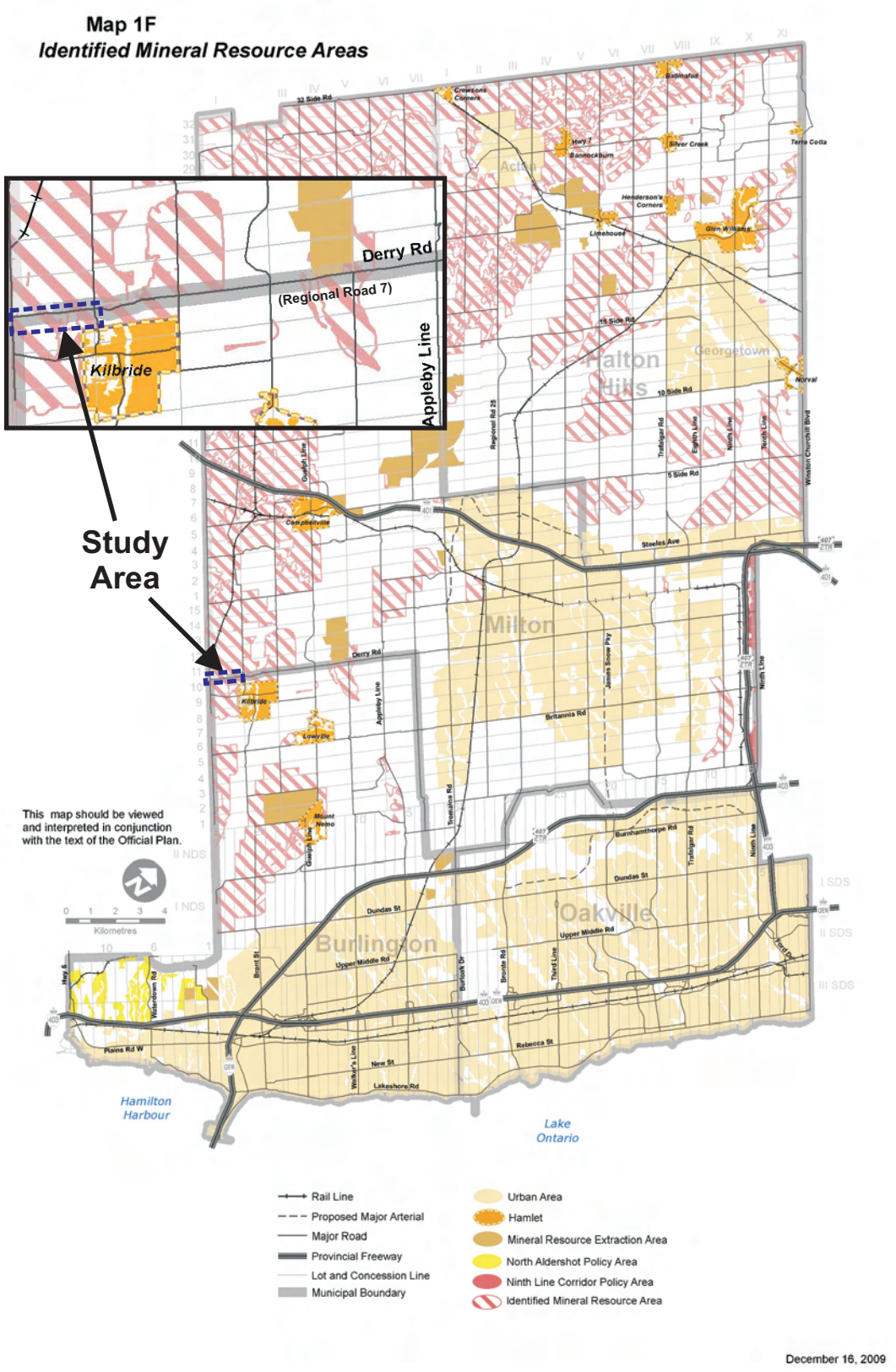
Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-2

REGIONAL LAND USE DESIGNATIONS (MAP 1E)

November 2010

IR ASSOCIATES



Halton REGION

NTS

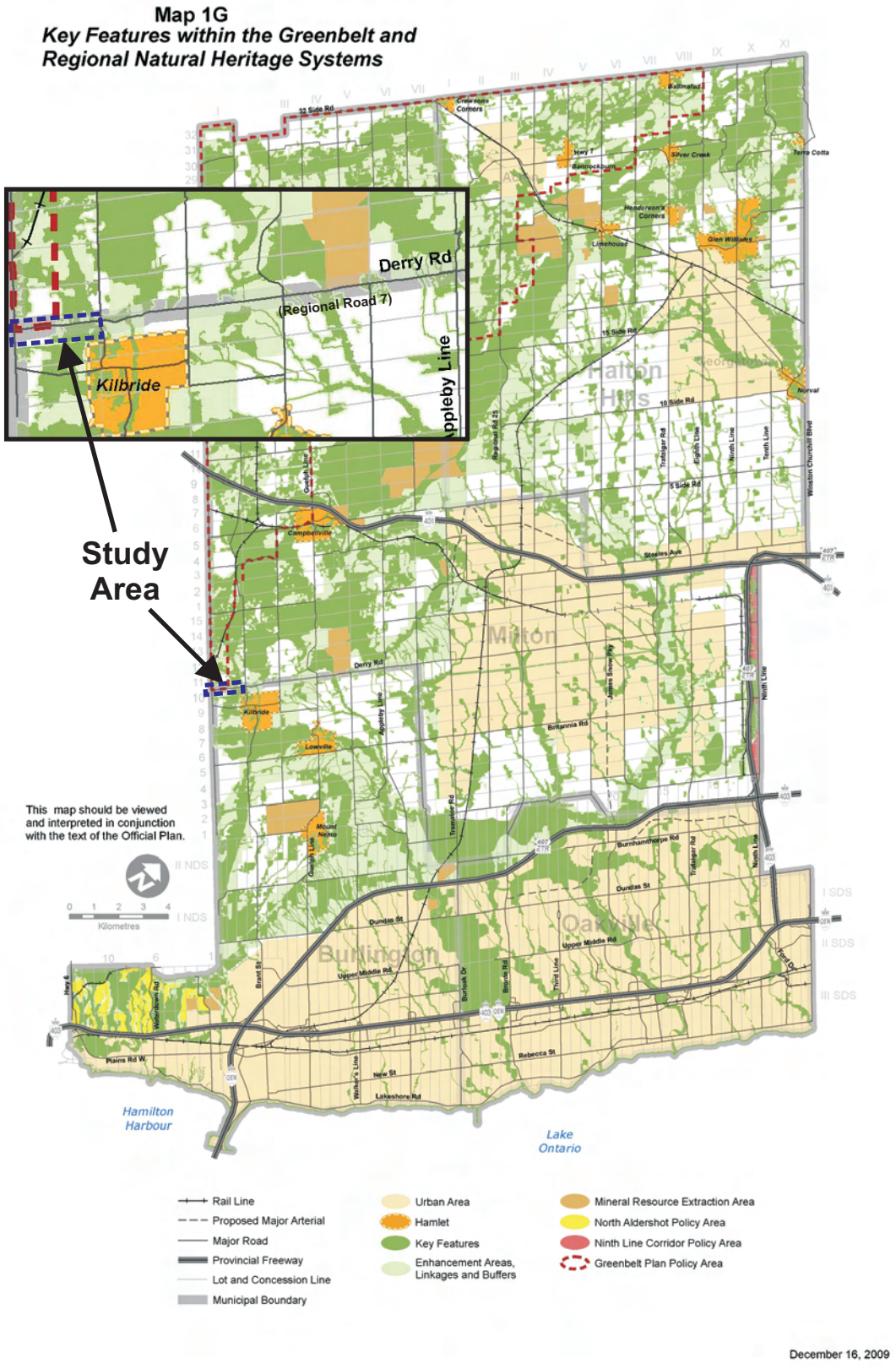
Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-3

REGIONAL LAND USE DESIGNATIONS (MAP 1F)

November 2010

IR ASSOCIATES



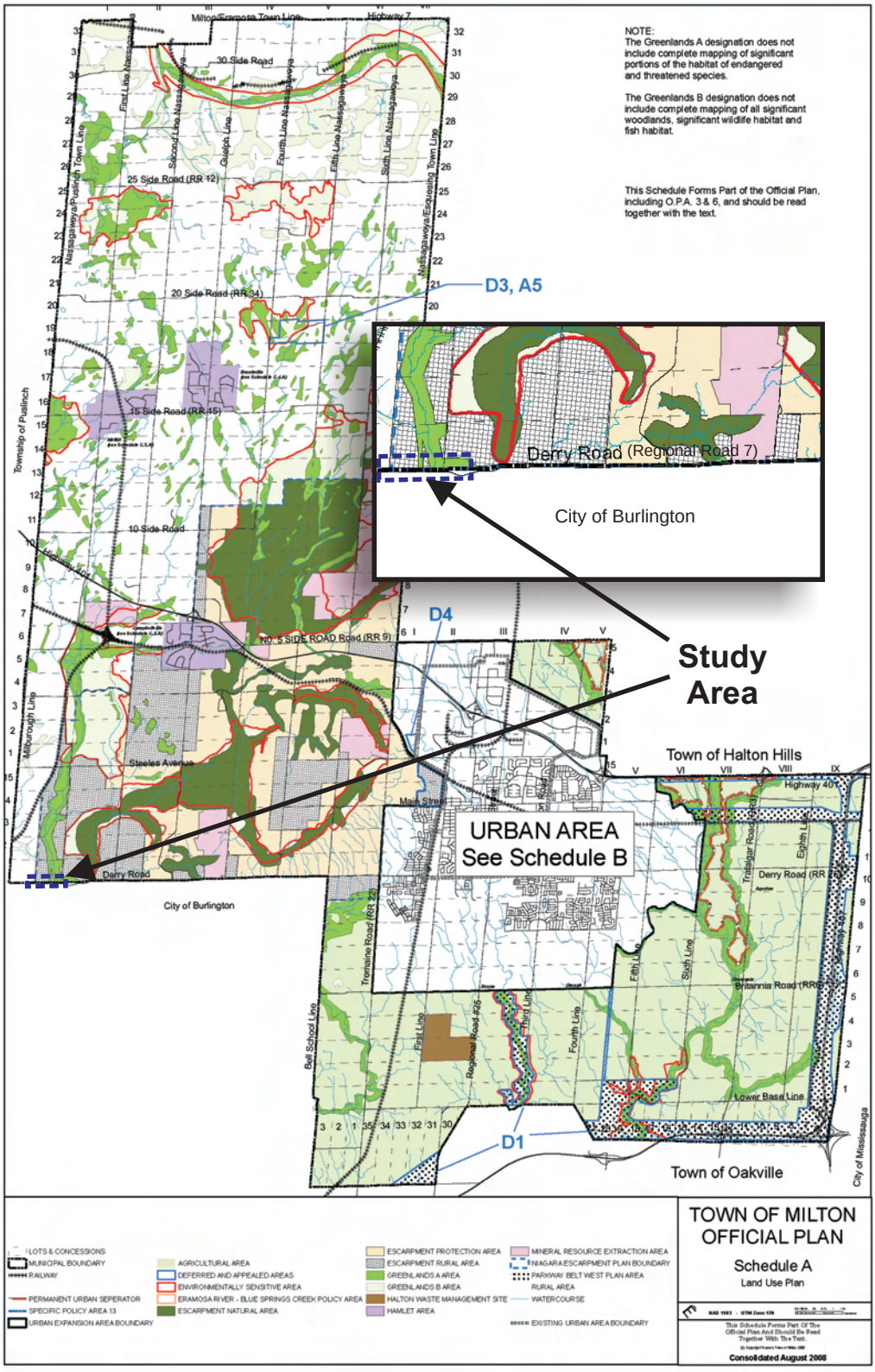
NTS

Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-4

REGIONAL LAND USE DESIGNATIONS (MAP 1G)

November 2010



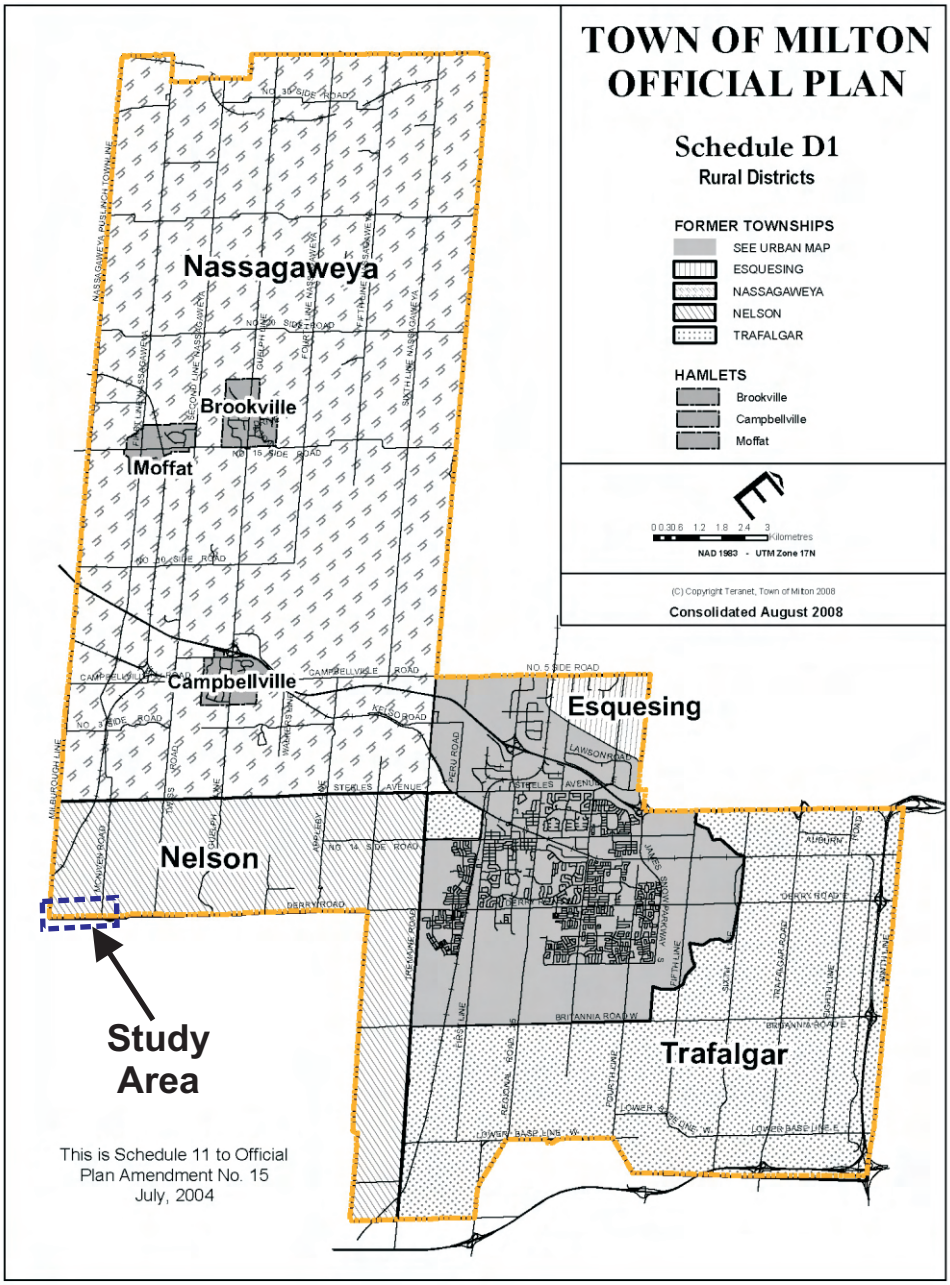
NTS

Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-5

TOWN OF MILTON LAND USE DESIGNATIONS (SCHEDULE A)

November 2010



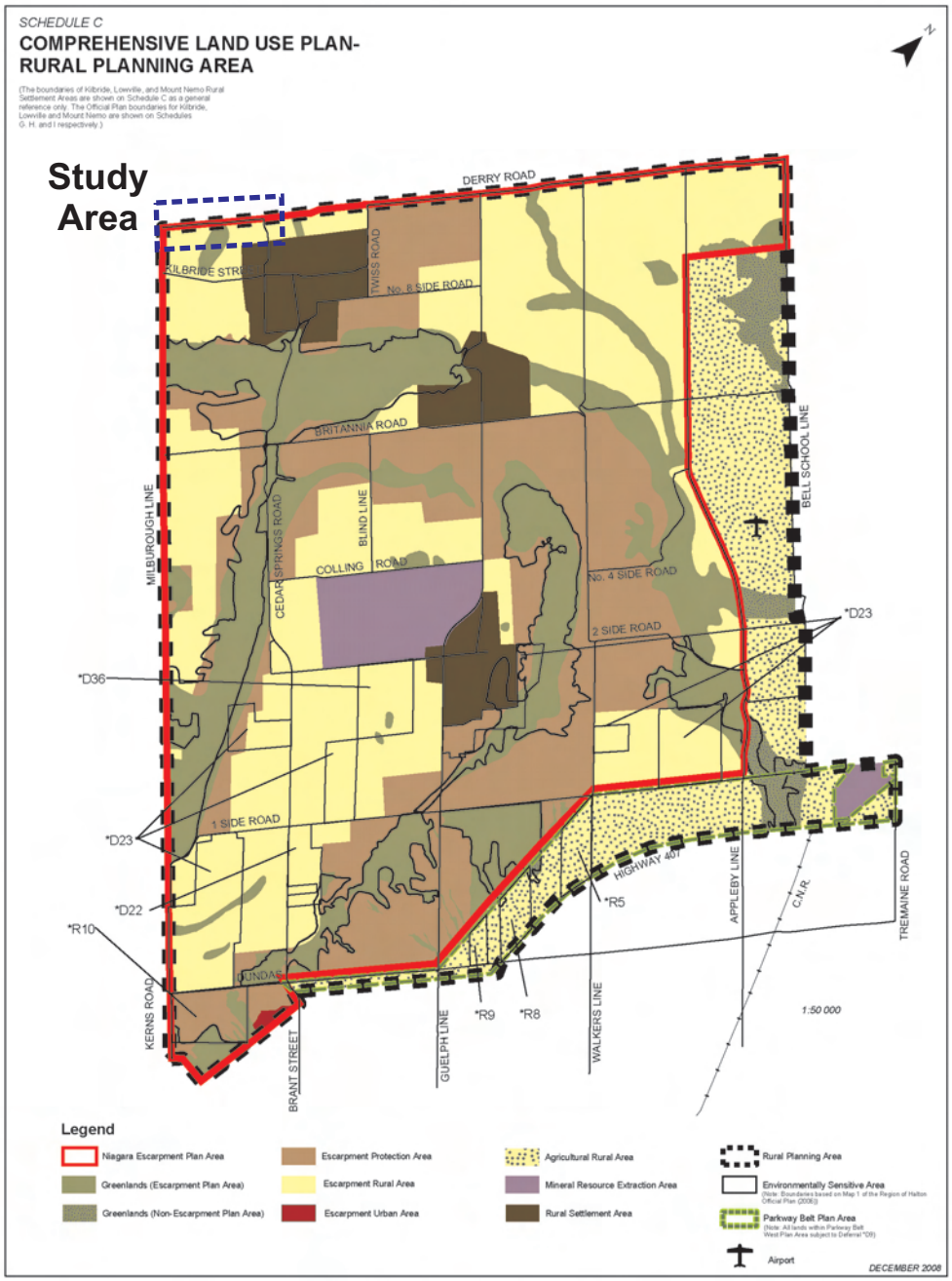
NTS

Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-6

TOWN OF MILTON LAND USE DESIGNATIONS (SCHEDULE D1)

November 2010



NTS

Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-7

CITY OF BURLINGTON LAND USE DESIGNATIONS (SCHEDULE C)

November 2010

3.4 Cultural Environment

3.4.1 Archaeological Assessment

A Stage 1 Archaeological Assessment of the study corridor was conducted in accordance with the *Ontario Heritage Act* (2005) and the Ontario Ministry of Culture's (MCL) *Draft Standards and Guidelines for Consultant Archaeologists* (2009). 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 corridor. Specifically, the background study provides information about previous archaeological fieldwork within and around the study corridor, its geography and history, and current land conditions.

3.4.1.1 Background Research

In order that an inventory of archaeological resources could be compiled for the study corridor, three sources of information were consulted: the site record forms for registered sites housed at the MCL; published and unpublished documentary sources; and the files of Archaeological Services Inc. In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MCL. This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 kilometres east to west, and approximately 18.5 kilometres north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The study corridor under review is located in Borden block AiGx. According to the OASD, six archaeological sites have been registered within one kilometre of the study corridor, none of which are located immediately adjacent to the corridor. The list of registered archaeological sites is provided in **Table 3-2**.

Table 3-2: List of Registered Sites within 1 Kilometre of the Study Corridor

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AiGx-1	Bennett	Aboriginal – Woodland	Village, burial	J.V. Wright, n.d.
AiGX-10	Laurenssen	Aboriginal – Woodland	Village	MIA 1982, 1984-86
AiGx-90	South Track	Aboriginal – Woodland	Village	W. Finlayson 1985
AiGx-131	Rotten Cabbage	Aboriginal – Archaic	Isolated Find	W. Finlayson 1985
AiGx-132	Sheetrock	Unknown	Unknown	W. Finlayson 1985
AiGx-173	Richardson	Aboriginal	Campsite	MPA 1991

3.4.1.2 Geography

The study corridor is situated within the Flamborough Plain and the Niagara Escarpment Physiographic Regions of Southern Ontario. The Flamborough Plain is an isolated tract of shallow drift on the Niagara cuesta, northwest of Hamilton. It is approximately 400 square kilometres, bounded on the northwest by the Galt Moraine, and on the south by the silts and sands of glacial Lake Warren. A few drumlins are found scattered over this limestone plain and swamps are plentiful. The limestone has been swept bare in places, particularly near the edge of the escarpment on its eastern border (Chapman and Putman 1984: 129-130).

The Niagara Escarpment extends from the Niagara River to the northern tip of the Bruce Peninsula, continuing through the Manitoulin Islands. Vertical cliffs along the brow mostly outline the edge of the dolostone of the Lockport and Amabel Formations, which the slopes below are carved in red shale. Flanked by landscapes of glacial origin, the rock-hewn topography stands in striking contrast, and its steep-sided valleys are strongly suggestive of non-glacial regions. While the escarpment stands out boldly in the Niagara Peninsula and along the shore of Georgian Bay, there is an intervening area in which the slopes are mantled by morainic deposits, particularly in Mono and Mulmur Townships, and in the Town of Caledon, long stretches are almost completely hidden (Chapman and Putman 1984: 114-122).

Potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in southeastern Ontario after the Pleistocene era, proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location.

The MCL's *Draft Standards and Guidelines for Consultant Archaeologists* (2009:5) stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.) are characteristics that indicate archaeological potential. A tributary of Bronte Creek bisects McNiven Road and flows adjacent to Derry Road.

Other geographic characteristics that can indicate archaeological potential include: elevated topography (eskers, drumlins, large knolls, plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal

plants (migratory routes, spawning areas, prairie) and scarce raw materials (quartz, copper, ochre, or outcrops of chert) are also considered characteristics that indicate archaeological potential (MCL 2009:5-6).

Therefore, due to the proximity to a tributary of Bronte Creek, the study corridor has potential for recovery of Aboriginal cultural material.

3.4.1.3 Land Use History

The study corridor is located within the Township of Nelson, Halton County. Historical research revealed that the land which encompasses the Township of Nelson contains a long and well-documented history extending to the early nineteenth century. The 1877 *Illustrated Historical Atlas of the County of Halton, Ontario* (Walker & Miles)[8] was reviewed to determine the potential for the presence of historical archaeological remains within the study corridor during the nineteenth century. Historically, the study corridor is located on part of Lots 10 and 11, Concession I and II, in the former Township of Nelson, Halton County. The atlas depicts several property owners/residents and historic features adjacent to the study corridor as listed in **Table 3-3**.

Table 3-3:
Summary of Property Owners and Historic Features Adjacent to the Study Corridor

Lot	Concession	Property Owners	Historic Features
10	I	George G. Greenless T. Greenlees	 Homestead
	II	J. Dempsy	Lime Kiln
11	I	John Rutherford Francis Small	Homestead, orchard Saw Mill, homestead, orchard
	II	John Coulson	

Additional details on the land use history are provided in the *Stage 1 Archaeological Assessment Report* located in **Appendix J**.

3.4.1.4 Archaeological Potential Evaluation

The MCL's *Draft 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 MCL standards and guidelines, the study corridor meets three of the criteria used for determining archaeological potential:

[8] Stage 1 Archaeological Assessment Report - Figure 2: The study corridor overlaid on the map of Nelson Township.

- Water sources: primary water source, or secondary water source; or past water source (i.e. a tributary of Bronte Creek);
- Areas of early Euro-Canadian settlement (i.e. 19th century homesteads, lime kiln, saw mill); and
- Early historical transportation routes (i.e. Derry Road).

These criteria characterize the study corridor as having potential for the identification of Aboriginal and Euro-Canadian archaeological sites.

3.4.1.5 Property Inspection

A property inspection of the study corridor was conducted by Peter Carruthers (P163), ASI, on November 6, 2009, in order to gain first-hand knowledge of its geography, topography, and current conditions, and to evaluate and map its archaeological potential.

Based on the results of the property inspection, it was determined that the Derry Road right-of-way has been subject to extensive and deep land alterations. Portions of the study corridor, adjacent to the right-of-way consist of rocky uneven terrain or can be characterized as low and wet. However, minimal disturbances have occurred along portions of the study corridor.

3.4.1.6 Conclusions

Based on the results of the *Stage 1 Archaeological Assessment*, the following conclusions were determined:

- The existing Derry Road right-of-way does not retain archaeological site potential due to previous ground disturbances (*Stage 1 Archaeological Assessment Report – Figures 4 to 6: areas marked in yellow*). Portions of the study corridor, adjacent to the right-of-way consist of rocky uneven terrain (*Stage 1 Archaeological Assessment Report – Figures 5 to 6: areas marked in irregular stipple*) or can be characterized as low and wet (*Stage 1 Archaeological Assessment Report – Figures 5 to 6: area marked in blue*). Additional archaeological assessment is therefore not required along these portions of the study corridor; and

- If construction extends beyond the disturbed right-of-way, a Stage 2 assessment is recommended on any lands within the study corridor where there is potential for archaeological sites (*Stage 1 Archaeological Assessment Report – Figures 4 to 6: areas marked in green*), in accordance with Ministry of Culture's Draft Standards and Guidelines for Consultant Archaeologists (MCL 2009).

Additional information on the *Stage 1 Archaeological Assessment*, including detailed graphical plots of the assessment are provided in **Appendix J**.

3.4.2 Built Heritage Resources and Cultural Heritage Landscapes

The purpose of a cultural heritage resource assessment was to identify built heritage resources and cultural heritage landscapes potentially impacted by the undertaking and to develop appropriate mitigation measures to minimize any negative effects. Background research was undertaken and a site visit was conducted to complete the identification of built heritage resources for the Derry Road study area.

A review of background historical research was completed to document the land use history of the study corridor. The City of Hamilton, City of Burlington and the Town of Milton heritage inventories were consulted to inventory any previously identified cultural heritage resources. This review confirmed that the study corridor is historically located on part of Lots 10 and 11, Concessions I and II, in the former Township of Nelson, Halton County. The Township of Nelson experienced Euro-Canadian settlement activities in the early nineteenth century, and by the end of the century, the township had flourished as an ideal place for agricultural land use activities. The 1877 historical atlas maps confirms that lands adjacent to the study corridor had been cleared and developed into farmstead properties, featuring homestead structures and landscape features such as orchards.

The results of the field review confirmed that the study corridor retains visual, landscape, and structural reminders of this rural nineteenth century land use history. Four cultural heritage resources were identified adjacent to the Derry Road right-of-way. **Table 3-4** provides a description of the identified features. Additional photographic inventories of the various properties, matched by feature identifier, along with mapping illustrating the locations of each property is provided in **Appendix J**.

Table 3-4:
Identified Built Heritage Resources (BHR) and Cultural Heritage Landscapes (CHL)

Feature	Location	Feature Type	Description/Comments
CHL 1	1521 Milburough Line	Farmstead	Identified in the City of Hamilton's Heritage Inventory of Buildings of Architectural and/or Historical Interest. This property consists of a one and a half storey farmhouse and several agricultural-related buildings. These built features are set well back from the road right-of-way, but landscape features such as the entrance drive, fence line, mature tree lines and adjacent farm fields are of heritage interest.
CHL 2	1094 Derry Road	Farmstead	Identified in the City of Burlington's Heritage Inventory. This property consists of a one and a half storey farmhouse with a large addition and a barn,

Table 3-4:
Identified Built Heritage Resources (BHR) and Cultural Heritage Landscapes (CHL)

Feature	Location	Feature Type	Description/Comments
			both of which are set well back from the road right-of-way. Landscape features such as the entrance drive, fence line, mature tree lines and adjacent farm fields are of heritage interest.
CHL 3	South side of Derry Road	Tree line	Identified during field review. The tree line located along the south side of Derry Road is of heritage interest.
CHL 4	North and south side of Derry Road	Tree lines and fence lines	Identified during field review. The tree line, fence line and stone fence lines are of heritage interest.

3.5 Transportation Facilities

3.5.1 Existing Road Network

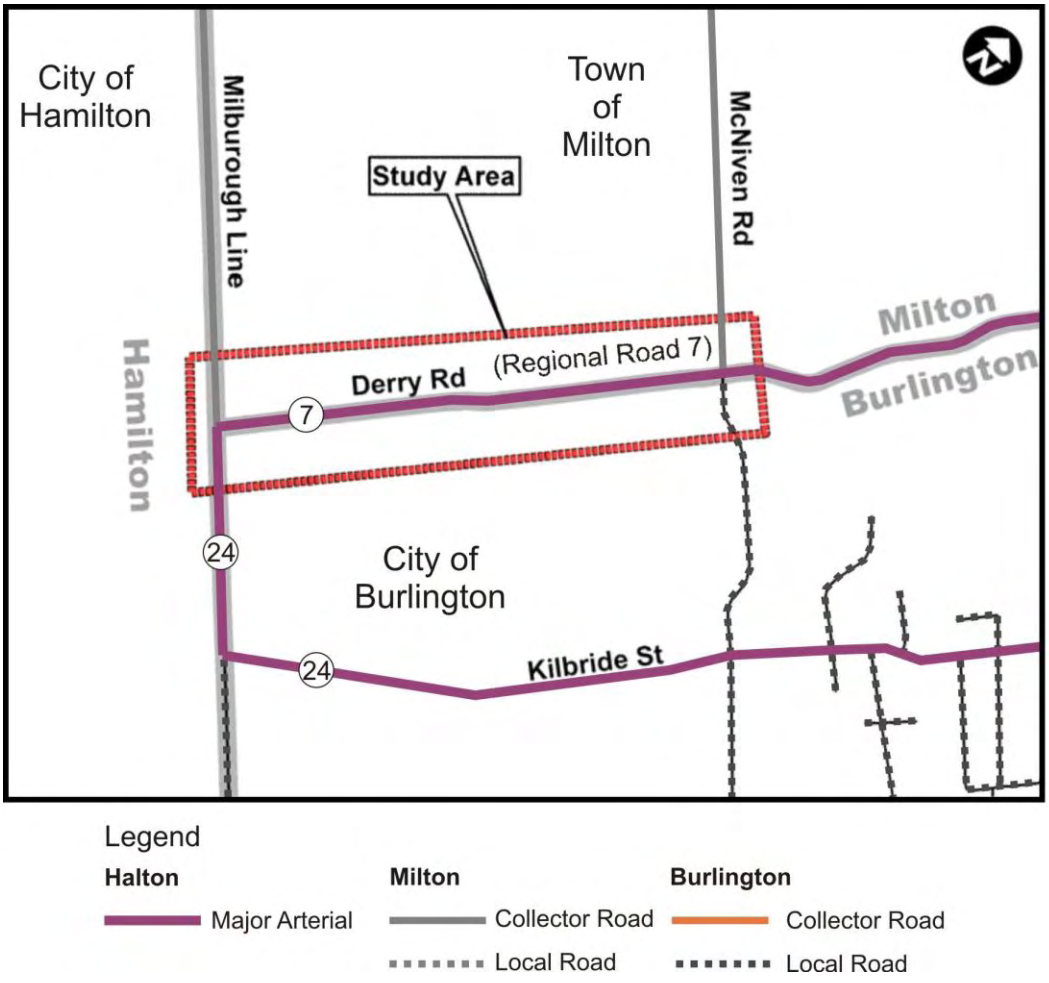
The location of the study area, in the context of the Regional and local road network, is illustrated in **Figure 3-8**. The section of Derry Road under study extends from Milburough Line (Regional Road 24) to McNiven Road. Derry Road (Regional Road 7) is a major east-west arterial road traveling along the municipal boundary between the Town of Milton to the north and the City of Burlington to the south. The western terminus of Derry Road meets Milburough Line at the City of Hamilton municipal boundary. Traveling easterly, Derry Road continues toward 407 ETR and into the Regional Municipality of Peel. Derry Road is under the jurisdiction of the Regional Municipality of Halton and is designated as a Major Arterial roadway.

Completing the local Regional road network, Twiss Road extends southerly from Derry Road into the City of Burlington, turning westerly as Kilbride Street, eventually changing its name to Carlisle Street west of the Halton municipal boundary. The remaining roadways north and south of Derry Road are currently under the jurisdiction of the Town of Milton and City of Burlington, respectively. These area roads are mainly designated Collector and Local roadways under their respective jurisdictions. For the most part, they maintain two lane rural road cross-sections.

Derry Road is a two lane rural roadway within the study area with a posted speed limit of 60 km/hr. At the western limit of the study area, the intersection at Milburough Line is unsignalized and controlled by a STOP condition on Derry Road (westbound direction). A secondary STOP sign is provided on the south side of Derry Road (facing east) approximately 21.5 metres from the near edge of Milburough Line. At the eastern limit of the study area, the intersection at

McNiven Road is presently unsignalized and controlled via an all-way STOP control. Additional auxiliary STOP signs, located on the opposite side of the roadway, are provided for McNiven Road in the northbound/southbound directions and for Derry Road in the eastbound/westbound directions.

Figure 3-8: Transportation Network



3.5.2 Transit Service

At the present time, there are no local (Burlington Transit/Milton Transit Service) or GO Transit services operating within the study limits.

3.5.3 Cycling Network and Pedestrian Facilities

There are currently no dedicated cycling or pedestrian facilities along Derry Road within the study area limits. McNiven Road, north and south of Derry Road and Milburough Line north of Derry Road is currently suggested as on-road cycling routes. These routes are considered to be lower traffic volume routes that provide continuity with other cycling facilities or provide a preferred route through a busy corridor. There are no designated bike lanes or signs along these routes. In the vicinity of the study area, sections of Milburough Line, McNiven Road, Twiss Road and Kilbride Street form part of the Kilbride Loop Ride cycling circuit. This loop extends along Milburough Line from Kilbride Street northerly to Campbellville Road then travels easterly to Twiss Road. At this point the route travels south along Twiss Road to Conservation Road (formerly Steeles Avenue), then west to McNiven Road, finally reconnecting south of Derry Road at Kilbride Street.

3.5.4 Traffic Operations Analysis

The traffic operations analysis encompassed an assessment of the existing and future traffic conditions within the study area including the determination of operating speeds, a review of intersection operations, potential remedial measures required to alleviate traffic congestion, and the need for modifications to existing traffic controls.

3.5.4.1 Existing Traffic Data

Traffic data used in undertaking the traffic operations analysis was provided by Halton Region as follows:

<u>Peak Period Turning Movement and Automatic Traffic Recorder Counts</u>

Existing traffic volumes at the intersections were obtained from current turning movement counts (TMCs). The TMCs included the weekday morning (AM) and afternoon (PM) peak periods for the following intersections:

- Derry Road (Regional Road 7) at Milburough Line (11-May-2009); and
- Derry Road (Regional Road 7) at McNiven Road (12-May-2009).

Automatic Traffic Recorder (ATR) roadway Average Daily Traffic (ADT) volumes were provided at the following location:

- Count ID #100715 – Derry Road (Regional Road 7) 250 metres east of Milburough Line (30-Apr-2008).

<u>Vehicle Speed Data</u>

Vehicle speed data (in both eastbound and westbound directions) was provided at the following location:

- Derry Road (Regional Road 7) 250 metres east of Milburough Line (30-Apr-2008).

Traffic Control

Existing traffic control conditions for the Derry Road intersections at Milburough Line and McNiven Road were provided by Halton Region.

Roadway Geometrics

Roadway geometrics, including existing lane widths, grades, auxiliary lane storage lengths, etc. were derived from available survey and drawing information supplemented by field measurements where required.

3.5.4.2 Existing Traffic Volumes

Derry Road, within the study area limits, carries approximately 3,250 vehicles per day. Two-way vehicle volumes during the weekday AM peak hour and PM peak hour are in the range of 300 and 380 vehicles per hour, respectively. In terms of the directional distribution of traffic along Derry Road the majority of traffic travels eastbound during the weekday AM peak hour—84 percent—returning in the westbound direction during the weekday PM peak hour with a direction distribution of 83 percent. Commercial and heavy vehicles represent about three percent of the total traffic on Derry Road during the weekday. A summary of the area roadway traffic volumes and traffic distribution is provided in **Table 3-5**.

Table 3-5: Two-Way 24-Hour and Peak Hour Directional Traffic Volumes

Roadway	ADT Volume (24-Hr)	Weekday Peak Hour Directional Splits (%)								Commercial/ Heavy Vehicles (%)	
		Northbound		Southbound		Eastbound		Westbound			
		AM	PM	AM	PM	AM	PM	AM	PM	EB	WB
Derry Road (Regional Road 7)	3,250	-	-	-	-	84.1	17.0	15.9	83.0	2.6	3.0

3.5.4.3 Operating Speeds

Operating speeds were sampled along Derry Road in the eastbound/westbound directions on April 30, 2009 at one location 250 metres east of Milburough Line. The data sample size included 1,528 vehicles traveling in the eastbound direction and 1,717 vehicles traveling in the westbound direction.

A range of statistical measurements were derived from the speed data including operating speed, average speed, 50th and 85th percentile speeds, and pace. Operating speed is commonly recognized as the speed at which drivers are observed operating their vehicles during free-flow conditions. Percentile speeds are speeds at or below which a specified

percentage of traffic is traveling. The 85th percentile speed is the most frequently used measure of the operating speed and is often considered the maximum reasonable speed of a traffic stream under geometric and control conditions. The "pace" refers to the speed range (typically 16 kilometres per hour) that contains the greatest number of vehicle speeds compared to all other corresponding range intervals. A summary of the speed data measurements for the combined eastbound/westbound directions is provided in **Table 3-6**. Graphical representations in the form of cumulative frequency distribution curves are illustrated in **Figures 3-9** and **3-10** for the eastbound and westbound directions, respectively. The data was developed at a 95 percent or higher confidence level.

Table 3-6: Speed Survey

Road	Road Section	Direction	Speed Measures (km/h)					Percent Compliance (%)
			Posted	Average	50th Percentile	85th Percentile	Pace	
Derry Road	250 metres east of Milburough Line	EB/WB	60	73	70	84	62 to 78	9.4%

It can be observed from the speed data that drivers traveling along Derry Road generally disregard the posted speed limit of 60 km/h. The average percentage compliance was found to be 9.4 percent. This indicates that 90.6 percent of motorists are exceeding the posted speed limit.

Figure 3-9: Speed Data Summary – Derry Road Eastbound Direction

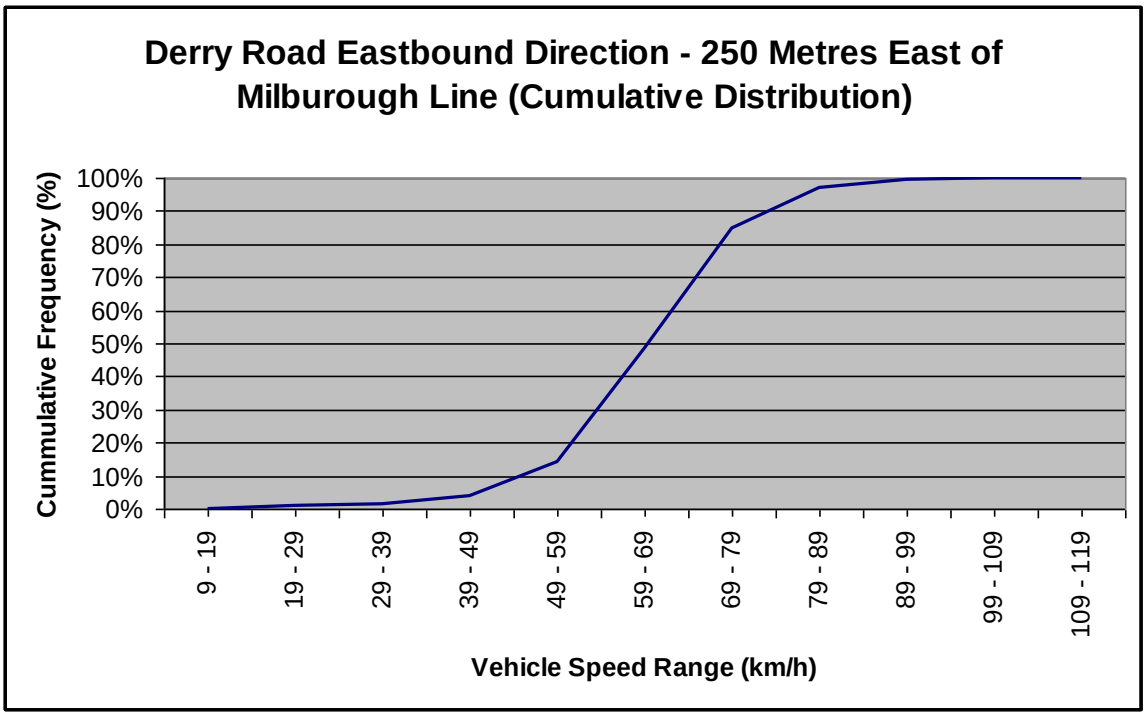
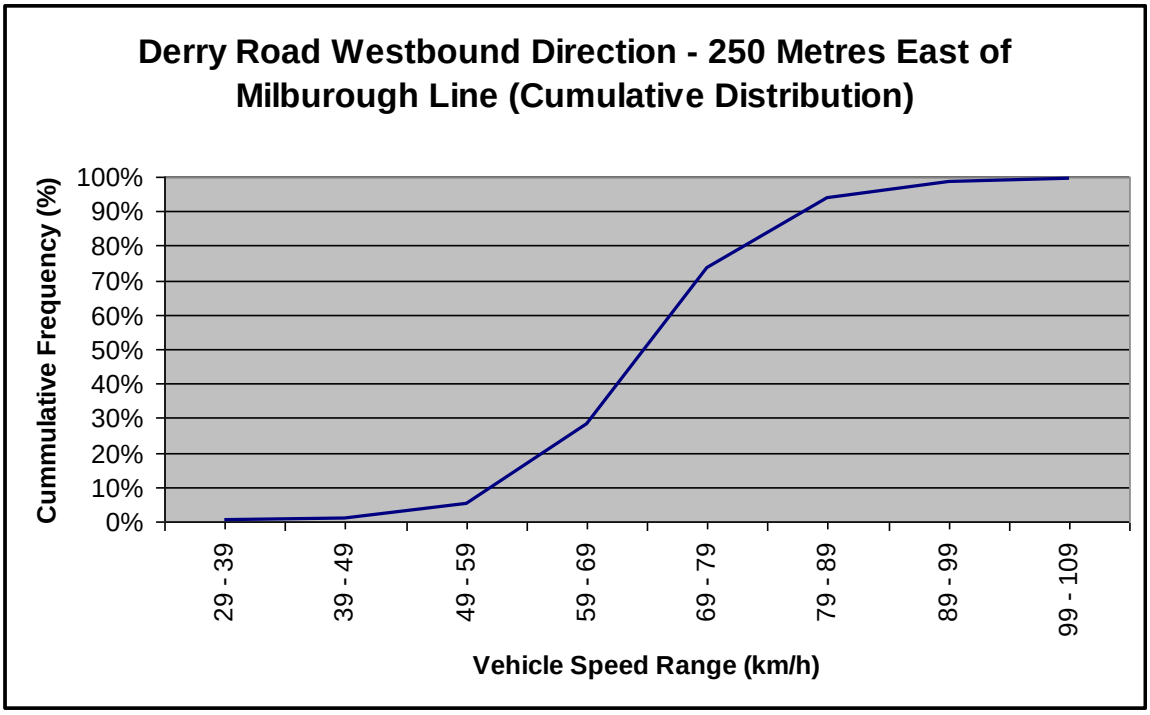


Figure 3-10: Speed Data Summary – Derry Road Westbound Direction

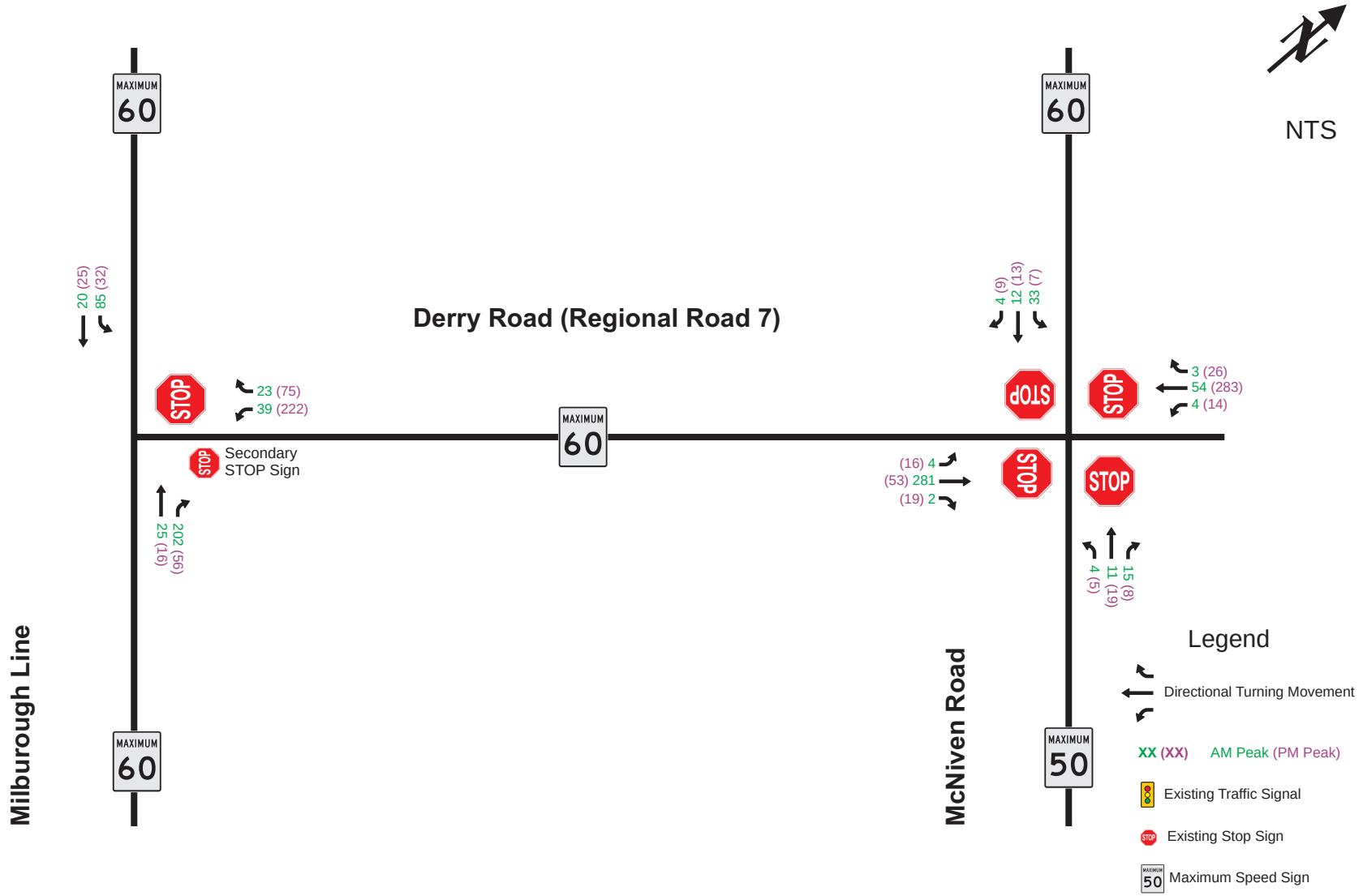


3.5.4.4 Existing 2009 Weekday Peak Hour Traffic Volumes

A review of the turning movement count (TMC) data for the weekday morning period revealed that entering/exiting traffic volumes at the study area intersections remained fairly stable from 7:00 a.m. to 8:00 a.m., representing the AM peak hour. The weekday afternoon traffic volumes exhibited a similar stability from 4:30 p.m. to 5:30 p.m., representing the PM peak hour. These two peak hours were considered to be the critical design hours for evaluating the existing traffic conditions at the study area intersections. Since the TMC data was collected on two different days, a selected number of volumes were adjusted conservatively upwards where required to ensure that the traffic flows were balanced throughout the study area. The existing balanced 2009 traffic volumes are illustrated in **Figure 3-11**. The peak hour factors and heavy vehicle volumes for each approach were calculated from the TMC data for each peak hour and were employed in the intersection performance analysis.

3.5.4.5 Existing 2009 Intersection Operational Performance

The operational performance of the study intersections at Derry Road/Milburough Line and at Derry Road/McNiven Road made use of the Highway Capacity Manual (HCM) techniques for unsignalized intersections as employed by the Synchro-SimTraffic package (Version 6). Capacity analysis of an intersection, signalized or unsignalized, is a process that is undertaken to determine how well an intersection will perform under various traffic conditions.



Note: Secondary STOP signs at Derry Road/McNiven Road intersection not shown.

EXISTING WEEKDAY PEAK HOUR TRAFFIC VOLUMES
Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-11

November 2010

The analysis results can then be evaluated to determine the need for capacity improvements at the intersection. For this study, the intersections were analyzed for both the AM and PM peak hours and were evaluated using Level of Service (LOS) measures.

LOS is a qualitative concept used to define the quality of service of traffic conditions at an intersection or along a road segment. Intersection LOS is based on the average control delay per vehicle for various movements occurring within the intersection. "Delay" is a measure of the quality of service to the road user based on a number of weighted factors. LOS ranges from 'A' to 'D' with LOS 'A' representing traffic operations with associated delays up to 10 seconds per vehicle. LOS 'D' can represent delays in the range of 35 to 55 seconds per vehicle with traffic congestion becoming much more apparent. This level of service is generally considered to be at the upper limit of acceptable delay. Beyond LOS 'F', delays can typically reach 80 seconds or higher per vehicle and is considered to be unacceptable. The capacity of an intersection at LOS 'F' becomes oversaturated with demand exceeding capacity.

The operational performance of the unsignalized intersection was measured by the LOS of the lowest priority movements, that is, the left turn movements from the STOP controlled approaches. The operational performance of critical intersection movements are illustrated in terms of directional movement, volume-to-capacity ratio, control delay in seconds per vehicle, and level of service.

Operational performance measurements for the unsignalized intersections are provided in **Table 3-7**. The direction of the minor approach (i.e. NB-northbound, SB-southbound, EB-eastbound, WB-westbound) is noted under the intersection location descriptions listed in Table 3-7 and correspond with the various performance measures for those movements. In the case of the Milburough Line intersection, the westbound left turn movement is considered to be the critical movement. Since the intersection at McNiven Road is under All-way STOP control, each movement is considered equal and the operational performance is listed for each approach. The critical major approach left turn is also noted by movement, v/c, delay and LOS for the Milburough Line intersection.

Table 3-7: Existing 2009 Operational Performance – Unsignalized Intersections

Intersection	Minor Approach				Major Approach Critical Left Turn Movement			
	HCM v/c	HCM Delay (sec/veh)	LOS	95th Percentile Queue (metres)	Movement	v/c	Delay (sec)	LOS
Weekday AM Peak Hour								
Derry Road at Milburough Line (WB)	0.13	11.4	B	3.3	-	-	-	-

Table 3-7: Existing 2009 Operational Performance – Unsignalized Intersections

Intersection	Minor Approach				Major Approach Critical Left Turn Movement			
	HCM v/c	HCM Delay (sec/veh)	LOS	95th Percentile Queue (metres)	Movement	v/c	Delay (sec)	LOS
Derry Road at McNiven Road (EB/WB/NB/SB)	-	10.1 8.5 7.9 8.6	B A A A	-	-	-	-	-
Weekday PM Peak Hour								
Derry Road at Milburough Line (WB)	0.46	13.0	B	18.9	-	-	-	-
Derry Road at McNiven Road (EB/WB/NB/SB)	-	8.3 14.5 8.6 8.5	A B A A	-	-	-	-	-

A review of the minor approaches at the unsignalized intersections revealed that the two-way and all-way STOP controlled intersections at Milburough Line and McNiven Road, respectively are operating at acceptable levels of service with reasonable delays and acceptable v/c ratios under both morning and afternoon peak hour traffic conditions.

3.5.4.6 Future 2021 Traffic Volumes

Traffic forecasting is an integral part of the transportation planning process. Forecasting serves as an analysis tool for transportation planners and assists decision-makers in the evaluation of transportation road networks. Traffic projections for the study area were derived from travel demand forecasts for the 2021 horizon year were provided for the weekday PM peak hour for selected roadway links from Halton Region's EMME/2 transportation model. The Region's transportation model is a planning tool that consists of assigning travel demand to a road network to estimate traffic volumes on the road sections and intersections. The model provides directional link traffic forecasts based on a set of road network improvements, future land use and development scenarios, trip rates and travel patterns. The Region's forecasts for the 2021 PM peak hour was used to estimate growth rates and adjustment factors that were then applied to the 2008 link volumes to yield computed 2021 link volumes comparable to the Region's model forecast levels. As the EMME/2 transportation model volumes represent PM peak hour volumes, to determine AM peak hour volumes, existing counts were used to determine the relationship between the AM peak hour and PM peak hour.

In addition to the review of the transportation model link volumes, historical ATR counts were also reviewed and compared to the transportation model growth rate findings. The results of the

comparisons indicated that there is a conservative growth rate of about three percent per year from 2009 to 2021 along the Derry Road corridor within the study area.

The future 2021 weekday AM and PM peak hour traffic volumes are illustrated in **Figure 3-12**.

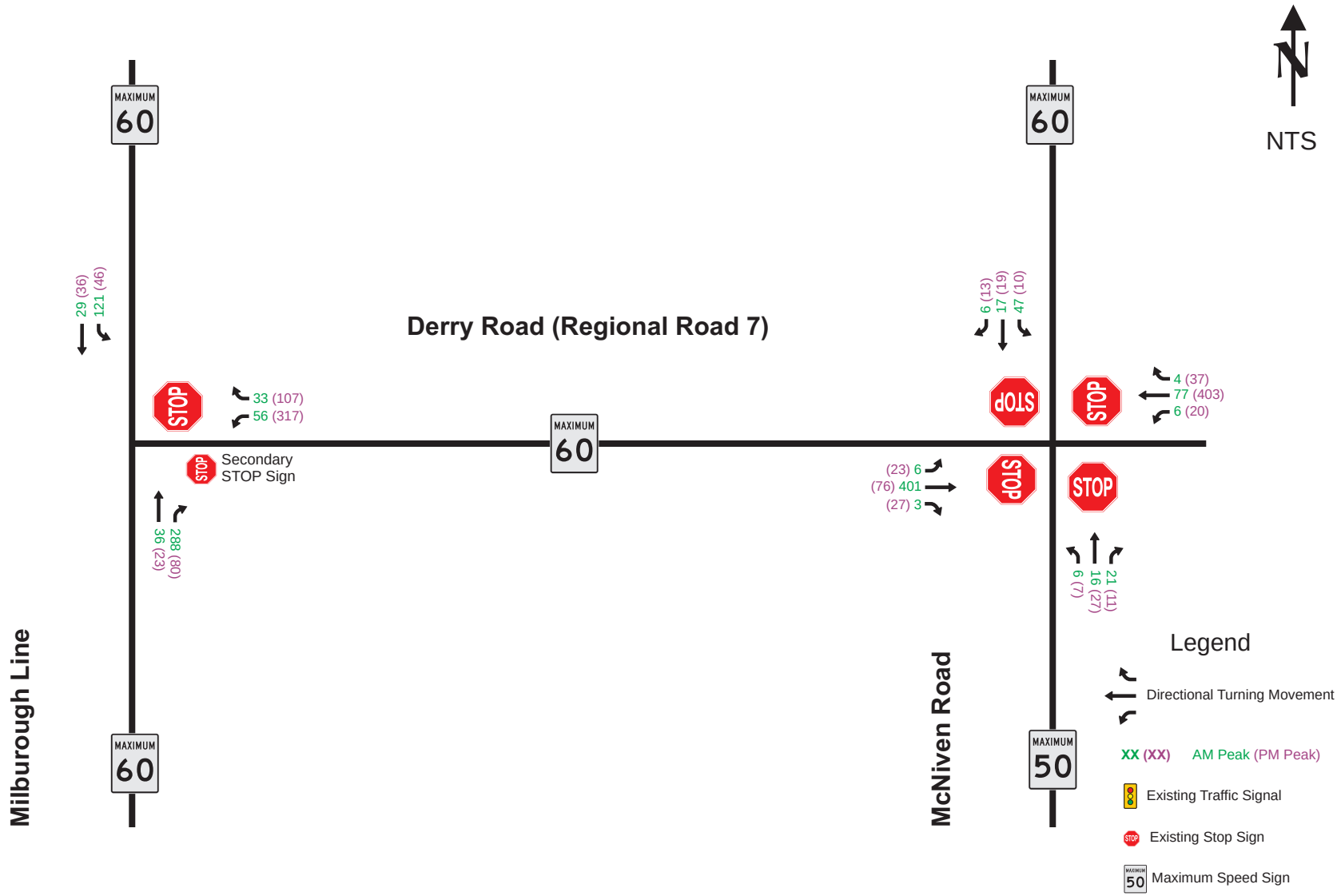
3.5.4.7 Future 2021 Intersection Operational Performance

The operational performance of the study area intersections with the future 2021 weekday AM and PM peak hour traffic volumes were evaluated to determine their operational performance. It should be noted that there are no programmed roadway improvements currently planned by Halton Region in the vicinity of the study area. The results of the operational performance of the unsignalized intersections are presented in **Table 3-8**.

Table 3-8: Future 2021 Operational Performance – Unsignalized Intersections

Intersection	Minor Approach				Major Approach Critical Left Turn Movement			
	HCM v/c	HCM Delay (sec/veh)	LOS	95th Percentile Queue (metres)	Movement	v/c	Delay (sec)	LOS
2021 Weekday AM Peak Hour								
Derry Road at Milburough Line (WB)	0.18	13.1	B	5.0	SB-Left	0.11	6.9	A
Derry Road at McNiven Road (EB/WB/NB/SB)	-	13.1 8.9 8.4 9.2	B A A A	-	-	-	-	-
2021 Weekday PM Peak Hour								
Derry Road at Milburough Line (WB)	0.61	16.5	C	31.7	SB-Left	0.03	4.3	A
Derry Road at McNiven Road (EB/WB/NB/SB)	-	8.8 16.2 8.9 8.9	A C A A	-	-	-	-	-

A review of the operational performance of the unsignalized intersections indicated that the critical minor approach will operate at a LOS ‘C’ or better during the weekday AM and PM peak periods.



Note: Secondary STOP signs at Derry Road/McNiven Road intersection not shown.

2021 FUTURE WEEKDAY PEAK HOUR TRAFFIC VOLUMES
Derry Road (Regional Road 7) Transportation Corridor Improvements

Figure 3-12

November 2010

3.5.5 Collision Analysis

3.5.5.1 Comprehensive Road Safety Action Plan (CROSAP)

Halton Region has adopted a Comprehensive Road Safety Action Plan (CROSAP) to guide the implementation of a road safety management system for Regional Roads.

CROSAP – Phase 1

Phase 1 follows an efficient screening process to evaluate the actual safety performance of each Regional Road intersection and road section against an expected performance measure, derived from the aggregate performance of similar intersections through the Region. The Evaluation of the safety performance uses a number of Safety Performance Functions (SPFs) developed for different categories of road sections and intersections within the Region. Based on these functions, a Potential for Safety Improvement (PSI) index was developed for each road section and intersection along the Regional road network. PSI indices take into account the difference between a location's long-term safety performance and the expected safety performance for a comparison group with similar traffic, design, and control characteristics. They also incorporate the potential savings in societal costs by collision type if the safety record at the location can be improved to the nominal level. The PSI index can range from 0 to 30 in the case of Halton's Regional Road System.

If the PSI for a particular location is greater than zero, it represents an opportunity for improvement (from a safety perspective) at that location, since more collisions are occurring at that location than typically occur at a similar/comparable group of locations in the Region. Conversely, if a location has a PSI index less than zero, fewer collisions occur at that location than at a comparable group of locations and therefore, it is performing better than the "norm" for that type of facility.

For this study, the Regional Municipality of Halton provided the results from the 2006 CROSAP network screening for locations within the project limits. **Table 3-9** shows the value of the PSI index, and corresponding rank within the Region, for the intersection and mid-block locations along Derry Road within the project limits.

Table 3-9: 2004 CROSAP Screening Results – Derry Road Corridor

Derry Road	PSI Index Value	Rank[9]
At Milburough Line Intersection	<1	185
Between Milburough Line and McNiven Road	0.00	301
At McNiven Road	0.00	218

A review of Table 3-9 shows that the PSI indices are either zero or close to zero for the intersections and along the Derry Road corridor, indicating that the intersections and road segment are functioning normally from a safety perspective in comparison to other similar Regional road intersections and segments. This is also reflected in the ranking of the intersections and roadway segments, ranging from 185 to 301, indicating that Derry Road is performing relatively well from a safety perspective.

3.6 Engineering Considerations

3.6.1 Roadway Geometrics

The existing geometric conditions for the Derry Road corridor are presented in **Table 3-10**. This table provides a description of the various geometric roadway features beginning with roadway classification through to the right-of-way limits.

Table 3-10: Existing Geometric Conditions
Derry Road (Regional Road 7) Corridor

Geometric Design Criteria	Milburough Line to McNiven Road
Classification	Rural Arterial Undivided
Design Speed	>70 km/hr[1]
Posted Speed	60 km/hr
Number of Lanes	2
Minimum Stopping Sight Distance	No obstructions
Minimum Radius (Max e 6%)	Tangent except for S-bends at Station 0+650 to 0+750
Maximum Grades	5.16%
Minimum Grades	0.50%
Vertical Curves (Min. K) Crest Sag	 25.00 25.00

[9] Rankings obtained from their respective intersection or midblock tables.

Table 3-10: Existing Geometric Conditions
Derry Road (Regional Road 7) Corridor

Geometric Design Criteria	Milburough Line to McNiven Road
Lane Widths – Through Lane	3.30 m±
Shoulder Widths	Varies [2]
Right-of-way	20 m

Notes:

[1] Design speed is based on current roadway geometry provided by City of Burlington design drawing information. Design speed of 80 km/h based on vertical curves with K-crest of 25.00 at Stations 0+180, 0+420, 0+710, and 0+810. Design speed of 70 km/h based on 190 m horizontal curve at Station 0+675

[2] The shoulder width varies from 0 m to approximately 0.5 m. Shoulder grades vary from flat to 15%

3.6.2 Crossing Roads

There are two crossing roads located at the western and eastern limits of the study area including Milburough Line and McNiven Road, respectively.

North of Derry Road – Town of Milton Jurisdiction

Milburough Line north of Derry Road is classified as a *Local Road* from Derry Road to 5 Side Road under Schedule E of the Town's Official Plan (August 2008). This section of Milburough Line maintains a two lane rural road cross-section with narrow granular shoulders and drainage ditches. The pavement width is approximately 7.1 metres with two 3.55 metre lanes.

McNiven Road north of Derry Road is classified as a *Local Road* under Schedule E of the Town's Official Plan (August 2008). This section of McNiven Road maintains a two lane rural road cross-section with narrow granular shoulders and drainage ditches. The pavement width is approximately 6.0 metres with two 3.0 metre lanes.

South of Derry Road – City of Burlington Jurisdiction

Milburough Line south of Derry Road is classified as a *Major Arterial* roadway from Derry Road to Kilbride Street and then as a *Local Road* south of Kilbride Street under Schedule L of the City's Official Plan (October 2006). This section of Milburough Line maintains a two lane rural road cross-section with narrow granular shoulders and drainage ditches. The pavement width is approximately 7.1 metres with two 3.55 metre lanes.

McNiven Road south of Derry Road is classified as a *Local Road* under Schedule L of the City's Official Plan (October 2006). This section of McNiven Road maintains a two lane rural road cross-section with narrow granular shoulders and drainage ditches. The pavement width is approximately 6.0 metres with two 3.0 metre lanes.

There are no separate auxiliary turn lanes at the intersections of Derry Road/Milburough Line or Derry Road/McNiven Road.

3.6.3 Drainage

The terrain through the study area is generally moderately rolling. Ontario Soil Survey Report No. 43 identifies the soils in the study area to be primarily Springvale sandy loams and Guelph Loam till which exhibit good drainage and relatively low runoff potential. The presence of quarry operations in the area indicates that there may be fractured bedrock near the surface which collects runoff.

Drainage is provided by a roadside ditch collection system that conveys runoff toward mainly four separate roadway watercourse crossings. In many areas, roadway drainage is conveyed onto adjacent private properties as sheet overland flow.

The four culvert crossings drain areas ranging from 0.5 hectares to 72.3 hectares and range from 500 mm to 800 mm diameter in size. Generally these culverts are adequate to convey the 25-year storm design event without surcharging.

It is generally recommended that a minimum 600 mm diameter pipe be used for roadway crossings for maintenance purposes. In addition, the culvert draining the 72.3 hectare area, located approximately 60 metres west of McNiven Road, is a 800 mm diameter concrete culvert with twin 200 mm relief culverts.

3.6.4 Bridges and Culverts

Currently, there are no Derry Road structural bridge crossings within the study area. However, there is a concrete box culvert crossing with accompanying retaining walls located on McNiven Road just north of Derry Road. The culvert is a single span structure with a span length of 8.0 metres and width of 9.7 metres constructed in 1950. This crossing is in generally good condition and accommodates a tributary of the Bronte Creek.

There are a number of existing culverts located along Derry Road within the study area including road crossings and driveway culverts as follows:

<u>Derry Road Culvert Crossings (north-south crossings)</u>

- 600 mm diameter CSP approximately 15 metres in length located approximately 26 metres from the northeast property line at the intersection of Milburough Line and Derry Road;

- 500 mm diameter CSP approximately 15 metres in length located approximately 568 metres from the northeast property line at the intersection of Milburough Line and Derry Road;
- 600 mm diameter CSP approximately 12 metres in length located approximately 299 metres from the northwest property line at the intersection of McNiven Road and Derry Road;
- 200 mm diameter CSP approximately 10.7 metres in length located approximately 46.6 metres from the northwest property line at the intersection of McNiven Road and Derry Road;
- 800 mm diameter concrete pipe approximately 11.2 metres in length located approximately 45.6 metres from the northwest property line at the intersection of McNiven Road and Derry Road; and
- 200 mm diameter CSP approximately 10.7 metres in length located approximately 45 metres from the northwest property line at the intersection of McNiven Road and Derry Road.

Driveway Culverts

- 450 mm diameter CSP on the north side of Derry Road (#1101) approximately 68 metres in length beginning approximately 374 metres from the northeast property line at the intersection of Milburough Line and Derry Road, extending easterly;
- 400 mm diameter CSP on the north side of Derry Road (Field Entrance) approximately 8 metres in length beginning approximately 534 metres from the northeast property line at the intersection of Milburough Line and Derry Road, extending easterly;
- 500 mm diameter CSP locate at #1200 Derry Road (south side) approximately 10 metres in length; and
- 400 mm diameter CSP on the north side of Derry Road (#1243) approximately 51 metres in length beginning approximately 384 metres from the northwest property line at the intersection of McNiven Road and Derry Road, extending westerly.

3.6.5 Pavement and Geotechnical

Applied Research Associates Inc. (ARA) was retained by the Regional Municipality of Halton to provide pavement engineering services in support of the Derry Road (Regional Road 7) Transportation Corridor Improvements Environmental Assessment study. The pavement evaluation was undertaken to determine the existing condition of the in-situ pavement and subgrade materials, estimate the remaining life of the in-place pavement structure, identify potential rehabilitation options, and recommend a cost-effective pavement rehabilitation strategy.

The field work component of this assignment examined the as-built pavement conditions along Derry Road. Boreholes were also advanced on both Milburough Line and McNiven Road to

determine the existing thickness for tie in purposes. The investigation comprised the following tasks:

- A pavement surface condition survey to determine the location, extent, and severity of pavement distresses;
- The advancement of boreholes to determine both the type and thickness of the existing pavement structure components, as well as the subgrade and groundwater conditions at the site; and
- Laboratory classification testing of the granular road base and subgrade soils.

The pavement surface condition survey was carried out in October 2009. The survey consisted of an examination of the pavement surface noting the condition of the pavement and identifying areas of visual pavement distress and distortion. The survey was completed in general accordance with the *MTO Manual for Condition Rating of Flexible Pavements for Municipalities*.

The geotechnical work for this investigation was carried out in November 2009 and comprised four pavement cores and eight boreholes advanced to a depth of 1.5 metres below existing grade. Representative samples of the granular base/subbase and subgrade materials encountered in the boreholes were retained for detailed visual examination and laboratory classification testing. Routine laboratory testing consisted of grain size analysis and moisture content determination.

Additional details on the results of the pavement investigation are provided in **Appendix K**.

Physiographic Setting

The site lies within the physiographic region known as the Peel Plain, *The Physiography of Southern Ontario, 3rd edition, L.J. Chapman and D.F. Putnam*. The underlying geological material of the Peel Plain consists of a variety of soil types. The soils are primarily comprised of tills, containing large amounts of clay and limestone with sandy areas near stream valleys. The frost penetration depth for the area is estimated to be 1.2 metres.

Pavement Condition Survey

The site was visited in October 2009 to conduct a visual pavement condition survey of Derry Road, within the project limits. The pavement surface was found to be in very good condition, with very little distress.

Reconstruction History

Derry Road was reconstructed by the City of Burlington from Milburough Line to Twiss Road in the year 2000. The reconstruction provided vertical alignment improvements and a new

pavement surface including 50 mm HL3 surface course asphalt, 50 mm HL8, base course asphalt and varying depth of Granular A base.

In 2006, a section of Derry Road from 250 metres west of McNiven Road to McNiven Road was reconstructed to provide full depth road repairs and slope stabilization. The existing asphalt was removed to a depth of 350 mm and replaced with 50 mm of HL1, 100 mm HDBC, 200 mm of Granular A, and 150 mm of Geoweb and geotextile filter fabric (Type 270R).

A 150 mm diameter perforated pipe subdrain with geotextile was provided in several sections along the north and south sides of Derry Road within the reconstructed area. Geoweb slope protection was also provided on the north side of Derry Road for an approximate distance of 50 metres between the creek and roadway.

An existing 3-cable guide rail along the south side of the roadway was removed and replaced with steel beam guide rail with extruder end treatments. Steel beam guide rail was also provided on the north side of the roadway, including extruder end treatments.

Subsurface Conditions

From Milburough Line to approaching McNiven Road, the pavement thickness on Derry Road varies from 80 to 120 mm, underlain by a crusher run limestone granular base and a crushed sand and gravel subbase. The thickness of the granular base was found to vary in thickness from 70 to 150 mm, while the thickness of the granular subbase varied from 170 to 450 mm.

Boreholes advanced beyond McNiven Road found thicker asphalt, in the range of 150 and 180 mm, respectively. However the granular base/subbase was found to be significantly less, with measurements of 100 mm and 120 mm.

The grain size analysis of selected granular base/subbase samples indicated that all of the samples were slightly finer than the OPSS Gradation requirements for Granular A, with as much as 19 percent passing the 75 µm sieve. It is suspected that the auger sampling procedure may have contributed to some breakdown of material, which would have increased the percentage of fines.

Underlying the pavement structure, the subgrade comprised brown sandy silt – silty sand, with traces of clay. Laboratory test results found the subgrade soil to be non-plastic. The in-situ moisture contents were typically found to vary from 8 to 10 percent, however, localized wet areas were found with moisture contents as high as 21 percent were encountered. Based on the grain size distribution, the soils were considered to have low potential for frost susceptibility.

Groundwater Conditions

On completion of drilling, no free water was encountered at any of the borehole locations. From Milburough Line to McNiven Road, the subgrade soils were typically dry to moist. The regional groundwater table is considered to be lower than the depth investigated.

3.6.6 Utilities and Services

There are a number of existing underground and overhead utilities within the study area at the following locations:

Hydro Services and Illumination

Beginning at the western limit of the study area, overhead hydro lines located on the north side of Derry Road near the intersection of Milburough Line travel easterly along the north side of the road for approximately 600 metres where they cross over to the south side of the roadway and continue on for approximately 100 metres. The overhead hydro lines then cross back over to the north side of the roadway where they continue on for approximately 500 metres before crossing back over to the south side of the roadway, finally crossing back over again to a central pole location situated on the north-east corner of McNiven Road at Derry Road.

Existing overhead hydro lines run along the west side of Milburough Line and along the east and west sides of McNiven Road, south of Derry Road and along the west side of McNiven Road, north of Derry Road. There are also a number of north-south overhead hydro line crossings providing hydro services to individual properties within the study area.

Partial illumination is provided at the intersection of Derry Road and Milburough Line via a cobra head light standard mounted on a hydro pole located on the west side of Milburough Line just south of Derry Road. Partial illumination is also provided at the intersection of Derry Road and McNiven Road via two cobra head light standards mounted on hydro poles located on the north east and southwest quadrants of the intersection. One additional light pole is located adjacent to #975 Derry Road on the north side of the roadway.

Bell Telephone

Underground Bell Telephone lines run along the south side of Derry Road beginning on the east side of Milburough Line and terminating at a Bell pedestal located across from #1101 Derry Road. The Bell lines then cross under Derry Road to a hydro pole located on the north side of the roadway in front of #1101 Derry Road. At this point the lines travel overhead along the north side of Derry Road following the hydro lines crossing to the south side of Derry Road and then back to the north side near #1215 Derry Road. The Bell lines then remain on the north side of the roadway, traveling overhead toward McNiven Road where they cross over the south side of

Derry Road approximately 45 metres east of McNiven Road. The lines then cross over to the north and south sides of Derry Road over McNiven Road continuing easterly along the north side of Derry Road and north and south along the east side of McNiven Road. There is one additional underground crossing at #1200 Derry Road providing telephone services to the existing dwelling at this location.

3.6.7 Wells

There are a number of existing wells located within the right-of-way limits fronting onto Derry Road including #7010 McNiven Road (located approximately 6 metres north of the existing property line), #1193 Derry Road (located approximately 20.75 metres north of the existing property line, and #1101 Derry Road (located approximately 12 metres north of the existing property line [to be confirmed during detailed design]).

3.7 Problem Statement

The need for improvements to Derry Road (Regional Road 7) from Milburough Line to McNiven Road was originally precipitated due to the issues associated with the stability of the section of roadway adjacent to the Bronte Creek tributary. Subsequent to the reconstruction of Derry Road adjacent to the creek, Regional Council approved the Class Environmental Assessment for Derry Road as part of the Regional Capital Budget. The Class EA was required to address a number of concerns including the following:

- Upgrading roadway geometrics to meet prevailing Regional standards including the roadway alignment and cross-section;
- Improving the substandard pavement structure of the roadway (the previous reconstruction in 2000 provided a new pavement surface and vertical alignment improvements but did not address existing roadway base conditions); and
- Improving roadway and roadside drainage through enhancements to the road grades and profiles, replacement and/or addition of drainage culverts, and provision of proper roadside ditches (including drainage improvements adjacent to the Bronte Creek tributary).

The *Problem Statement* provides a clear statement of the problem/opportunities that need to be addressed for a specific undertaking. The Problem Statement is based on and is a culmination of the analyses undertaken for a specific undertaking. The various analyses (e.g., traffic operations reviews, structural assessments, drainage reviews, etc.) provide input for and contribute to the identification and description of the problem and/or opportunity.

The prevailing and future deficiencies along Derry Road from Milburough Line to McNiven Road are summarized by the following Problem Statement:

> ***"As presently configured, Derry Road (Regional Road 7) has a number of existing structural, geometric and roadway cross-section deficiencies which can be improved to increase overall safety, capacity, and roadside drainage."***

In order to address the deficiencies described by the Problem Statement, a range of reasonable and feasible alternative "solutions" were identified to solve the Problem. The development and evaluation of the alternative solutions is the subject of Section 4 of the ESR.

4. PLANNING SOLUTIONS

4.1 Alternative Solutions Considered

Under Phase 2 of the Class EA planning and design process all reasonable and feasible solutions to the problem are identified and described. The type of project schedule that the Class EA is categorized under is also confirmed in Phase 2. In this case, the Derry Road Transportation Corridor Improvements Class EA was confirmed as a Schedule 'C' under the Class Environmental Assessment process.

In order to address the Problem encompassing the deficiencies that were identified as part of the Derry Road (Regional Road 7) Transportation Corridor Improvements, a range of reasonable and feasible "solutions" were identified as alternative ways to solve the Problem. The range of solutions also included the "Do Nothing" alternative. In the "Do Nothing" alternative, no improvements or changes would be made to solve the identified problem or opportunity. This means that the problem would remain in the system. A decision to "Do Nothing" would typically be made when the costs of all other alternatives, both financial and environmental, significantly outweigh the benefits.

The alternative solutions included the following:

1. **Do Nothing** – Do not undertake any improvements or changes within the Derry Road corridor;
2. **Improve Other Roadways** – This alternative involved improving other roadways that travel parallel or perpendicular to Derry Road such as Milburough Line, McNiven Road, Conservation Road (formerly Steeles Avenue), or Kilbride Street to accommodate future traffic volumes;
3. **Limit Future Development** (within the vicinity of the study area) – This alternative would limit or restrict future development in the area to limit traffic growth along Derry Road;
4. **Use of Travel Demand Management Measures** – This alternative is aimed at shifting travel behaviour to reduce peak hour vehicle travel demands (i.e. car-pooling, HOV lanes, flexible work hours);
5. **Implement Localized Intersection and/or Traffic Control Improvements** – This alternative involved localized intersection improvements that may include the provision of auxiliary lanes, improvements to traffic control such as the installation of traffic signal control signals and/or the optimization of traffic controls along the study corridor to increase efficiency of operation;

6. **Implement Geometric Roadway Improvements to Improve Safety** – This alternative included modifications to the existing roadway geometrics (i.e. horizontal and vertical roadway alignments) and roadway cross-section elements (e.g., travel lane width, median width, shoulder width, side slopes, ditches, etc.) to provide a safer roadway;
7. **Pavement Resurfacing, Rehabilitation, Repair and/or Reconstruction** – This alternative would involve a range of roadway pavement repairs ranging from full depth reconstruction of the roadway (i.e. removal and replacement of the roadway base and subbase structures) to an asphalt overlay or simple surface spot repairs within the study area corridor;
8. **Improvements to Existing Drainage Culverts and Ditches** – This alternative would include modifications or replacement of existing culverts with larger, higher capacity culverts or augmentation of existing culverts (i.e. providing additional culvert drainage capacity through installation of new culverts in the area of existing culverts) and the improvement or construction of new roadside ditches where necessary to improve overall roadside drainage. This alternative would also consider the additional benefits of improving culvert sizes to better accommodate the movement of aquatic life as part of the Bronte Creek tributary cold water fishery; and
9. **Combination of Roadway Improvement Alternatives and Other Supporting Measures** – This alternative entailed a combination of the various planning alternatives toward the goal of providing the best overall solution to the problem through addressing a range of issues within the study area.

4.2 Preliminary Screening of Alternative Solutions

A preliminary screening of the alternative planning solutions was undertaken to determine the overall positive and negative attributes of each alternative. In comparing alternative solutions, it is recognized that many of the potential solutions may resolve more than one problem and the feasibility of an alternative solution will depend, in part, on a range of factors including but not limited to the nature and location of the transportation system, the nature and location of the problem, comparative costing of alternative solutions, local area growth pressures, and municipal goals and objectives.

The following provides a discussion of the screening results:

1. **Do Nothing** – The “Do Nothing” solution does not address future travel demands, current geometric design standards, pavement structural issues, stormwater drainage concerns, and safety issues within the Derry Road corridor. This alternative was carried forward for comparison purposes.
2. **Improve Other Roadways** – This alternative has been identified in the Halton Transportation Master Plan (HTMP) and is currently part of an overall strategy to improve the Regional road transportation network within Halton Region.

3. **Limit Future Development** (within the vicinity of the study area) – Future travel demands are based on approved future development and growth. It is not anticipated that any significant amount of future growth will occur over the planning horizon within the vicinity of the Derry Road study area and therefore this alternative was not carried forward.
4. **Use of Travel Demand Management Measures** – On its own, this alternative does not fully address the problem but was carried forward as part of the overall transportation strategy.
5. **Implement Localized Intersection and/or Traffic Control Improvements** – On its own, this alternative does not fully address the problem, but was carried forward as part of the solution.
6. **Implement Geometric Roadway Improvements to Improve Safety** – On its own, this alternative does not fully address the problem, but was carried forward as part of the solution.
7. **Pavement Resurfacing, Rehabilitation, Repair and/or Reconstruction** – On its own, this alternative does not fully address the problem, but was carried forward as part of the solution.
8. **Improvements to Existing Drainage Culverts and Ditches** – On its own, this alternative does not fully address the problem, but was carried forward as part of the solution.
9. **Combination of Roadway Improvement Alternatives and Other Supporting Measures** – This alternative represents a combination of the various alternatives and supporting measures listed previously and would fully address the problem.

4.3 Evaluation Factors

The following four categories of evaluation factors, which represent environmental issues and mitigation measures that are related to potential improvements for the Derry Road corridor, were considered in the evaluation of the planning and design alternatives for this study. These evaluation factors and their respective criteria were finalized based on input received from affected agencies, stakeholders, the public and Halton Region.

TECHNICAL

- Capacity and Level of Service
- Safety
- Access
- Active Transportation
- (e.g., Pedestrians and Cyclists)
- Geometric Standards

SOCIO-ECONOMIC ENVIRONMENT

- Land Use
- Effects on Official Plans and other Planning Initiatives (e.g., Greenbelt Plan and Niagara Escarpment Plan)
- Effects on business

- Structural (i.e. Pavement)
- Utility Relocations
- Construction and Property Costs
- Construction Staging

access/operations
- Effects on residential and rural land uses
- Potential property requirements
- Noise effects
- Aesthetics
- Emergency access

NATURAL ENVIRONMENT

- Effects on Vegetation
- Effects on Wildlife
- Effects on Aquatic Ecology
- Stormwater Management
- Effects on Groundwater Resources

CULTURAL ENVIRONMENT

- Effects on Built Heritage Features
- Effects on Archaeological Resources

The evaluation criteria are defined in more detail in **Table 4-1**.

Table 4-1: Evaluation Factors

Factor	Area of Study	Factor Criteria
Technical	**Capacity and Level of Service**	Potential adverse effects include traffic delays and poor levels of service. Potential advantages include increased traffic capacity to reduce traffic congestion. Need to improve intersections and/or roadways to improve traffic operations.
	Safety	Safety related factors include roadway geometrics, roadside hazards, intersection design, and control, accommodating pedestrians and cyclists.
	Access	Potential adverse effects include limited access during construction and changes to existing entrances.
	Active Transportation	Potential impact on existing and future pedestrian and cyclist facilities including type, continuity, and location.
	Geometrics Standards	Consistency with prevailing design standards/guidelines (i.e. horizontal and vertical road alignments and roadway cross-section.
	Structural	Potential adverse impacts to existing pavement structure.
	Utility Relocations	Potential adverse effects on existing utilities.

Table 4-1: Evaluation Factors

Factor	Area of Study	Factor Criteria
	Construction and Property Cost	The cost of constructing the preferred design and the cost of the property required to accommodate the preferred design.
	Construction Staging	Potential impact to local area businesses and transportation facilities through the staging of future construction works.
Natural Environment	**Effects on Vegetation**	Proximity, size, characteristics and sensitivity of significant natural areas, terrestrial ecosystems. Potential impact or loss of natural areas, terrestrial ecosystems or wetland areas, function or habitat.
	Effects on Wildlife	Presence of identified or documented wildlife habitat areas. Potential adverse effects on existing wildlife due to disturbance or loss of habitat.
	Effects on Aquatic Ecology	Potential adverse effects on aquatic ecology (e.g., existing fish populations) due to disturbance or loss of habitat.
	Stormwater Management	Potential for adverse effects on drainage, and effects on surface water and groundwater.
	Effects on Groundwater Resources	Potential for adverse effects on existing water resources (water quality and/or quantity).
	Natural Hazards	A natural process that has the potential to damage property and injure humans and wildlife. A natural hazard encompasses a variety of phenomenon ranging from fog and snow/ice to earthquakes, forest fires and tornadoes. In Halton Region, natural hazards of key concern include the potential for flooding and erosion.
Socio-Economic Environment	**Land Use**	Presence, number and characteristics of residences, community facilities, public parks, institutions or businesses within or adjacent to the study area.
	Effects on Official Plans and other Planning Initiatives	Potential impacts or effects on approved planning areas including Municipal Official Plans, Greenbelt Plan, Niagara Escarpment Plan and other special planning area adjacent to the study area.
	Effects on Business Access/Operations	Potential for displacement or disturbance to institutions or businesses within the study area including potential affects to business access.
	Effects on Residential and Rural Land Uses	Potential for displacement or disturbance to residences, community facilities, or agricultural land uses within the study area.

Table 4-1: Evaluation Factors

Factor	Area of Study	Factor Criteria
	Potential Property Requirements	Requirement for property acquisition and displacement or disruption of residences and businesses within the study area.
	Noise Effects	Number and characteristics of noise sensitive receivers (residences, community facilities, or institutions) within the study area. Potential effects of traffic related noise on residences, community facilities, or institutions adjacent to and/or within study area.
	Aesthetics	Impact to landscape and aesthetic nature of the roadway corridor and adjacent landscapes.
	Emergency Access	Potential to reduce travel times within study corridor that can lead to improved (reduced) emergency response times.
Cultural Environment	**Effects on Built Heritage Features**	Presence and characteristics of designated built heritage resources under the Heritage Act or registered built heritage resources by the City of Burlington and the Town of Milton.
	Effects on Archaeological Resources	Presence and characteristics of registered archaeological resources. Potential adverse impacts on archaeological resources adjacent to and/or within the study area.

4.4 Selection of Preferred Alternative Solution

The evaluation of the planning alternatives were based on an assessment of potential impacts for the various evaluation factors identified in the previous section and on an assessment of how each planning alternative best addressed the *Problem Statement*.

Alternative 1 and **Alternative 2** have minimal immediate capital costs in terms of addressing the technical issues associated with the Derry Road corridor (e.g., improve the structural adequacy of the roadway, improve drainage, or address safety concerns). The implementation of either of these alternatives would also not impact the natural, social or cultural environment within the study area. However, neither alternative would address the Problem Statement. Further, improvements to other roadways outside of the study area are already considered as part of the Halton Transportation Master Plan initiatives for Regional roads entailing a strategic approach to overall improvement of the transportation network within Halton Region. Any future improvements to other roadways within the vicinity of the study area would be under the jurisdiction of the Town of Milton and City of Burlington.

Alternative 3 was not carried forward as no further development within or adjacent to the area is anticipated based on the Official Plan review for the Region and surrounding municipalities. Current land use designations and policy planning areas, such as the Greenbelt Plan and Niagara Escarpment Plan, prohibit the expansion of development beyond existing levels.

While there may be some opportunities to implement Travel Demand Management measures in the future, on its own, **Alternative 4** is not expected to significantly reduce vehicular demands within the study area. However, this alternative was carried forward as part of the overall transportation strategy.

Alternative 5 through **Alternative 8** will address localized safety, operational, drainage and structural issues; however individually as stand-alone solutions, they will not fully address the problem. All of these alternatives were carried forward as part of the solution.

The recommended planning solution was therefore determined to be represented by **Alternative 9**, which is a combination of the aforementioned alternatives. Alternative 9 includes the following general components:

- Provides geometric roadway improvements, where feasible, including adjustments to the horizontal and vertical roadway alignment to meet prevailing standards;
- Provides improvements to the roadway rural cross-section through adjustments to the travel lane widths, shoulder widths, and side slopes;
- Improves the pavement structure of the roadway;
- Improve roadway and roadside drainage through enhancements to the road grades and profiles, replacement and/or addition of drainage culverts, and provision of proper roadside ditches; and
- Provides improvements or modifications to intersection traffic control where necessary to meet future traffic operational demands.

Alternative planning solution 9 was carried forward in to Phase 3 of the Class EA planning and design process as the *Preferred Alternative Planning Solution*.

5. DESIGN CONCEPTS

The third phase of the Class EA Planning and Design process followed guidelines similar to that followed under Phase 2. A number of reasonable *Alternative Design Concepts* for the preferred alternative solution (i.e. Alternative 9) were identified and evaluated to determine the *Preliminary Preferred Design*.

The potential impacts of the various alternative designs on the environment were identified and documented. The alternative designs were then evaluated based on the range of criteria identified under Phase 2 of the EA process (Refer to Section 4.3) taking into consideration the identified environmental impacts and appropriate mitigating measures. Based on the results of the evaluation, a preliminary preferred design was presented to the public and technical agencies along with the documented environmental inventories. The culmination of Phase 3—the *Recommended Alternative Design Concept*—resulted in the confirmation of the preliminary preferred design, taking into consideration input and comments received from the public and review agencies.

5.1 Design Criteria

The development of the alternative design concepts were based on a number of design criterion which ensured that each alternative would be developed to prevailing standards. *Design Criteria* are established local, provincial, and national standards and procedures that guide the establishment of roadway layouts, alignments, geometry, and dimensions for specified types of roadways in certain defined conditions. The principal design criteria for roadways are traffic volume, design speed, functional classification, the physical characteristics of vehicles, the classification of vehicles, and the percentage of various vehicle classification types that use the roadway. In the case of Derry Road, the present conditions of the roadway were determined as a factor of the various design criteria. Then, based on prevailing provincial and national standards, current design standards were defined, and compared to the present roadway criteria, culminating with the *Proposed Standards* for the future Derry Road. The proposed standards also took into account currently established Halton Region standards for regional arterial road designs.

The Design Standards employed in the development of the alternative design concepts are provided in **Table 5-1**. The design standards were approved by Halton Region and include a list of noted annotations which further define the various attributes of the design criterion. The table includes a listing of current provincial and national prevailing design standards for the Ministry of Transportation (MTO) and the Transportation Association of Canada (TAC) along with the proposed standards for each design criteria attribute.

Table 5-1: Design Criteria
Derry Road (Regional Road 7) Transportation Corridor Improvements from Milburough Line (Regional Road 24) to McNiven Road

Attributes	Present Conditions	Design Standards		Proposed Standards
		MTO	TAC	
Classification	Rural Arterial Undivided	RAU 80	RAU 80	RAU 80
Design Speed	>70 km/hr [1]	80 km/h	80 km/h	80 km/h [16]
Posted Speed	60 km/hr	60 to 80 km/h	N/A	60 km/h [16]
No. of Lanes	2	N/A	N/A	2
Minimum Stopping Sight Distance	No obstructions	135 m [3]	115 to 140 m [7]	135 m
Minimum Radius (max e 6%)	Tangent except for S-bends at Station 0+650 to 0+750	250 m	250 m	250 m
Maximum Grades	5.16 %	6 to 8 %	4 %	4 %
Minimum Grades	0.50 %	0.5 % [4]	0 % [8]	0.5 %
Vertical Curves (Min K) Crest Sag	 25 25	 35 30	 24 to 36 25 to 32 [9]	 35 30
Lane Widths Through (TL) Left turn Left adj. to median Right turn	 3.30 m±	 3.5 m 3.25 m [5] 3.0 m [5] 3.25 m [5]	 3.5 to 3.7 m [10] 3.3 m [11] 3.0 m [12] 3.3 m [13]	 3.65 m [17] 3.50 m 3.25 m 3.50 m
Superelevation	Varies at S-bend	6 % (maximum)	7 % (maximum) [14]	6 % (maximum)
Flush Median	N/A	1.0 m	1.0 to 4.0 m	0 to 2.0 m
Shoulder Widths	Varies [2]	2.5 m [6]	2.5 to 3.0 m [15]	2.5 m (1.0 m Paved and 1.5 m granular) [17]
Right-of-Way	20 m	26 to 40 m	20 to 45 m	35 m [17]

Notes:

[1] Design speed is based on current roadway geometry provided by City of Burlington design drawing information. Design speed of 80 km/h based on vertical curves with K-crest of 25.00 at Stations 0+180, 0+420, 0+710, and 0+810. Design speed of 70 km/h based on 190 m horizontal curve at Station 0+675.
[2] The shoulder width varies from 0 m to approximately 0.5 m. Shoulder grades vary from flat to 15%.
[3] Minimum (rounded) stopping sight distance on level grade wet pavements.
[4] Desirable minimum grades are 0.5 %; Absolute minimum grades are 0.3 %.
[5] Minimum acceptable width.
[6] Minimum width for pavement support: 0.5 m paved shoulder or 1.0 m granular shoulder.
[7] Stopping sight distance for automobiles and trucks with anti-lock braking systems on level grade wet pavement.
[8] Level grades (i.e. 0 %) are acceptable on uncurbed (i.e. rural) roadways provided that the roadway is adequately crowned, snow does not interfere with surface drainage, and ditches have positive drainage.
[9] Based on “headlight control” criteria for non-illuminated roadways.

[10] Based on an undivided arterial roadway classification carrying an anticipated future Design Hour traffic volume of in the range of 450 vehicles per hour or greater.
[11] Left-turn lane not adjacent to a median are generally the same as the adjacent lane width or 0.2 m less, but not less than 3.3 m.
[12] Left-turn lane adjacent to a raised or painted median are either the same width as the adjacent lane or 0.2 m less, but not less than 3.0 m wide.
[13] The width of the right turn lane may be reduced from the through lane dimension by 0.2 m, but the width must not fall below 3.3 m.
[14] Pavement cross-slope for resurfacing.
[15] Based on an undivided arterial roadway classification carrying an anticipated future Design Hour traffic volume of in the range of 450 vehicles per hour or greater.
[16] 85th percentile speed is 84 km/h based on spot speed survey measured on April 30, 2008 at a location on Derry Road 250 metres east of Milburough Line. The total volume of vehicles was measured to be 3,246 during the 24-hour spot speed survey period. 60 km/h posted speed set at 20 km/hr below design speed based on the 85th percentile speed consistent with adjacent sections of Derry Road.
[17] Based on Halton Region Transportation Master Plan (HTMP), June 2004. Shoulders to have full depth granular structure

5.2 Development of Alternative Design Concepts

The development of the alternative design concepts were based on the Preferred Alternative Planning Solution, incorporating the findings of the various technical investigations and analyses and relevant input received from technical agencies and the public as follows:

Technical Investigations and Analyses

- Traffic Operations and Safety Review
- Drainage and Stormwater Management Review
- Natural Environment Assessment
- Archaeological and Cultural Heritage Resource Assessment
- Noise Impact Assessment
- Geotechnical Investigation
- Access and Right-of-Way considerations (existing and future)
- Roadway Cross-section Elements
- Impacts to Existing/Future Utilities
- Impacts to Existing Residential/Commercial Properties
- Coordination with the City of Burlington/Town of Milton
- Construction Timing and Costs

Public and Technical Agency Input

Summary of Public Input

- The use of the Derry Road corridor as a possible truck by-pass route and the effects that higher volumes of truck traffic could have on the structural integrity of the roadway.
- Potential drainage issues related to the study area and the Bronte Creek tributary including the accommodation of a possible replacement culvert across the roadway.

- Potential property impacts and the expected future road allowance width impacts.
- Degree of noise impacts of the proposed roadway improvements.
- Regular maintenance within the roadway right-of-way width.

Summary of Technical Agency Input

- The City of Burlington requested that some form of bike lanes be implemented along this section of Derry Road.
- Comments provided by Conservation Halton (Refer to **Appendix C**).

5.2.1 Roadway Improvement Design Concepts – Mainline Section of Derry Road

Roadway improvement design concepts included various alternatives for the improvement of the existing two lane rural road cross-section to meet Regional road standards. In each case, a two lane rural roadway cross-section was maintained for each of the improvement alternatives and included the following general concepts:

- "Do Nothing" Alternative;
- Symmetrical widening about the existing roadway centreline; and
- Symmetrical widening within the existing roadway right-of-way.

The "Do Nothing" Alternative was evaluated and documented along with the other alternatives. In the case of the "Do Nothing" alternative, no improvements or changes would be made to solve the identified problem or opportunity. This means that the problem would remain in the system. A decision to "Do Nothing" would typically be made when the costs of all other alternatives, both financial and environmental, significantly outweigh the benefits. The "Do Nothing" alternative may be implemented at any time during the design process, prior to the commencement of construction.

The following provides a general description of the alternative roadway improvement design concepts considered as part of the Environmental Assessment process for this study:

- **"Do Nothing" Alternative** – No improvements or changes would be made to solve the identified problem or opportunity—existing roadway remains in current state.

- **Alternative 1** – Maintain the current horizontal roadway alignment with a rural 2-lane road cross-section including 3.65 metre lanes and 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular).

- **Alternative 2** – Centre the roadway alignment within the existing right-of-way limits with a horizontal curve radius of 250 metres at the S-bend with a rural 2-lane road cross-

section including 3.65 metre lanes and 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular).

- **Alternative 3** – Centre the roadway alignment within the existing right-of-way limits with tangent sections to separate the S-bend and a horizontal curve radius of 250 metres with a rural 2-lane road cross-section including 3.65 metre lanes and 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular).

The roadway improvement alternatives for the mainline section of Derry Road are illustrated in **Figures 5-1**, **5-2** and **5-3**. The mainline section extends from approximately Milburough Line (Regional Road 24) to 150 metres west of McNiven Road, a distance of approximately 1.25 kilometres.

5.2.2 Roadway Improvement Design Concepts – Derry Road west of McNiven Road

Separate roadway improvement design concepts were also considered for the section of Derry Road from approximately 150 metres west of McNiven Road to the McNiven Road intersection to improve the existing two lane road cross-section to meet Regional Road standards while minimizing potential impacts to the Bronte Creek tributary. The following two alternatives were considered as part of the Environmental Assessment process for this study:

- **Alternative 1-A** – A rural 2-lane road cross-section with 3.65 metre lanes with 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metre granular). Guiderail protection and granular shoulder side slopes matching to the existing creek location.

- **Alternative 1-B** – An urban 2-lane road cross-section with 3.65 metre lanes and 1.0 metre paved shoulders with concrete curb and gutter. Guiderail protection and retaining walls adjacent to the Bronte Creek tributary.

Alternatives 1-A and 1-B were included as a "subset" of Alternatives 1 through 3 noted under Section 5.2.1 and were evaluated separately in order to determine which of the two alternatives 1-A or 1-B would be combined with either Alternative 1, 2 or 3 to be carried forward as the *Preliminary Preferred Design*.

The roadway improvement alternatives for the section of Derry Road west of McNiven Road are illustrated in **Figures 5-1**, **5-2** and **5-3**.

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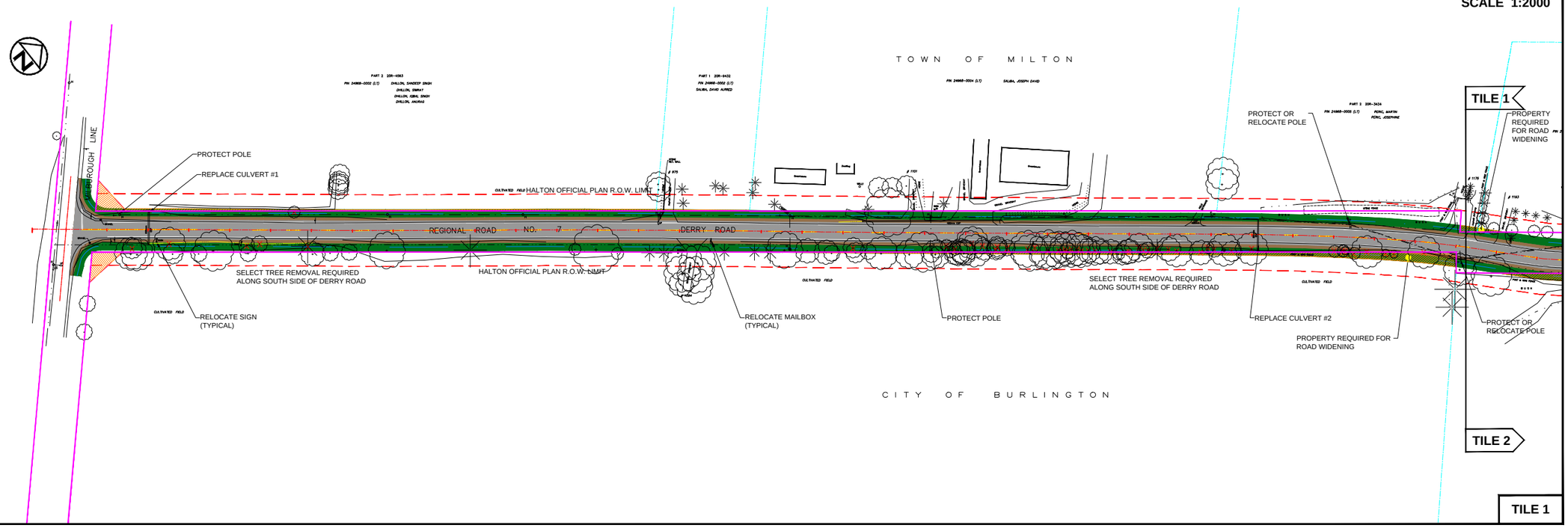

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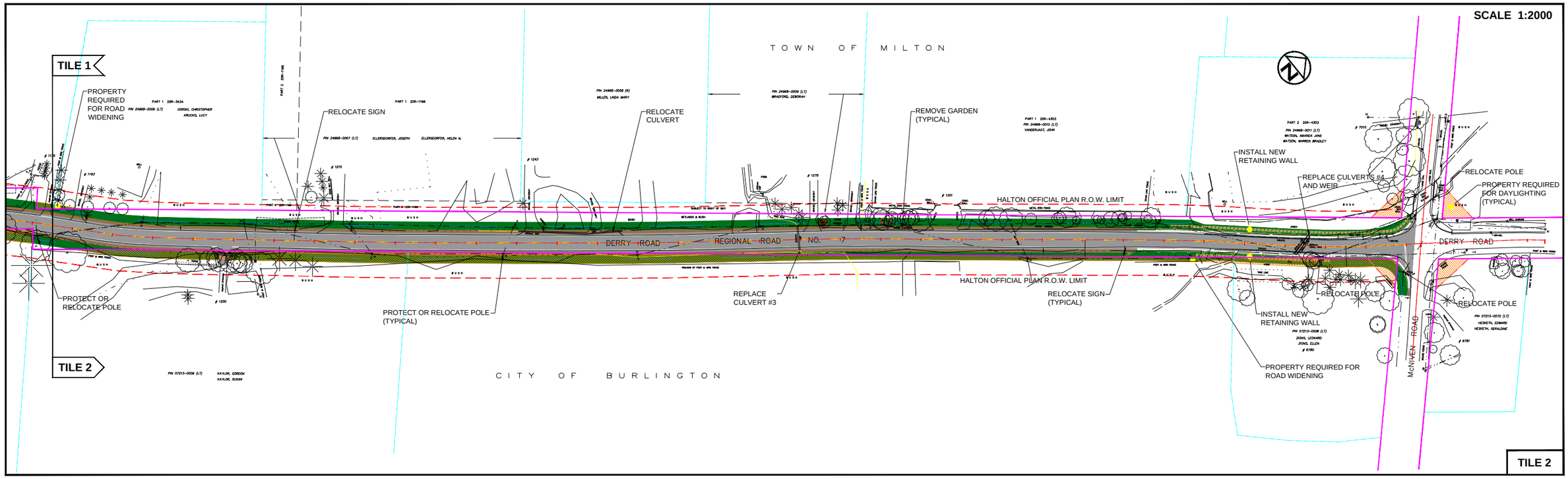


ALTERNATIVE DESIGN CONCEPTS 1 AND 1-B

Alternative 1 (Mainline Section) - Rural Road Cross-section on Existing Horizontal Road Alignment
Alternative 1-B (West of McNiven Road) - Urban Road Cross-section on Existing Horizontal Road Alignment With Retaining Wall

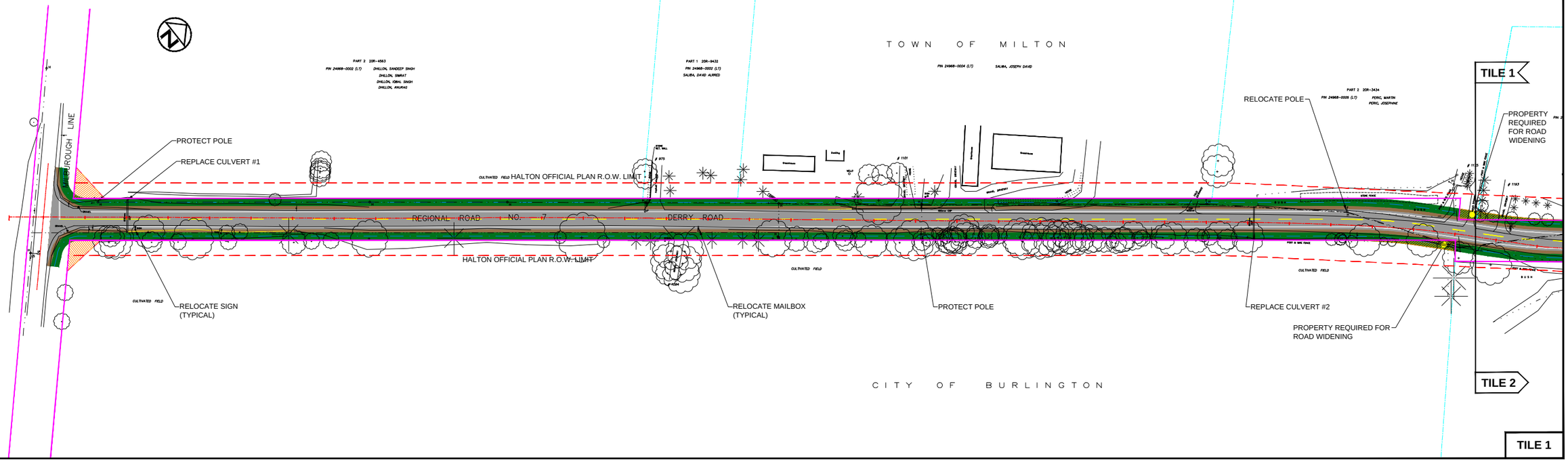
R. ASSOCIATES

Halton REGION

DERRY ROAD (REGIONAL ROAD 7)
MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD
CLASS ENVIRONMENTAL ASSESSMENT
NOVEMBER 2010

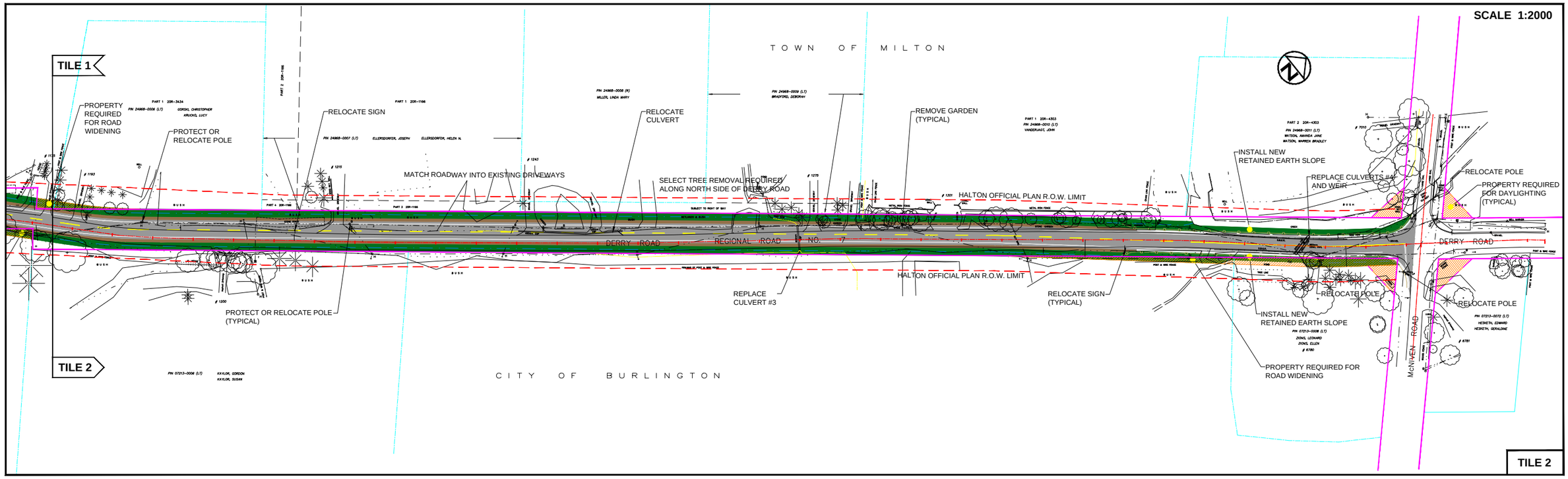
FIGURE 5-1

SCALE 1:2000



TILE 1

SCALE 1:2000



TILE 2

ALTERNATIVE DESIGN CONCEPTS 2 AND 1-A

Alternative 1 (Mainline Section) - Rural Road Cross-section within Existing Right-of-Way Limits (250 Metre S-Bend Radius)
Alternative 1-A (West of McNiven Road) - Rural Road Cross-section on Existing Horizontal Road Alignment with Retained Earth Slopes

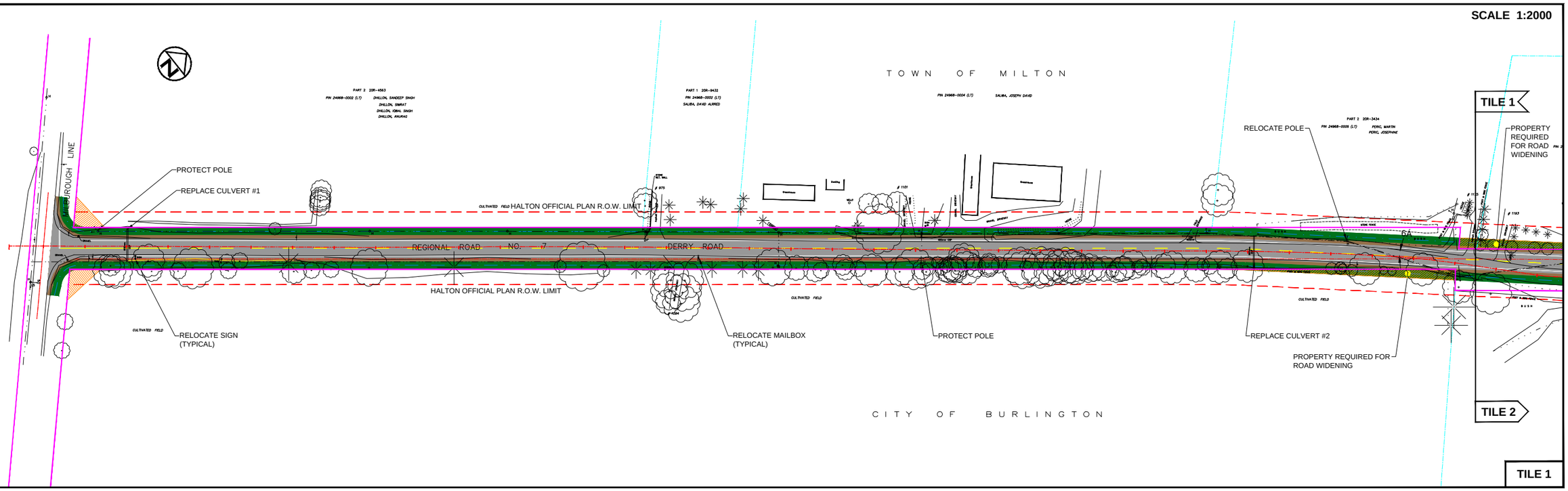
R. ASSOCIATES

Halton REGION

**DERRY ROAD (REGIONAL ROAD 7)
MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD
CLASS ENVIRONMENTAL ASSESSMENT
NOVEMBER 2010**

FIGURE 5-2

SCALE 1:2000



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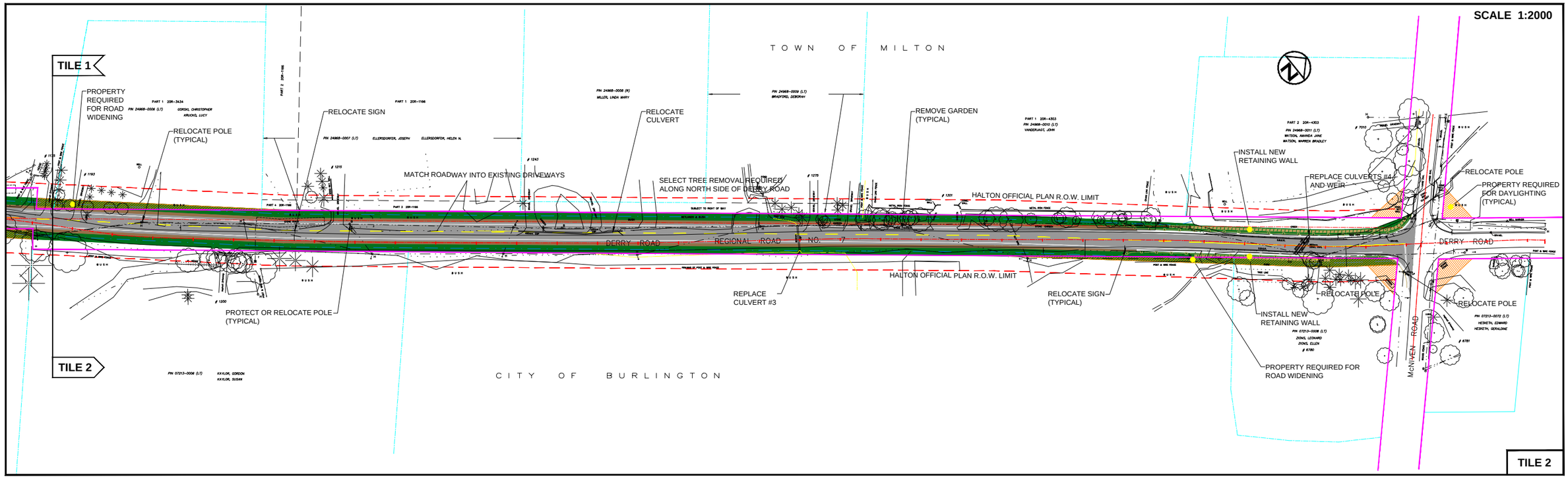


ALTERNATIVE DESIGN CONCEPTS 3 AND 1-B

Alternative 1 (Mainline Section) - Rural Road Cross-section within Existing Right-of-Way Limits (250 Metre S-Bend Radii)
Alternative 1-B (West of McNiven Road) - Urban Road Cross-section on Existing Horizontal Road Alignment with Retaining Wall

IR ASSOCIATES | Halton REGION

**DERRY ROAD (REGIONAL ROAD 7)
MILBURROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD
CLASS ENVIRONMENTAL ASSESSMENT
NOVEMBER 2010**

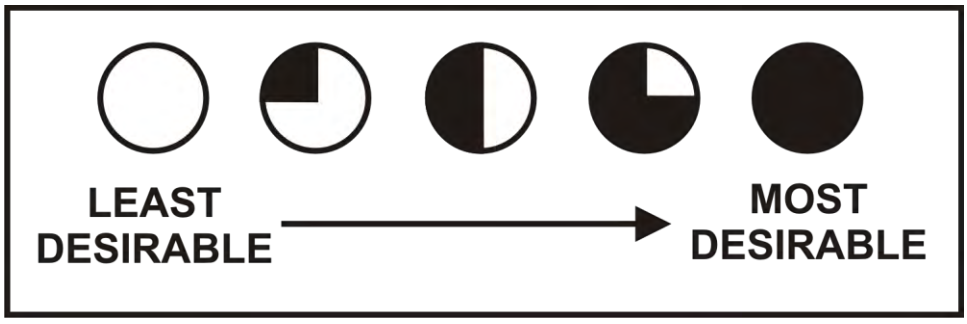
FIGURE 5-3

5.3 Net Effects Evaluation of Alternative Design Concepts

The alternative design concepts presented in Sections 5.2.1 and 5.2.2 were evaluated using the evaluation factors and criteria discussed in Section 4.3. The evaluation criteria represented potential impacts/improvements on the Technical, Socio-Economic, Natural and Cultural Environments. The Summary Net Effects evaluation of the roadway improvement design concepts for the Derry Road Mainline and the section west of McNiven Road are presented in **Tables 5-2** and **Table 5-3,** respectively.

Tables 5.2 and 5.3 show the various "Evaluation Categories" along with a description of the evaluation criteria associated with each category. The alternatives, including the "Do Nothing" Alternative, are defined and evaluated against the criteria for each category. A description of the evaluation results in terms of net impacts/improvements is provided for each grouping of evaluation criteria. The "range" for each evaluation category is defined according to **Figure 5-4**, ranging from "least desirable" to "most desirable".

Figure 5-4: Evaluation Category Range



Summary comments for each alternative are noted at the end of each table, indicating whether or not each alternative meets the stated objectives of the Problem Statement. Finally, a recommendation is provided for each alternative, noting whether the alternative is "Recommended" or "Not Recommended" to be carried forward as the Preferred Alternative Design Concept.

5.3.1 Net Effects Evaluation – Mainline Section of Derry Road

The results of the net effects evaluation for the Mainline section of Derry Road indicated that the "Do Nothing Alternative" did not meet the objectives of the Problem Statement while Alternatives 1 through 3 all met the Problem Statement objectives. The following describes the background associated with the recommendations for each alternative.

"Do Nothing" Alternative – Not Recommended

In the case of the "Do Nothing" Alternative, there would be no improvements to the roadway structure including the surface, base, and subbase allowing the road to continue to deteriorate over time. The roadway geometrics (i.e. the current horizontal/vertical alignments and roadway cross-section) would remain in their current substandard state with a narrow pavement width, non-existent shoulders and a lack of proper roadside drainage ditches. There would be no overall improvements to safety, including the provision for active transportation modes. Finally, there would be no improvements to the existing drainage system including the implementation of roadside ditches and the replacement of undersized roadway cross culverts to sufficiently accommodate stormwater runoff.

*Alternative 1 (Centred on Existing Roadway Alignment) – **Recommended***

Alternative 1 is the recommend alternative design concept as this alternative provides for a number of improvements while minimizing the degree of impact on the surrounding natural and physical environments at the lowest cost. This alternative meets the objectives of the Problem Statement through improvements to the roadway structure, geometrics and roadway cross-section. The horizontal alignment configuration at the S-bend location would, for the most part, remain in place but the current rural roadway cross-section is improved to Regional standards with 3.65 metre lane widths and 2.5 metre partially paved shoulders (1 metre paved; 1.5 metres granular). The overall safety performance of the roadway is improved along with the provision for active transportation modes (i.e. cycling and pedestrians) with the partially paved shoulder. The addition of the wider shoulders will also accommodate stopped vehicles and provide for emergency uses, maintenance operations (e.g. snow removal and storage) and increase the lateral structural support for the road base. New drainage ditches along both sides of the roadway will ensure proper roadway drainage and help improve water quality via the grassed ditch areas. In addition, the existing roadway cross culverts will be replaced with larger, higher capacity culverts to ensure proper drainage under the roadway from north to south without modifying the present drainage patterns.

There will be minimal impacts to the natural environment (vegetation, wildlife, aquatic ecology and groundwater) since the road improvements extend very little beyond the existing roadway shoulders with the addition of the 2.5 metre shoulders and drainage. There will be some additional impacts near the S-bend location where approximately 1,020 metres of frontage on the south side (~0.35 hectares) and 380 metres of frontage on the north side (~0.06 hectares) will be required to accommodate the S-bend alignment. Existing utilities will be minimally impacted within this section of Derry Road with the anticipated relocation of five to ten Hydro/Bell poles and associated lines.

In terms of the socio-economic environment, there are no impacts anticipated for local area uses (community/public/institutional/facility land uses), official or other planning initiatives, or to

current noise levels. During construction, it is anticipated that there will be some temporary impacts during construction activities and existing driveway throats will be redefined to match into the new roadway alignment. Adverse effects to the cultural environment may include minor impacts to existing cultural heritage landscapes (i.e. mature tree lines) and minor disturbances to areas considered to possess "archaeological potential" directly adjacent to the existing roadway and within the existing roadway right-of-way limits. The primary area of impact is considered to be near the area of the existing S-bend.

As **Alternative 1** scored significantly higher than Alternatives 2 and 3, it was carried forward as part of the *Preferred Alternative Design Concept*.

Alternative 2 (Centred within Existing Roadway Right-of-Way Limits) – Not Recommended

Although Alternative 2 met the objectives of the Problem Statement—provided similar benefits to Alternative 1—it was not recommended as the preferred alternative due to the higher impacts of this alternative on the technical, natural, socio-economic, and cultural environments. Alternative 2 scored lower in light of additional impacts created through the realignment of the roadway within the existing right-of-way limits. There would be less property required to construct this alternative with approximately 280 metres of frontage on the south side (~0.01 hectares) and 80 metres of frontage on the north side (~0.05 hectares) of Derry Road needed to accommodate the S-bend realignment to a 250 metre. However, there would be greater impacts to existing utilities, residential properties, and a higher construction cost. It is anticipated that ten to fifteen Hydro/Bell poles and associated lines would need to be relocated to accommodate the roadway realignment.

In terms of the Natural Environment, Alternative 2 further impacts vegetation near the S-bend location in addition to road widening impacts due to the horizontal alignment shift. Since the alignment would be shifted to the centre of the existing right-of-way, there would be potentially higher impacts as they relate to residential and rural land uses, existing cultural heritage landscapes, and archaeological resources making up part of the socio-economic and cultural environments.

Alternative 3 (Centred within Existing Roadway Right-of-Way Limits) – Not Recommended

As in Alternatives 1 and 2, Alternative 3 meets the objectives of the Problem Statement, providing greater benefits in some cases from a technical perspective (i.e. improved horizontal alignment with tangent sections and 250 metre radius curves); however, there would be greater impacts to existing driveways, utilities, and properties. Approximately 340 metres of frontage on the south side (~0.11 hectares) and 180 metres of frontage on the north side (~0.07 hectares) of Derry Road would be required (less property than Alternative 1) to accommodate the tangent sections and S-bend realignment at a higher construction cost than Alternative 1.

In terms of the natural environment, Alternative 3 further impacts vegetation near the S-bend location in addition to road widening impacts due to the horizontal alignment change. Since the alignment would be shifted to the centre of the existing right-of-way, there would be potentially higher impacts related to residential and rural land uses, existing cultural heritage landscapes, and archaeological resources making up part of the socio-economic and cultural environments.

5.3.2 Net Effects Evaluation – Derry Road west of McNiven Road

The results of the net effects evaluation for the section of Derry Road west of McNiven Road indicated that both Alternative 1-A and 1-B met the Problem Statement objectives. The overall scoring of each alternative proved to be similar with Alternative 1-A scoring higher in the socio-economic category and Alternative 1-B scoring higher in both the technical and natural environment categories with each alternative scoring equally under the cultural environment category. The following describes the background associated with the recommendations for each alternative.

Alternative 1-A – (Rural Roadway Cross-Section) – Not Recommended

Alternative 1-A would introduce more impacts to the surrounding natural environment including vegetation and aquatic ecology impacts as a result of the wider shoulder width requirements and through sheetflow stormwater runoff directly into the adjacent creek and pond areas. Overall, the impacts on the natural environment for Alternative 1-A were slightly greater than those of Alternative 1-B. In contrast to Alternative 1-B, this alternative had slightly less impact on the socio-economic environment with a more natural tie-in to the creek area via sloped granular shoulders. Alternative 1-A was deemed to have no impacts on existing built heritage features or archaeological resources in the area. The estimated construction cost for this alternative was similar to that of Alternative 1-B, with the cost of the wider cross-section and approximately 500 square metres of additional property required on the south side of Derry Road.

From a natural environmental perspective, the improvements to existing through lane widths, provision of paved shoulders with a sloped tie-in adjacent to the Bronte Creek tributary and pond area translates into a higher impact due to the toe of slope requirements being located further beyond that required for a retaining wall system. In terms of the socio-economic environment, minor impacts would be anticipated though some additional property requirements on the south side of Derry Road. No impacts are anticipated to existing archaeological resources or built heritage features under this alternative.

Alternative 1-B – (Urban Roadway Cross-Section) – ***Recommended***

In the technical category, Alternative 1-B had more benefits associated with the implementation of an urban cross-section, representing less impact to the Bronte Creek tributary on the north

side of Derry Road and to the existing pond located on the south side. Stormwater runoff would be directed via roadside curbs to drainage ditches rather than running directly from the road surface to the creek and pond. Alternative 1-B provided safety performance improvements with the addition of wider through lanes and a one metre paved shoulder with curb and gutter on both sides of the roadway which provides for cyclists and pedestrians alike. The roadway surface would be improved substantially with some impact beyond the current roadway width (i.e. installation of retaining wall would necessitate but minimize impacts to the creek). There would be minimal impacts to adjacent properties during the roadway reconstruction. The estimated construction cost for this alternative was similar to that of Alternative 1-A, with the cost of the wider cross-section and approximately 500 square metres of additional property required on the south side of the roadway.

From a natural environmental perspective, the implementation of a retaining wall would minimize the footprint impact of the roadway to the creek and adjacent pond areas. Improving the habitat adjacent to the retaining wall could include planting zones on the wall itself, the use of ribbon grass with the faster creek flows, or providing some form of earthen slope adjacent to the wall by shifting the road alignment to the south. Kilbride Creek could also be realigned further north to provide additional space at the north side of the road platform to include a retaining wall and earthen slope adjacent to the retaining wall to create a bank along the wall.

In terms of the socio-economic environment, improvements to existing through lane widths and the provision of paved shoulders with curb and gutter would formalize the area adjacent to the Bronte Creek tributary and create a more aesthetically pleasing look with a retaining wall system. Minor impacts would be anticipated though some additional property requirements on south side of Derry Road. No impacts are anticipated to existing archaeological resources or built heritage features under this alternative.

As **Alternative 1-B** scored slightly higher than Alternative 1-A, it was carried forward as part of the *Preferred Alternative Design Concept*.

Table 5-2: Summary Net Effects Evaluation (Mainline Section)
Milburough Line to 150 Metres West of McNiven Road)
Derry Road Transportation Corridor Improvements Class Environmental Assessment

Evaluation Categories	Evaluation Criteria	ALTERNATIVE DESIGN CONCEPTS (Derry Road Mainline)			
		"Do Nothing" Alternative	**Alternative 1**	**Alternative 2**	**Alternative 3**
		No improvements or changes would be made to solve the identified problem or opportunity—existing roadway remains in current state	Maintain current horizontal roadway alignment with a rural road cross-section including 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide 250 metre radii at the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide a tangent section to separate the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders

TECHNICAL	• Capacity and Level of Service
	• Safety
	• Access
	• Active Transportation
	• (e.g., Pedestrians and Cyclists)
	• Geometric Standards
	• Structural (i.e. Pavement)
	• Utility Relocations
	• Construction and Property Costs
	• Construction Staging
		• No improvements for existing:
		  ○ Lane widths and vertical/horizontal alignments
		  ○ Overall safety performance of the roadway corridor
		  ○ Access to adjacent lands
		  ○ Active Transportation modes
		  ○ Road structure
		• No utility impacts or relocations required
		• No construction and property cost or construction staging required
			• Provides improvements for existing:
			  ○ Lane and shoulder widths including roadway geometrics
			  ○ Safety performance improvements with the addition of 2.5 metre partially paved shoulders on each side of the roadway
			  ○ Access with improved roadway/driveway sightlines
			  ○ Accommodation and increased safety for cyclists/pedestrians
			  ○ Road base and pavement structure
			• Approximately 0.41 hectares of additional property required
			• Minimal impacts to adjacent properties during reconstruction
				• Provides improvements for existing:
				  ○ Lane and shoulder widths including roadway geometrics (250 metre radii at S-bend)
				  ○ Safety performance improvements with the addition of 2.5 metre partially paved shoulders on each side of the roadway
				  ○ Access with improved roadway/driveway sightlines
				  ○ Accommodation and increased safety for cyclists/pedestrians
				  ○ Road base and pavement structure
				• Approximately 0.06 hectares of additional property required
				• Some impacts to adjacent properties during reconstruction
					• Provides improvements for existing:
					  ○ Lane and shoulder widths including roadway geometrics (250 metre radii at S-bend with separate tangent section)
					  ○ Safety performance improvements with the addition of 2.5 metre partially paved shoulders on each side of the roadway
					  ○ Access with improved roadway/driveway sightlines
					  ○ Accommodation and increased safety for cyclists/pedestrians
					  ○ Road base and pavement structure
					• Approximately 0.18 hectares of additional property required
					• Some impacts to adjacent properties during reconstruction

	Evaluation Category Score	○	●	◔	◔
NATURAL ENVIRONMENT	• Effects on Vegetation • Effects on Wildlife • Effects on Aquatic	• No impacts to existing vegetation, wildlife and aquatic ecology	• Minimal impacts on vegetation, wildlife and aquatic ecology due to	• Additional impacts on vegetation, wildlife and aquatic ecology near S-bend	• Additional impacts on vegetation, wildlife and aquatic ecology near S-bend

Table 5-2: Summary Net Effects Evaluation (Mainline Section)
Milburough Line to 150 Metres West of McNiven Road)
Derry Road Transportation Corridor Improvements Class Environmental Assessment

Evaluation Categories	Evaluation Criteria	ALTERNATIVE DESIGN CONCEPTS (Derry Road Mainline)			
		"Do Nothing" Alternative	**Alternative 1**	**Alternative 2**	**Alternative 3**
		No improvements or changes would be made to solve the identified problem or opportunity—existing roadway remains in current state	Maintain current horizontal roadway alignment with a rural road cross-section including 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide 250 metre radii at the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide a tangent section to separate the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders
	Ecology • Stormwater Management • Effects on Groundwater Resources • Natural Hazards	• No improvements to stormwater management • No impacts to groundwater resources • No natural hazard impacts anticipated	roadway widening and drainage ditch installation • New drainage ditches along both sides of the roadway (also provides for water quality improvements) • Four existing cross culverts to be replaced with larger culverts • No natural hazard impacts anticipated. Potential construction erosion impacts will be addressed through temporary erosion and sedimentation control measures.	location in addition to road widening impacts due to horizontal alignment changes (250 metre radius curves) • New drainage ditches along both sides of the roadway (also provides for water quality improvements) • Four existing cross culverts to be replaced with larger culverts • No natural hazard impacts anticipated. Potential construction erosion impacts will be addressed through temporary erosion and sedimentation control measures.	location in addition to road widening impacts due to horizontal alignment changes (250 metre radius curves and tangent section) • New drainage ditches along both sides of the roadway (also provides for water quality improvements) • Four existing cross culverts to be replaced with larger culverts • No natural hazard impacts anticipated. Potential construction erosion impacts will be addressed through temporary erosion and sedimentation control measures.
	Evaluation Category Score	●	●	◔	◑
SOCIO-ECONOMIC ENVIRONMENT	• Land Use • Effects on Official Plans and other planning initiatives (e.g., Greenbelt Plan and Niagara Escarpment Plan) • Effects on business access/operations • Effects on residential and rural land uses • Potential property	• No impacts to existing land use, business access/operations, and residential/rural land uses • No property required • No noise impacts beyond current levels • No improvements to the aesthetic nature of the roadway corridor or adjacent landscapes • No improvements to	• No impacts to existing land use, business access/operations, and residential/rural land uses (Some temporary impacts during construction activities and driveway throats to be redefined to match into roadway) • Approximately 1,020 metres of frontage on the south side (~0.35 hectares) and 380	• No impacts to existing land use, business access/operations, and residential/rural land uses (Some temporary impacts during construction activities and driveway throats to be redefined to match into roadway) • Approximately 280 metres of frontage on the south side (~0.01 hectares) and 80	• No impacts to existing land use, business access/operations, and residential/rural land uses (Some temporary impacts during construction activities and driveway throats to be redefined to match into roadway) • Approximately 340 metres of frontage on the south side (~0.11 hectares) and 180

Table 5-2: Summary Net Effects Evaluation (Mainline Section)
Milburough Line to 150 Metres West of McNiven Road)
Derry Road Transportation Corridor Improvements Class Environmental Assessment

Evaluation Categories	Evaluation Criteria	ALTERNATIVE DESIGN CONCEPTS (Derry Road Mainline)			
		"Do Nothing" Alternative	**Alternative 1**	**Alternative 2**	**Alternative 3**
		No improvements or changes would be made to solve the identified problem or opportunity—existing roadway remains in current state	Maintain current horizontal roadway alignment with a rural road cross-section including 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide 250 metre radii at the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide a tangent section to separate the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders
	requirements • Noise effects • Aesthetics • Emergency access	potential emergency response times	metres of frontage on the north side (~0.06 hectares) to accommodate the S-bend alignment • Negligible change in noise levels—no alignment shift; • Improvements to through lane widths, wider shoulders, and roadway vertical alignment geometrics including roadside ditches • Some improvements to potential emergency access/response times due to improved roadway geometrics	metres of frontage on the north side (~0.05 hectares) to accommodate the S-bend alignment • Negligible change in noise levels—alignment shift to the north; • Improvements to through lane widths, wider shoulders, and roadway vertical alignment geometrics including roadside ditches • Some improvements to potential emergency access/response times due to improved roadway geometrics	metres of frontage on the north side (~0.07 hectares) to accommodate the S-bend and tangent section alignment • Negligible change in noise levels—alignment shift to the north; • Improvements to through lane widths, wider shoulders, and roadway vertical alignment geometrics including roadside ditches • Some improvements to potential emergency access/response times due to improved roadway geometrics
	Evaluation Category Score				
CULTURAL ENVIRONMENT	• Effects on Built Heritage Features • Effects on Archaeological Resources	• No impacts on existing cultural heritage features or archaeological resources	• Potential for minor impacts to existing cultural heritage landscapes (i.e. mature tree lines) • Potential for minor disturbance to areas considered to possess "archaeological potential" adjacent to the existing roadway and within the existing roadway right-of-way limits (western and eastern	• Potential for minor impacts to existing cultural heritage landscapes (i.e. mature tree lines) • Higher potential for minor disturbance to areas considered to possess "archaeological potential" adjacent to the existing roadway and within the existing roadway right-of-way limits (western and	• Potential for minor impacts to existing cultural heritage landscapes (i.e. mature tree lines) • Higher potential for minor disturbance to areas considered to possess "archaeological potential" adjacent to the existing roadway and within the existing roadway right-of-way limits (western and

Table 5-2: Summary Net Effects Evaluation (Mainline Section)
Milburough Line to 150 Metres West of McNiven Road)
Derry Road Transportation Corridor Improvements Class Environmental Assessment

Evaluation Categories	Evaluation Criteria	ALTERNATIVE DESIGN CONCEPTS (Derry Road Mainline)			
		"Do Nothing" Alternative	**Alternative 1**	**Alternative 2**	**Alternative 3**
		No improvements or changes would be made to solve the identified problem or opportunity—existing roadway remains in current state	Maintain current horizontal roadway alignment with a rural road cross-section including 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide 250 metre radii at the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide a tangent section to separate the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders
			sections of study area) potentially requiring an Archaeological Stage II study	eastern sections of study area) potentially requiring an Archaeological Stage II study	eastern sections of study area) potentially requiring an Archaeological Stage II study
					
SUMMARY COMMENTS		• **Does not meet the objectives of the Problem Statement:** ○ No improvements to the structural adequacy of the roadway; ○ No improvements to the roadway geometrics and roadway cross-section (i.e. the current horizontal/vertical alignments and narrow 3.3 metre cross-section without shoulders will remain); ○ No overall improvements to safety including provisions for active transportation modes; and ○ No drainage improvements (i.e. current lack of roadside ditches,	• **Meets the objectives of the Problem Statement:** ○ Improves the structural adequacy of the roadway; ○ Improves the roadway geometrics and roadway cross-section (i.e. vertical alignment improvements, 3.65 metre lane widths, and 2.5 metre partially paved shoulders); ○ Improves the overall safety performance of the roadway including provisions for active transportation modes (wider lanes and shoulders) and shoulder refuge areas for vehicles; ○ Drainage improvements include defined roadside ditches and larger culverts; ○ Minor impacts to utilities; ○ Minimal impacts to the natural environment with no significant changes to the	• **Meets the objectives of the Problem Statement:** ○ Improves the structural adequacy of the roadway; ○ Improves the roadway geometrics and roadway cross-section (i.e. vertical/horizontal alignment improvements, 3.65 metre lane widths, and 2.5 metre partially paved shoulders); ○ Improves the overall safety performance of the roadway including provisions for active transportation modes (wider lanes and shoulders) and shoulder refuge areas for vehicles; ○ Drainage improvements include defined roadside ditches and larger culverts; ○ Some impacts to the natural environment with	• **Meets the objectives of the Problem Statement:** ○ Improvements to the structural adequacy of the roadway; ○ Improves the roadway geometrics and roadway cross-section (i.e. vertical/horizontal alignment improvements, 3.65 metre lane widths, and 2.5 metre partially paved shoulders); ○ Improves the overall safety performance of the roadway including provisions for active transportation modes (wider lanes and shoulders) and shoulder refuge areas for vehicles; ○ Drainage improvements include defined roadside ditches and larger culverts; ○ Greater impacts to the

Table 5-2: Summary Net Effects Evaluation (Mainline Section)
Milburough Line to 150 Metres West of McNiven Road)
Derry Road Transportation Corridor Improvements Class Environmental Assessment

Evaluation Categories	Evaluation Criteria	ALTERNATIVE DESIGN CONCEPTS (Derry Road Mainline)			
		"Do Nothing" Alternative	**Alternative 1**	**Alternative 2**	**Alternative 3**
		No improvements or changes would be made to solve the identified problem or opportunity—existing roadway remains in current state	Maintain current horizontal roadway alignment with a rural road cross-section including 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide 250 metre radii at the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders	Centre roadway alignment within the existing right-of-way limits and provide a tangent section to separate the S-bends while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders
		and in some cases, undersized culverts will remain)	existing drainage pattern; and ○ Minor impacts anticipated for the Socio-economic and Cultural Environments	no significant changes to the existing drainage pattern; ○ Greater impacts to existing utilities, residential properties, and higher construction cost; and ○ Greater impacts anticipated for the Natural, Socio-economic and Cultural Environments	natural environment with no significant changes to the existing drainage pattern; ○ Greatest impacts to existing utilities, residential properties, and higher construction cost; and ○ Greatest impacts anticipated for the Natural, Socio-economic and Cultural Environments
RECOMMENDATION		Not Recommended	**RECOMMENDED**	Not Recommended	Not Recommended

Table 5-3: Summary Net Effects Evaluation (McNiven Road to 150 Metres West)
Derry Road Transportation Corridor Improvements Class Environmental Assessment

Evaluation Categories	Evaluation Criteria	ALTERNATIVE DESIGN CONCEPTS (West of McNiven Road; Adjacent to Bronte Creek)	
		Alternative 1-A	**Alternative 1-B**
		Provide a wider <u>rural roadway</u> cross-section including 3.65 metre lanes, 1.0 metre partially paved shoulders, guiderail protection, and granular shoulder side slopes matching into the existing creek location	Provide a wider <u>urban roadway</u> cross-section including 3.65 metre lanes, 1.0 metre paved shoulders with curb and gutter, guiderail protection, and retaining walls
TECHNICAL	• Capacity and Level of Service • Safety • Access • Active Transportation • (e.g., Pedestrians and Cyclists) • Geometric Standards • Structural (i.e. Pavement) • Utility Relocations • Construction and Property Costs • Construction Staging	• Safety performance improvements with the addition of wider through lanes and 1.0 metre partially paved shoulder on both sides of the roadway which provides for cyclists and pedestrians • Improved roadway surface with some impact beyond the current roadway width (i.e. ditch side slopes would match into existing creek location beyond current toe of slope) • Minimal impacts to adjacent properties during reconstruction • Some impacts to creek (north side) and pond (south side) during construction	• Safety performance improvements with the addition of wider through lanes and 1.0 metre paved shoulder with curb and gutter on both sides of the roadway which provides for cyclists and pedestrians • Improved roadway surface with some impact beyond the current roadway width (i.e. installation of retaining wall would necessitate but minimize impacts to creek) • Minimal impacts to adjacent properties during reconstruction • Minor impacts to creek (north side) and pond (south side) during construction
	Evaluation Category Score		
NATURAL ENVIRONMENT	• Effects on Vegetation • Effects on Wildlife • Effects on Aquatic Ecology • Stormwater Management • Effects on Groundwater Resources • Natural Hazards	• Improvements to through lane widths, wider shoulders/ditches while formalizing area adjacent to creek with natural tie-in to creek area • No natural hazard impacts anticipated. Potential construction erosion impacts will be addressed through temporary erosion and sedimentation control measures	• Improvements to through lane widths, provision of paved shoulder with curb and gutter while formalizing area adjacent to creek area with aesthetic retaining wall • No natural hazard impacts anticipated. Potential construction erosion impacts will be addressed through temporary erosion and sedimentation control measures
	Evaluation Category Score		
SOCIO-ECONOMIC ENVIRONMENT	• Land Use • Effects on Official Plans and other planning initiatives (e.g., Greenbelt Plan and Niagara Escarpment Plan) • Effects on business access/operations • Effects on residential and rural land uses • Potential property requirements	• Minor impacts anticipated though some additional property requirements on south side of Derry Road • Improvements to through lane widths, wider shoulders/ditches while formalizing area adjacent to creek with natural tie-in to creek area	• Minor impacts anticipated though some additional property requirements on south side of Derry Road • Improvements to through lane widths, provision of paved shoulder with curb and gutter while formalizing area adjacent to creek area with aesthetic retaining wall

Table 5-3: Summary Net Effects Evaluation (McNiven Road to 150 Metres West)
Derry Road Transportation Corridor Improvements Class Environmental Assessment

Evaluation Categories	Evaluation Criteria	ALTERNATIVE DESIGN CONCEPTS (West of McNiven Road; Adjacent to Bronte Creek)	
		Alternative 1-A	**Alternative 1-B**
		Provide a wider rural roadway cross-section including 3.65 metre lanes, 1.0 metre partially paved shoulders, guiderail protection, and granular shoulder side slopes matching into the existing creek location	Provide a wider urban roadway cross-section including 3.65 metre lanes, 1.0 metre paved shoulders with curb and gutter, guiderail protection, and retaining walls
	• Noise effects • Aesthetics • Emergency access		
	Evaluation Category Score	●	◔
CULTURAL ENVIRONMENT	• Effects on Built Heritage Features • Effects on Archaeological Resources	• No impacts to existing built heritage features • No impacts to existing archaeological resources	• No impacts to existing built heritage features • No impacts to existing archaeological resources
	Evaluation Category Score	●	●
SUMMARY COMMENTS		• **Meets the objectives of the Problem Statement:** ○ Improves the structural adequacy of the roadway; ○ Improves the roadway cross-section (i.e. 3.65 metre lane widths, and 1.0 metre paved shoulders with toe of slope tie-in to creek area); ○ Improves the overall safety performance of the roadway including provisions for active transportation modes (wider lanes and shoulders); ○ Drainage improvements include larger culvert which also allows for improved fish passage; ○ Minor impacts to utilities; ○ Some impacts to the Natural Environment (i.e. creek area) with no significant changes to the existing drainage pattern; and ○ Minor impacts anticipated for the Socio-economic Environment with a small amount of additional property required to accommodate side slopes on south side of Derry Road	• **Meets the objectives of the Problem Statement:** ○ Improves the structural adequacy of the roadway; ○ Improves the roadway cross-section (i.e. 3.65 metre lane widths, and 1.0 metre paved shoulders with curb and gutter and retaining wall adjacent to creek area); ○ Improves the overall safety performance of the roadway including provisions for active transportation modes (wider lanes and shoulders); ○ Drainage improvements include larger culvert which also allows for improved fish passage; ○ Minor impacts to utilities; ○ Less impacts to the Natural Environment (i.e. creek area) with no significant changes to the existing drainage pattern; and ○ Minor impacts anticipated for the Socio-economic Environment with a small amount of additional property required to accommodate retaining wall on south side of Derry Road
RECOMMENDATION		Not Recommended	**RECOMMENDED**

5.4 Preferred Roadway Improvement Design Alternative

The Preferred Roadway Improvement Design Alternative includes a combination of **Alternative 1** and **Alternative 1-B** as determined through the evaluation process and discussed in Sections 5.2 and 5.3. The key features of the Preferred Roadway Improvement Design Alternative include the following:

- A combination of 2-lane rural (Mainline Section) and urban (West of McNiven Road) cross-sections with 3.65 metre travel lanes throughout the length of the study area.

- 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular) with formalized drainage ditches for the majority of the study area and 1.0 metre paved shoulders with mountable curb and gutter in the area west of McNiven Road. A short section of concrete mountable curb (approximately 340 metres) will be provided on the south side of Derry Road beginning about 345 metres east of the Derry Road/Milburough Line intersection to preserve the existing tree line adjacent to the roadway.

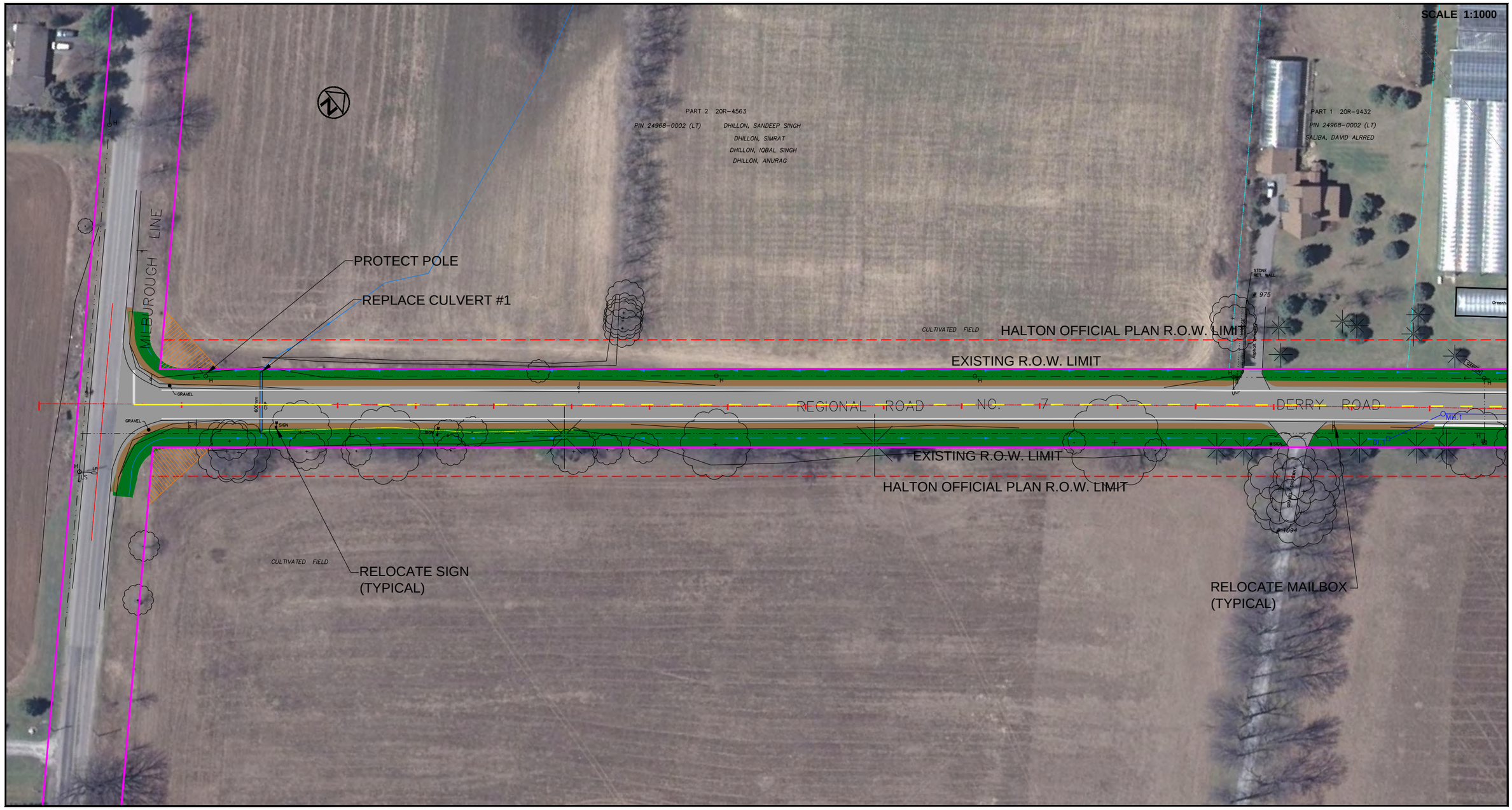
- The construction of a retaining wall on both sides of Derry Road west of McNiven Road to minimize the impacts to the Bronte Creek tributary (north side) and the adjacent pond area (south side).

- The future horizontal roadway alignment is generally maintained along the current centreline roadway alignment with vertical alignment improvements to prevailing standards to improve overall sight distance.

- Provision of drainage culvert extensions and/or replacements and a larger culvert (1,000 mm pipe) crossing at Derry Road west of McNiven road to improve drainage conditions and to provide improved passage for native fish species.

- Minimal impacts to the overall Natural, Socio-Economic and Cultural Environments while meeting prevailing Regional roadway standards.

The Preferred Roadway Improvement Design Alternative is illustrated in **Figure 5-5A** through **Figure 5-5D**. Typical roadway cross-sections for the Preferred Roadway Improvement Design Alternative for the Mainline and Urban (west of McNiven Road) sections of Derry Road are provided in **Figure 5-6**.



LEGEND

- PROPOSED ASPHALT
- PROPOSED BOULEVARD
- PROPOSED DITCH
- PROPOSED CURB AND GUTTER
- PROPOSED GRANULAR
- PROPOSED PROPERTY REQUIREMENTS
- EXISTING PROPERTY LINE
- PROPOSED STORM SEWER AND MAINTENANCE HOLE (MH.1)

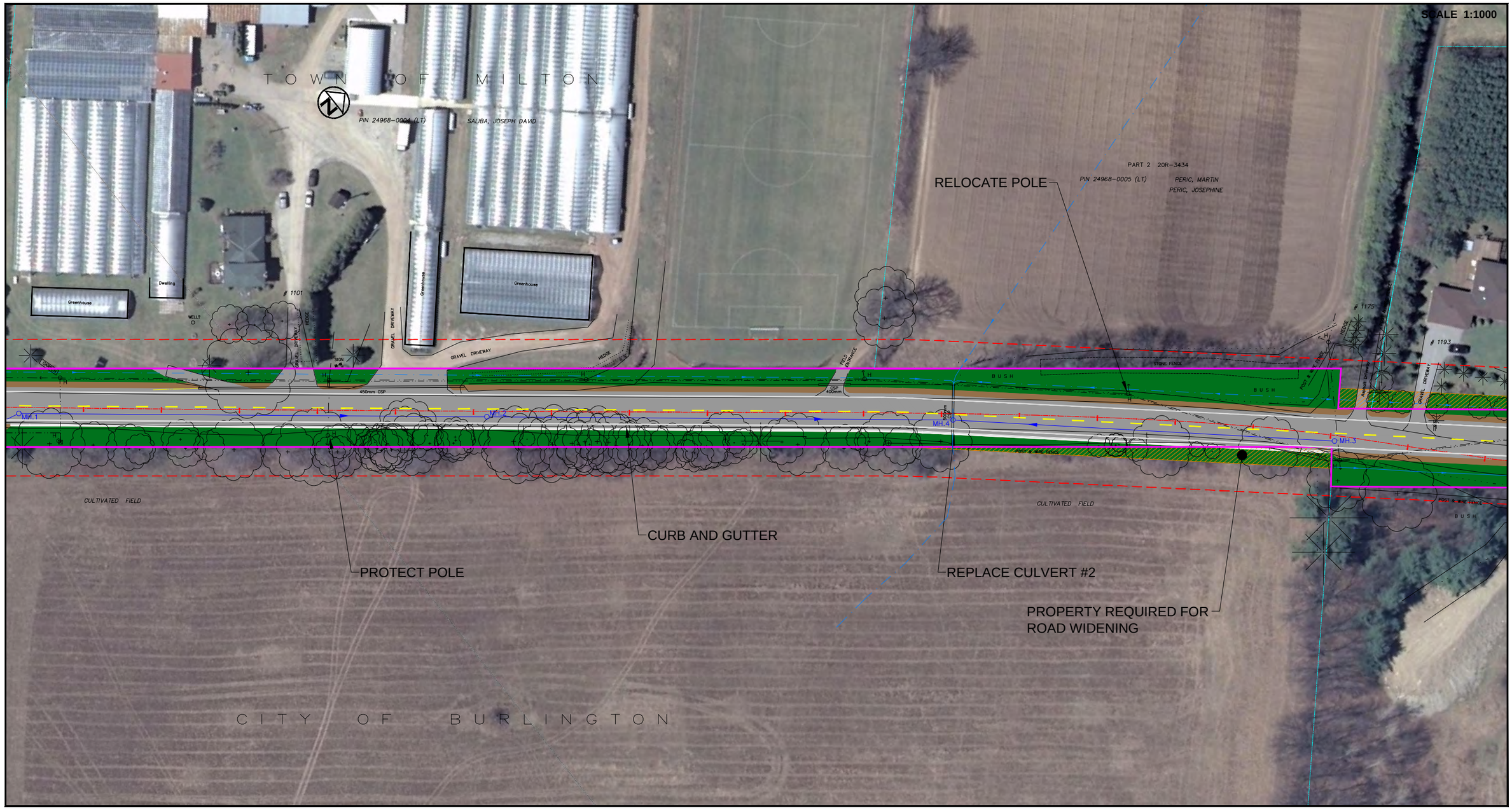
PREFERRED ALTERNATIVE DESIGN

Alternative 1 (Mainline Section) - Rural Road Cross-section on Existing Horizontal Road Alignment
Alternative 1-B (West of McNiven Road) - Urban Road Cross-section on Existing Horizontal Road Alignment with Retaining Wall

DERRY ROAD (REGIONAL ROAD 7)
MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD
CLASS ENVIRONMENTAL ASSESSMENT
NOVEMBER 2010

FIGURE 5-5A

SCALE 1:1000



LEGEND

- PROPOSED ASPHALT
- PROPOSED BOULEVARD
- PROPOSED DITCH
- PROPOSED CURB AND GUTTER
- PROPOSED GRANULAR
- PROPOSED PROPERTY REQUIREMENTS
- EXISTING PROPERTY LINE
- MH.1 PROPOSED STORM SEWER AND MAINTENANCE HOLE

PREFERRED ALTERNATIVE DESIGN

Alternative 1 (Mainline Section) - Rural Road Cross-section on Existing Horizontal Road Alignment
Alternative 1-B (West of McNiven Road) - Urban Road Cross-section on Existing Horizontal Road Alignment with Retaining Wall

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DERRY ROAD (REGIONAL ROAD 7)
MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD
CLASS ENVIRONMENTAL ASSESSMENT
NOVEMBER 2010

FIGURE 5-5B

SCALE 1:1000

PROPERTY REQUIRED FOR ROAD WIDENING

RELOCATE SIGN

RELOCATE CULVERT

MATCH ROADWAY INTO EXISTING DRIVEWAYS

SELECT TREE REMOVAL REQUIRED ALONG NORTH SIDE OF DERRY ROAD

REPLACE CULVERT #3

PROTECT OR RELOCATE POLE (TYPICAL)

RELOCATE POLE (TYPICAL)

PART 1 20R-3434

PIN 24968-0006 (LT) GORSKI, CHRISTOPHER
KRUCKO, LUCY

PART 1 20R-1166

PART 2 20R-1166

PIN 24968-0007 (LT) ELLERSDORFER, JOSEPH ELLERSDORFER, HELEN N.

PIN 24968-0008 (R)
MILLER, LINDA MARY

PIN 24968-0009 (LT)
BRADFORD, DEBORAH

PIN 07213-0006 (LT) KAYLOR, GORDON
KAYLOR, SUSAN

1193
1215
1200
1243
1275

PART 4 20R-1166
PART 3 20R-1166

DERRY ROAD REGIONAL ROAD NO. 7

CITY OF BURLINGTON

TOWN O

LEGEND

PROPOSED ASPHALT	PROPOSED BOULEVARD	PROPOSED DITCH	PROPOSED CURB AND GUTTER
PROPOSED GRANULAR	PROPOSED PROPERTY REQUIREMENTS	EXISTING PROPERTY LINE	MH.1 PROPOSED STORM SEWER AND MAINTENANCE HOLE

PREFERRED ALTERNATIVE DESIGN

Alternative 1 (Mainline Section) - Rural Road Cross-section on Existing Horizontal Road Alignment
Alternative 1-B (West of McNiven Road) - Urban Road Cross-section on Existing Horizontal Road Alignment with Retaining Wall

IR ASSOCIATES Halton REGION

**DERRY ROAD (REGIONAL ROAD 7)
MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD
CLASS ENVIRONMENTAL ASSESSMENT
NOVEMBER 2010**

FIGURE 5-5C

SCALE 1:1000

REMOVE GARDEN (TYPICAL)

PART 1 20R-4303
PIN 24968-0010 (LT)
VANDERJAGT, JOHN

PART 2 20R-4303
PIN 24968-0011 (LT)
WATSON, AMANDA JANE
WATSON, WARREN BRADLEY

INSTALL NEW RETAINING WALL

REPLACE CULVERTS #4

RELOCATE POLE

PROPERTY REQUIRED FOR DAYLIGHTING (TYPICAL)

HALTON OFFICIAL PLAN R.O.W. LIMIT

EXISTING R.O.W. LIMIT

EXISTING R.O.W. LIMIT

HALTON OFFICIAL PLAN R.O.W. LIMIT

RELOCATE SIGN (TYPICAL)

RELOCATE POLE

RELOCATE POLE

INSTALL NEW RETAINING WALL
PIN 07213-0008 (LT)
ZIONS, LEONARD
ZIONS, ELLEN
6780

PROPERTY REQUIRED FOR ROAD WIDENING

PIN 07213-0072 (LT)
HESKETH, EDWARD
HESKETH, GERALDINE
6781

DERRY ROAD

McNIVEN ROAD

NO. 7

LEGEND

PROPOSED ASPHALT	PROPOSED BOULEVARD	PROPOSED DITCH	PROPOSED CURB AND GUTTER
PROPOSED GRANULAR	PROPOSED PROPERTY REQUIREMENTS	EXISTING PROPERTY LINE	PROPOSED STORM SEWER AND MAINTENANCE HOLE (MH.1)

PREFERRED ALTERNATIVE DESIGN

Alternative 1 (Mainline Section) - Rural Road Cross-section on Existing Horizontal Road Alignment
Alternative 1-B (West of McNiven Road) - Urban Road Cross-section on Existing Horizontal Road Alignment with Retaining Wall

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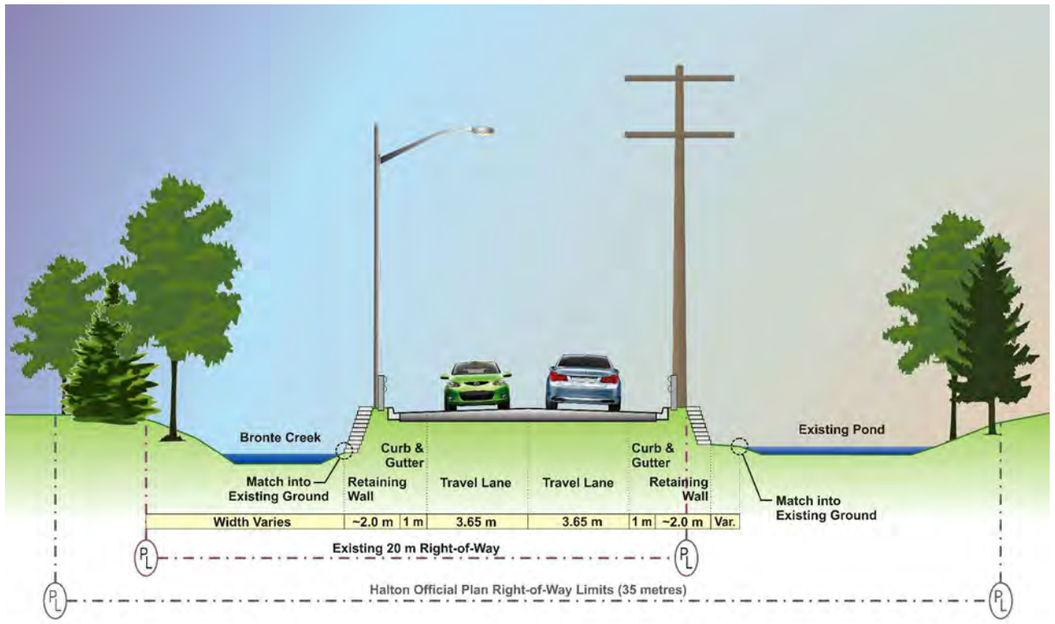
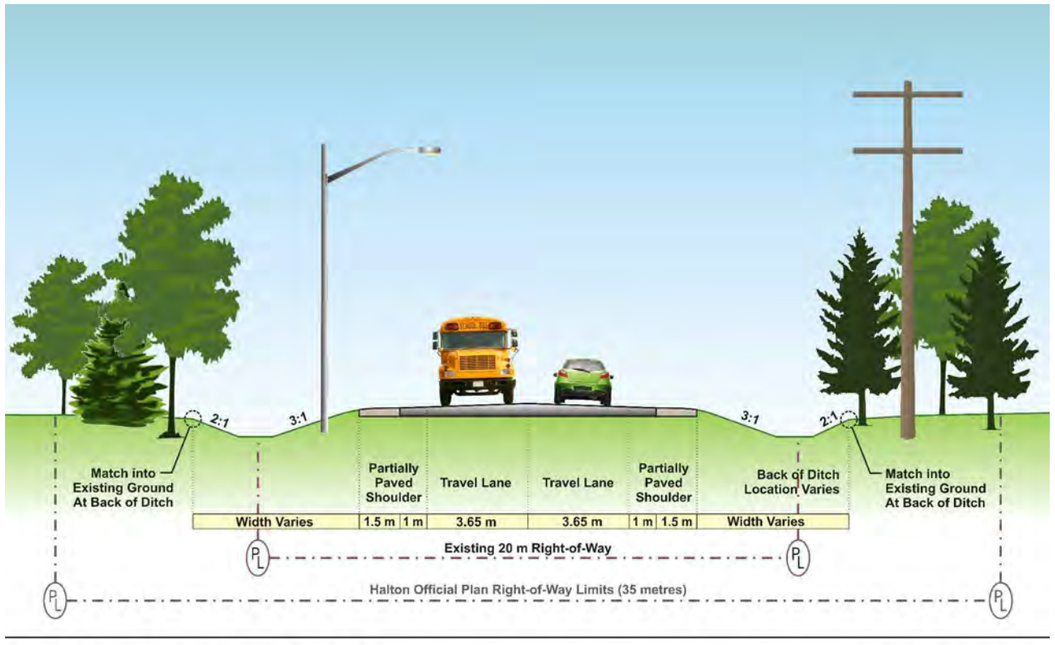
**DERRY ROAD (REGIONAL ROAD 7)
MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD
CLASS ENVIRONMENTAL ASSESSMENT
NOVEMBER 2010**

FIGURE 5-5D



Derry Road (Regional Road 7)
Typical Urban Roadway Cross-Section with Retaining Wall (West of McNiven Road)



Derry Road (Regional Road 7)
Typical Rural Roadway Cross-Section

PREFERRED ALTERNATIVE DESIGN

Typical Roadway Cross-Sections
(Mainline and West of McNiven Road)

IR. ASSOCIATES Halton REGION

DERRY ROAD (REGIONAL ROAD 7)
MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD
CLASS ENVIRONMENTAL ASSESSMENT
NOVEMBER 2010

FIGURE 5-6

6. DESCRIPTION OF PREFERRED DESIGN

This section provides a discussion of the Preferred Roadway Design Improvements for Derry Road (Regional Road 7) from Milburough Line (Regional Road 24) to McNiven Road, including the technical elements and refinements associated with the preliminary design as proposed. The information presented in Section 6 should also be reviewed in conjunction with Sections 2, 4 and 5 of the ESR which describes the Class EA process followed to define the project. While changes may occur during the detail design stage, any changes should not alter the intent of the recommended undertaking or its components. During detail design, there will be further consultation with technical agencies including but not limited to Conservation Halton, Ministry of the Environment, City of Burlington, Town of Milton, utilities and affected property owners.

The preliminary plan, profile and typical cross-sections for Derry Road from Milburough Line to McNiven Road were developed based on the technical and public consultation input received throughout the Class EA process. *Preliminary Design Plates* of the recommended undertaking, comprised of 7 sheets, are provided in **Figures 6-1 (A to F)** and **6-2**. The preliminary design extends for approximately 1.36 kilometres from Milburough Line to McNiven Road.

The recommended undertaking for the Derry Road Transportation Corridor Improvements includes the following:

- The proposed horizontal centreline alignment of Derry Road generally follows the existing centerline alignment;
- The vertical centreline alignment of Derry Road will generally be maintained with a minimum grade of 0.5 percent and a maximum grade of 5.2 percent;
- 3.65 metre travel lanes throughout the length of the study area;
- 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metre granular) with formalized drainage ditches for the mainline section of the study area from Milburough Line to about 150 metres west of McNiven Road. A short section of mountable curb and gutter (approximately 340 metres) will be provided on the south side of Derry Road (beginning about 345 metres east of the Derry Road/Milburough Line intersection) to protect the existing tree line adjacent to the roadway
- 1.0 metre paved shoulders with curb and gutter from 150 metres west of McNiven Road to the McNiven Road intersection including the north and south curb return radii on the west side of the intersection;
- Retaining walls on both sides of Derry Road west of McNiven Road to minimize potential impacts to the Bronte Creek tributary (north side) and to the adjacent pond area (south side).
- Installation of guiderail protection as required to provide additional roadside protection adjacent to the Bronte Creek tributary;

- Accommodation of active transportation modes (cyclists and pedestrians) through the provision of a 1.0 metre paved shoulder on both sides of the roadway throughout the study area;
- Stormwater management provisions with the installation of new drainage ditches along both sides of the roadway within the rural section and the provision of a storm sewer system within the urban section adjacent to the Bronte Creek tributary and within the mountable curb section (approximately 340 metres);
- Replacement of existing roadway cross culverts with higher capacity culverts;
- Relocation of existing Hydro/Bell poles to accommodate road realignment at the S-bend and at other locations as required to accommodate the wider rural cross-section;
- Minimal amount of property required to accommodate the retaining wall system adjacent to the south side of the roadway adjacent to the Bronte Creek tributary and roadside ditches at the S-bend location; and
- Provision of daylighting triangles at the intersections of Derry Road with Milburough Line and McNiven Road.

6.1 Major Features of the Preferred Roadway Improvement Design

6.1.1 Design Criteria

Currently, Derry Road maintains a posted speed limit of 60 km/hr within the study area. The proposed geometrical standards for the roadway improvements for Derry Road are provided in **Table 6-1**.

Table 6-1: Geometric Standards

Attribute	Proposed Standards
Classification	RAU 80
Design Speed	80 km/h
Posted Speed	60 km/h
No. of Lanes	2
Minimum Stopping Sight Distance	135 m
Minimum Radius (max e 6%)	250 m
Maximum Grades	6 %
Minimum Grades	0.5 %

Table 6-1: Geometric Standards

Attribute	Proposed Standards
Vertical Curves (Min K) - Crest - Sag	 25 min. 25 min.
Through Lane Width	3.65 m
Superelevation	6 % (maximum)
Shoulder Widths	2.5 m (1.0 m paved and 1.5 m granular)
Basic Right-of-Way Width Official Plan Right-of-Way Width	Varies 35 m

6.1.2 Typical Cross-Section

Figure 6-2 includes the typical proposed cross-sections developed for the Derry Road Transportation Corridor Improvements from Milburough Line to McNiven Road. The following provides a summary description of the typical cross-section attributes for the two distinct sections (rural mainline and urban eastern sections) of Derry Road. It should be noted that the right-of-way limits indicated are the nominal right-of-way limits and are subject to change based on the sloping requirements at the cut and fill locations.

Mainline Section – Milburough Line to 150 metres west of McNiven Road

- 2 – 3.65 metre lanes
- 2.5 metre partially paved shoulder (1.0 metre paved; 1.5 metre granular)
- Rural cross-section (ditches) on both sides
- 340 metres of semi-urban cross-section (curb and gutter) from Station 0+340 to Station 0+680
- ±20 metre right-of-way

Eastern Section – 150 metres west of McNiven Road to the McNiven Road intersection

- 2 – 3.65 metre lanes
- 1.0 metre paved shoulder
- Urban cross-section (curb and gutter) on both sides
- ±20 metre right-of-way

6.1.3 Alignment and Grade

Derry Road will generally follow the existing centreline horizontal alignment with slight modifications near the existing S-bend location to accommodate larger 250 metre radius curves. The alignment will shift at the S-bend location encompassing 240 metres from Station 0+570 to Station 0+810. Traveling easterly from Milburough Line, the alignment follows the existing centreline horizontal alignment through the straight section, through the proposed 250 metre radii S-bend, again traveling along a straight alignment until reaching the vicinity of the Bronte Creek tributary where the alignment gently curves south and then slightly northward to meet the McNiven Road intersection.

The vertical alignment is designed to match as closely as possible with the existing roadway vertical alignment to minimize cut/fill quantities. The maximum grade for the proposed Derry Road profile is 5.2 percent.

6.1.4 Intersections

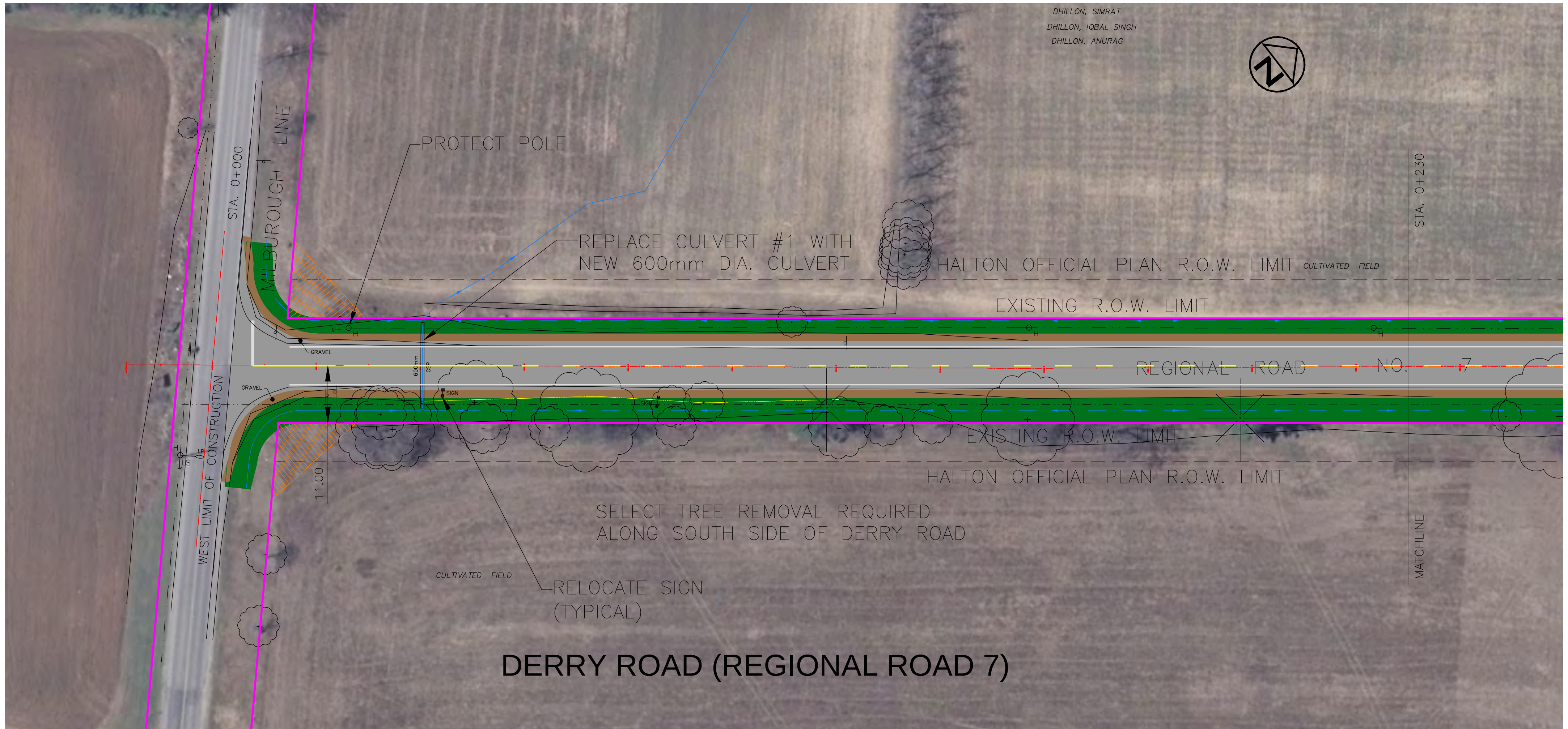
The existing intersections at Milburough Line and McNiven Road will remain in place in their current state. The proposed asphalt and shoulders will match into the locations and grades of the existing curve returns at the two intersections. There are no planned modifications for either intersection as part of this study. Daylighting (sight) triangles will be added to the northeast and southwest quadrants of the Milburough Line intersection and to all quadrants at the McNiven Road intersection to ensure unobstructed driver visibility (sight distance) at each intersection with Derry Road. All existing obstructions will be removed to provide stopping sight distance and pedestrian safety. The sight triangles will be a minimum of 15 metres by 15 metres as indicated in the Regional Official Plan.

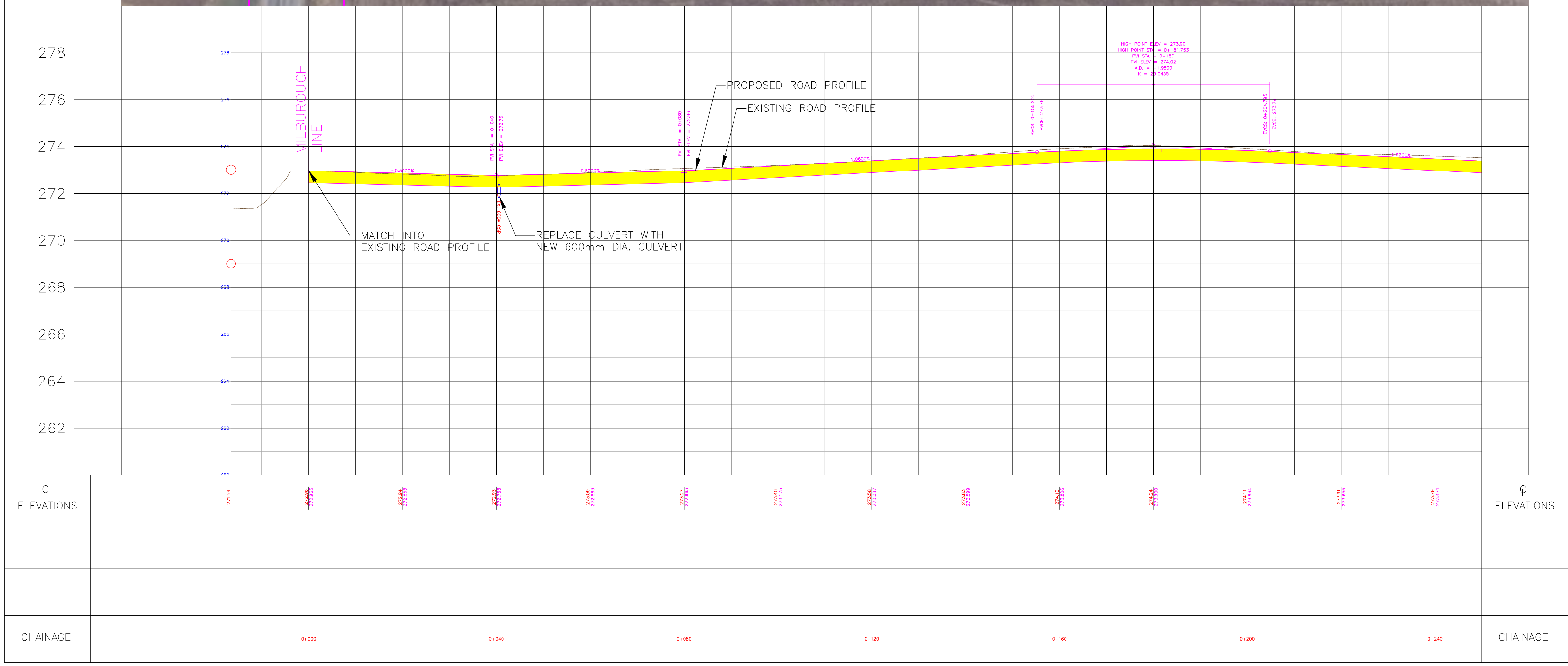
6.1.5 Entrances

The existing entrances along Derry Road will be maintained. The entrance grades will be reviewed and confirmed during the detail design stage. Driveway treatments and surfaces will be replaced with equivalent or superior materials. For granular entrances, it is recommended to install hard surface driveway aprons. This will help ensure that granular materials are kept from accumulating on the traveled portion of the roadway. Since the proposed road profile is very similar to the existing road profile, existing access grades and the road top asphalt grade will be matched close to existing conditions. Where the roadway is shifted horizontally (which may shorten the existing driveway), the adjacent driveway shall be graded to no more than a six percent slope. This may require grading on private property and would be shown on the detailed design drawings.

6.1.6 Provisions for Cyclists and Pedestrians

There is currently no dedicated cycling or pedestrian facilities located along Derry Road within the study area limits. The provision of a 1.0 metre paved shoulder on both sides of the roadway throughout the study area will be provided to meet active transportation needs in accordance with the Regional Official Plan.





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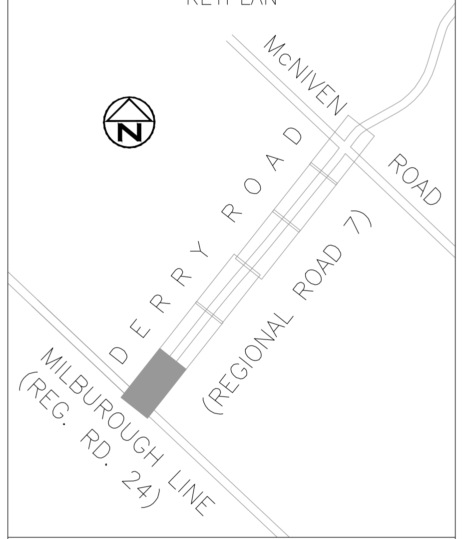


LEGEND

- PROPOSED ASPHALT
- PROPOSED GRANULAR
- PROPOSED BOULEVARD
- PROPOSED PROPERTY REQUIREMENTS
- PROPOSED DITCH
- EXISTING PROPERTY LINE
- PROPOSED CURB AND GUTTER
- MH.1 PROPOSED STORM SEWER AND MAINTENANCE HOLE

Nº	Date	By	REVISIONS	MANU	CAD

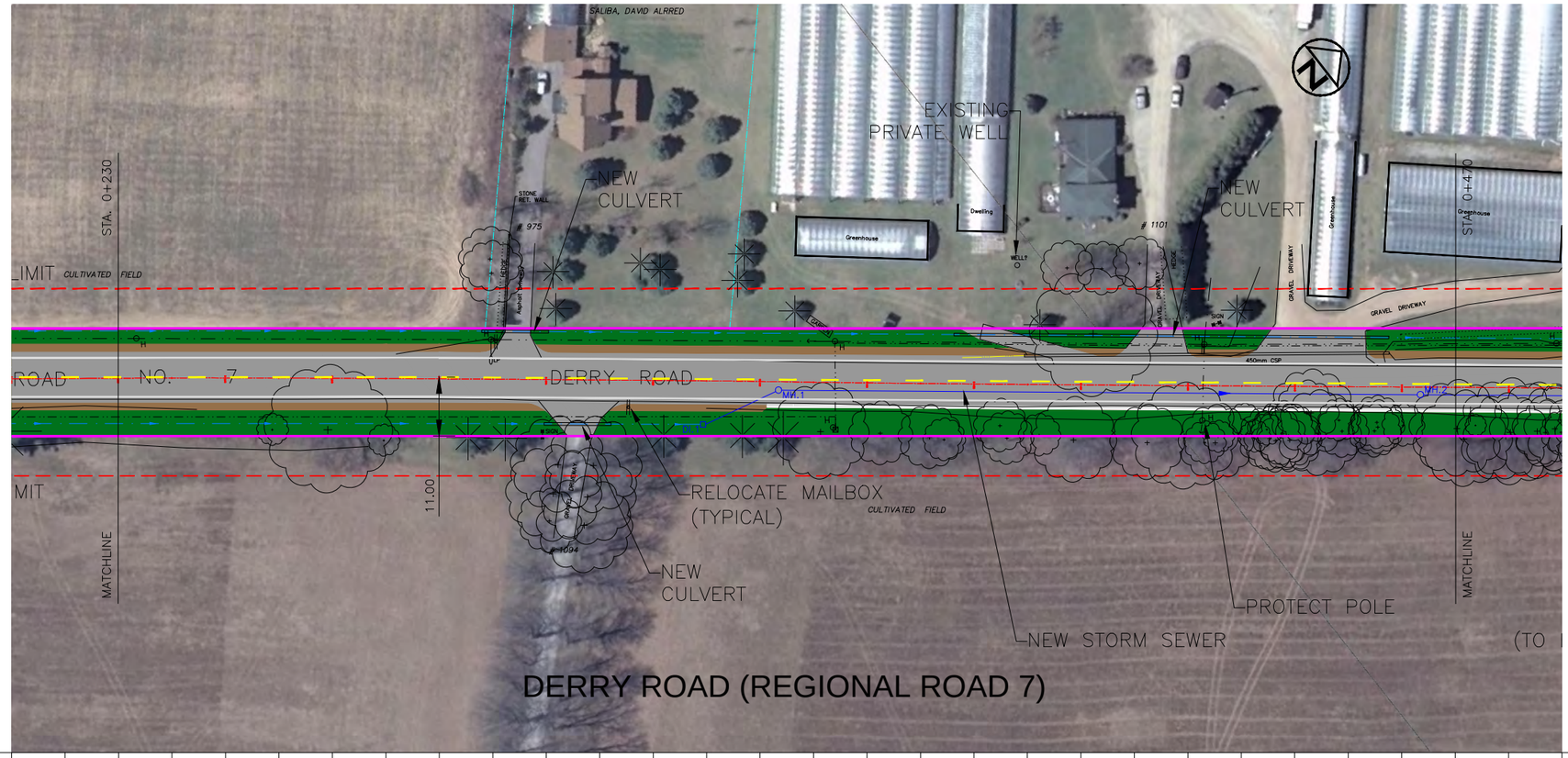
Design | Ch'kd | Date: NOVEMBER 2010
Drawn | Ch'kd
Scale Horiz. / Vert. | References
APPROVALS | Field Notes
Municipal
Regional
Director, Engineering Services
Manager, Design Services

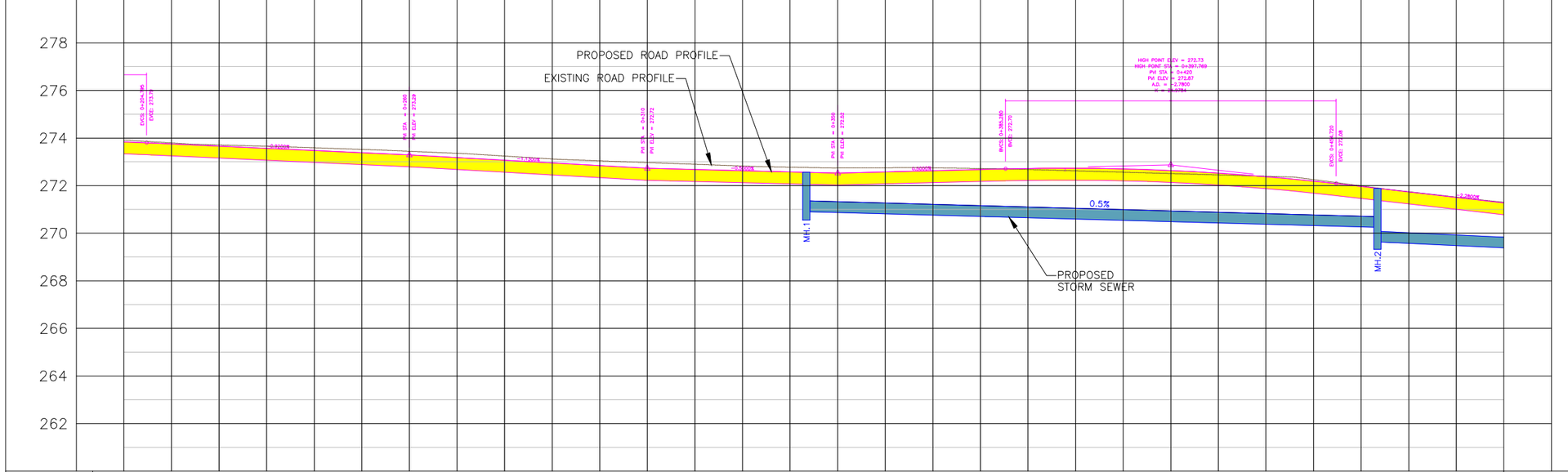
R.J. BURNSIDE & ASSOCIATES

Halton REGION

PROPOSED PLAN AND PROFILE
DERRY ROAD (REGIONAL ROAD 7)
FROM MILBUROUGH LINE (REGIONAL ROAD 24) TO McNIVEN ROAD

Consultant File Nº: FIGURE 6-1A | Regional Drawing Nº
CONTRACT Nº: RR-09-019 | Drawing Nº: SHEET 1 OF 7





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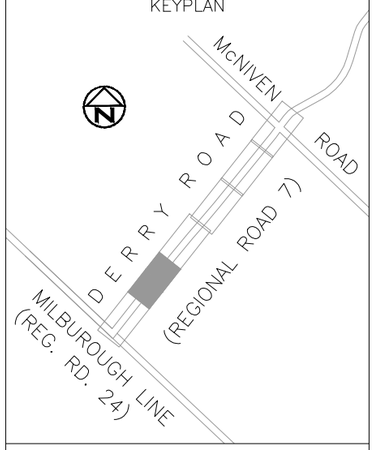

LEGEND

- PROPOSED ASPHALT
- PROPOSED GRANULAR
- PROPOSED BOULEVARD
- PROPOSED PROPERTY REQUIREMENTS
- PROPOSED DITCH
- EXISTING PROPERTY LINE
- PROPOSED CURB AND GUTTER
- PROPOSED STORM SEWER AND MAINTENANCE HOLE (MH.1)

NO	Date	By	REVISIONS	MANU	CAD

Design		Ch'kd		Date NOVEMBER 2010
Drawn		Ch'kd		
Scale Horiz. Vert.				References

APPROVALS

Municipal

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Director, Engineering Services

Manager, Design Services

Field Notes

R. ASSOCIATES

Halton REGION

PROPOSED PLAN AND PROFILE DERRY ROAD (REGIONAL ROAD 7)

FROM MILBUROUGH LINE (REGIONAL ROAD 24) TO McNIVEN ROAD

Consultant File NO. FIGURE 6-1B	Regional Drawing NO.
CONTRACT NO. RR-09-019	Drawing NO. SHEET 2 OF 7

KEYPLAN

LEGEND

- PROPOSED ASPHALT
- PROPOSED GRANULAR
- PROPOSED BOULEVARD
- PROPOSED PROPERTY REQUIREMENTS
- PROPOSED DITCH
- EXISTING PROPERTY LINE
- PROPOSED CURB AND GUTTER
- PROPOSED STORM SEWER AND MAINTENANCE HOLE

Nº	Date	By	REVISIONS	MANU	CAD

Design | Ch'kd
Drawn | Ch'kd
Date: NOVEMBER 2010
Scale Horiz. Vert.
References
APPROVALS
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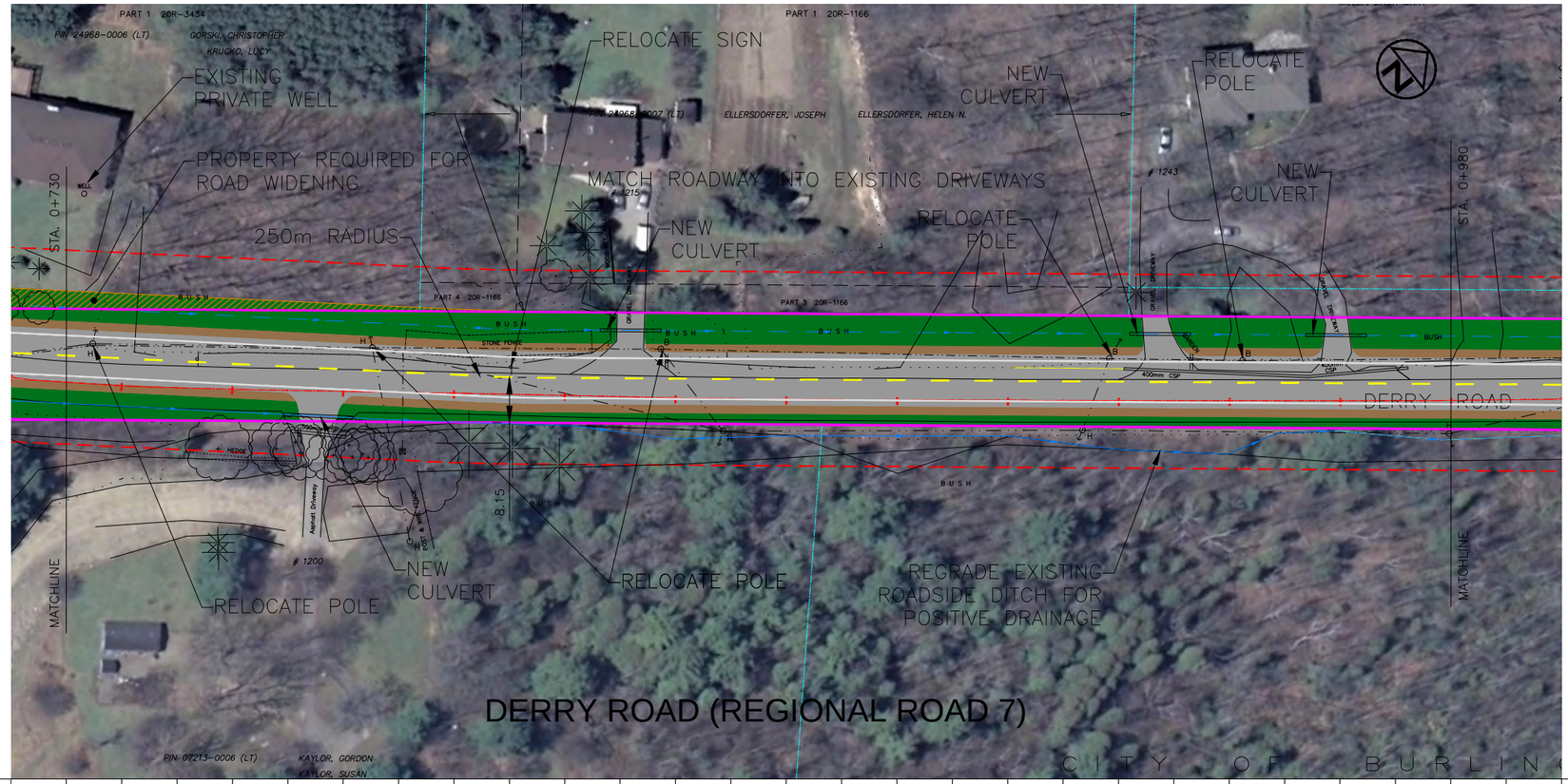
Municipal
Regional
Director, Engineering Services
Manager, Design Services

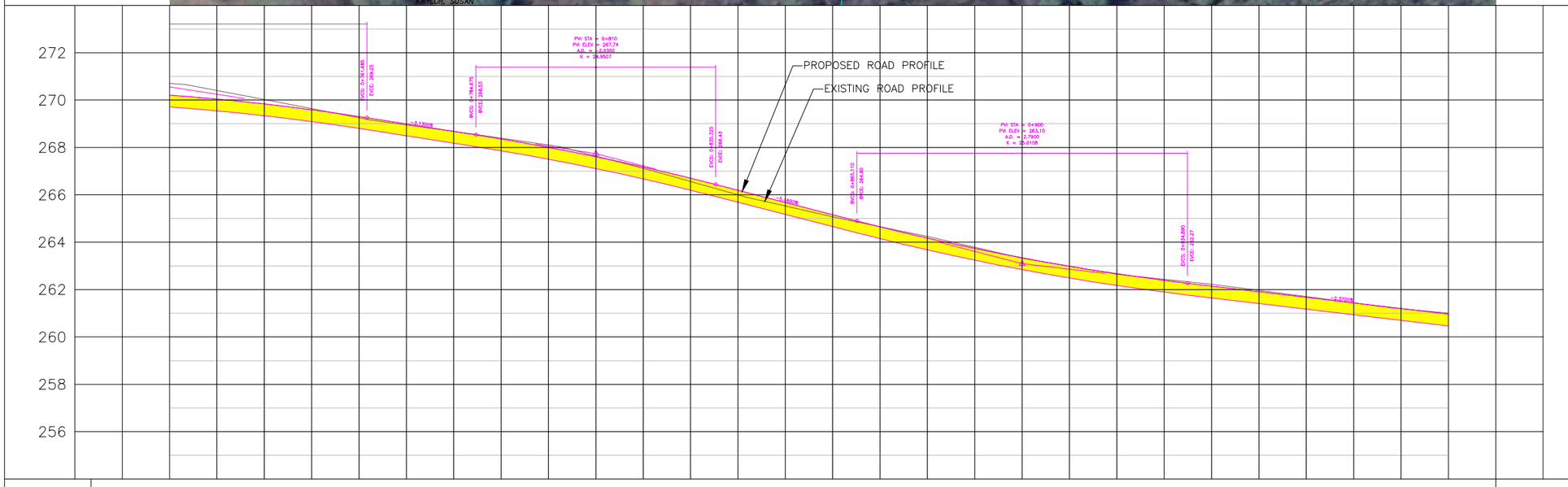
R.J. Burnside ASSOCIATES

Halton REGION

PROPOSED PLAN AND PROFILE
DERRY ROAD (REGIONAL ROAD 7)
FROM MILBOROUGH LINE (REGIONAL ROAD 24) TO McNIVEN ROAD

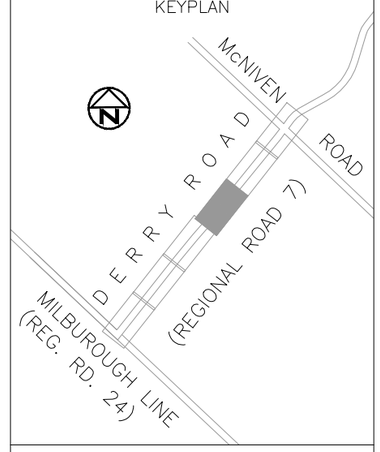
Consultant File Nº: FIGURE 6-1C
Regional Drawing Nº:
CONTRACT Nº: RR-09-019
Drawing Nº: SHEET 3 OF 7





℄ ELEVATIONS	270.91 270.91	270.21 270.21	269.45 269.45	268.88 268.88	268.30 268.30	267.72 267.72	268.20 268.20	266.72 266.72	265.46 265.46	264.53 264.53	263.85 263.85	262.45 262.45	261.91 261.91	261.38 261.38	℄ ELEVATIONS
CHAINAGE	0+720		0+760		0+800		0+840		0+880		0+920		0+960		CHAINAGE

KEYPLAN



LEGEND

- PROPOSED ASPHALT
- PROPOSED GRANULAR
- PROPOSED BOULEVARD
- PROPOSED PROPERTY REQUIREMENTS
- PROPOSED DITCH
- EXISTING PROPERTY LINE
- PROPOSED CURB AND GUTTER
- MH.1 PROPOSED STORM SEWER AND MAINTENANCE HOLE

NO	Date	By	REVISIONS	MANU	CAD

Design		Ch'kd		Date NOVEMBER 2010
Drawn		Ch'kd		
Scale Horiz. Vert.				References
APPROVALS				Field Notes
Municipal				
Regional				
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Manager, Design Services				

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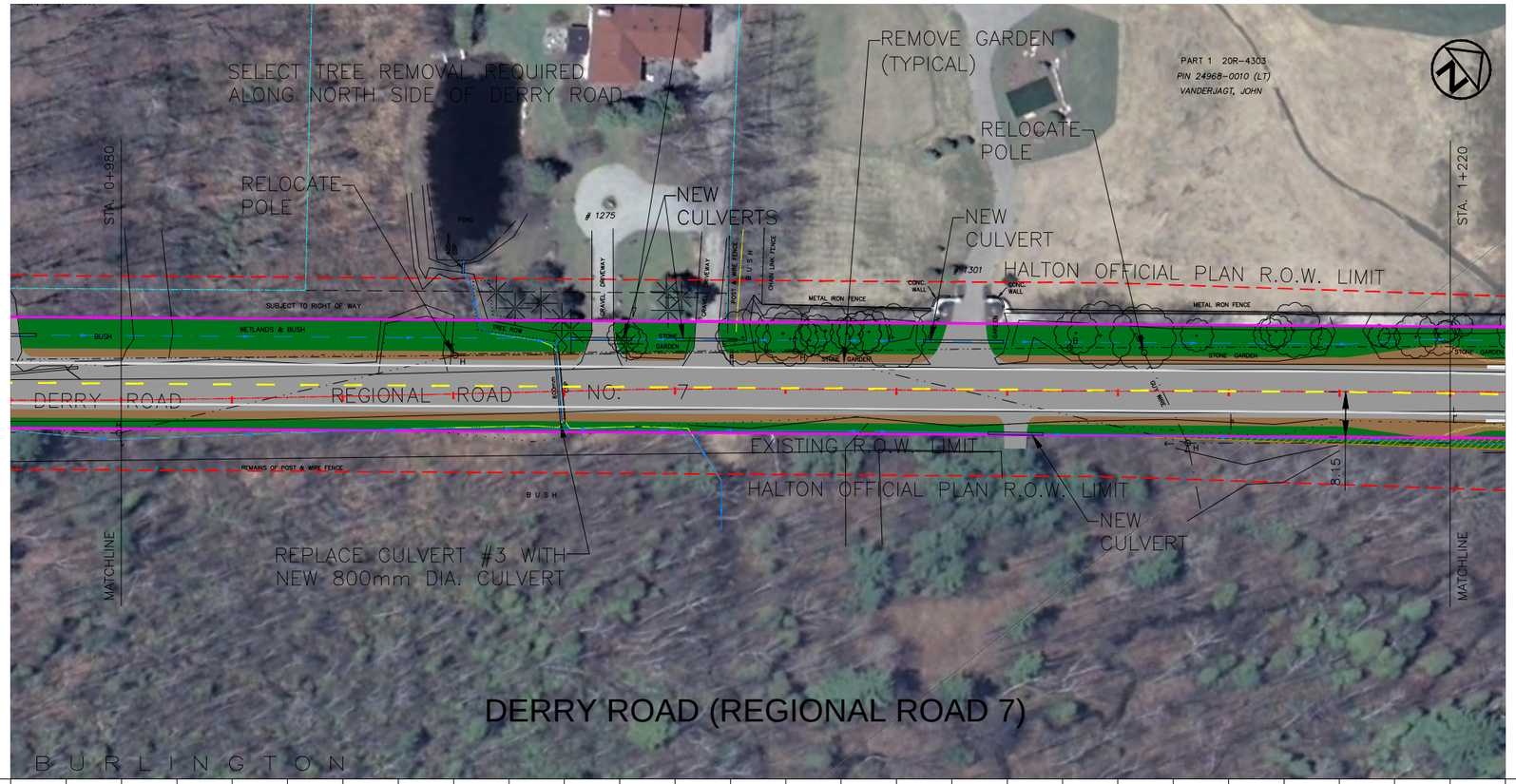
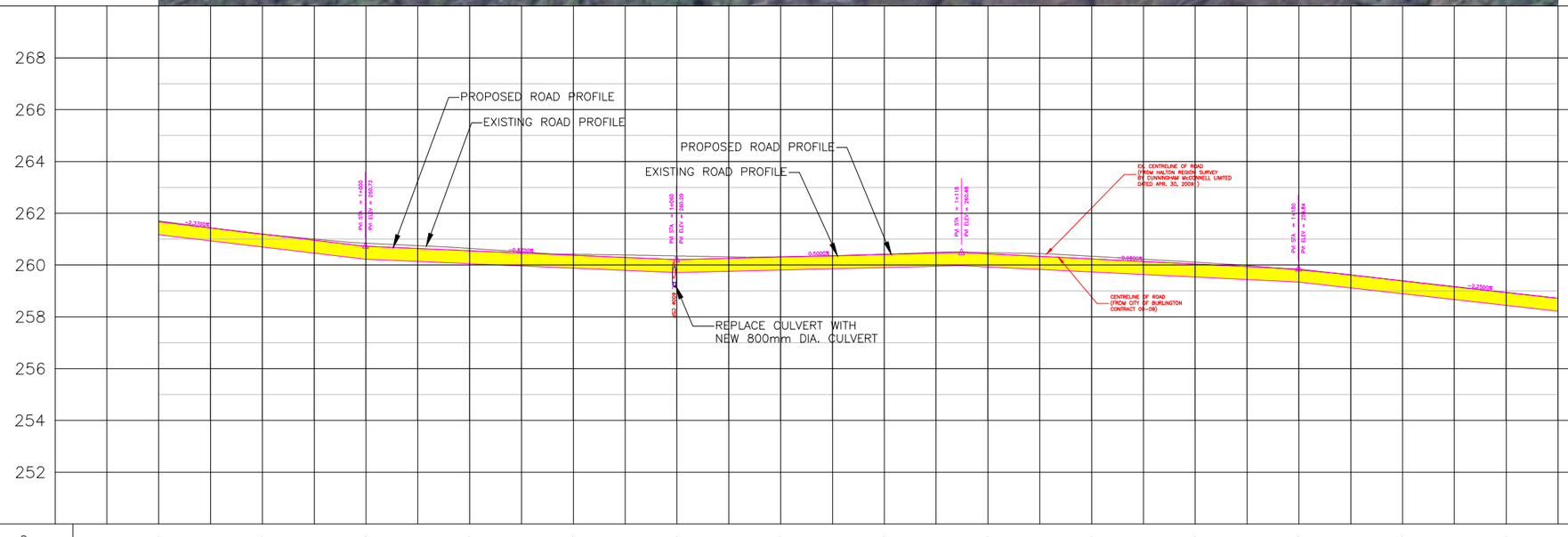
PROPOSED PLAN AND PROFILE DERRY ROAD (REGIONAL ROAD 7)

FROM MILBUROUGH LINE (REGIONAL ROAD 24) TO McNIVEN ROAD

Consultant File NO. FIGURE 6-1D	Regional Drawing NO.
CONTRACT NO. RR-09-019	Drawing NO. SHEET 4 OF 7





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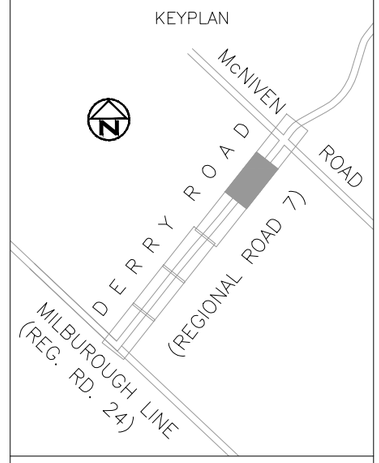

LEGEND

- PROPOSED ASPHALT
- PROPOSED GRANULAR
- PROPOSED BOULEVARD
- PROPOSED PROPERTY REQUIREMENTS
- PROPOSED DITCH
- EXISTING PROPERTY LINE
- PROPOSED CURB AND GUTTER
- PROPOSED STORM SEWER AND MAINTENANCE HOLE (MH.1)

№	Date	By	REVISIONS	MANU CAD

Design		Ch'kd		Date NOVEMBER 2010
Drawn		Ch'kd		
Scale Horiz.				References
Vert.				

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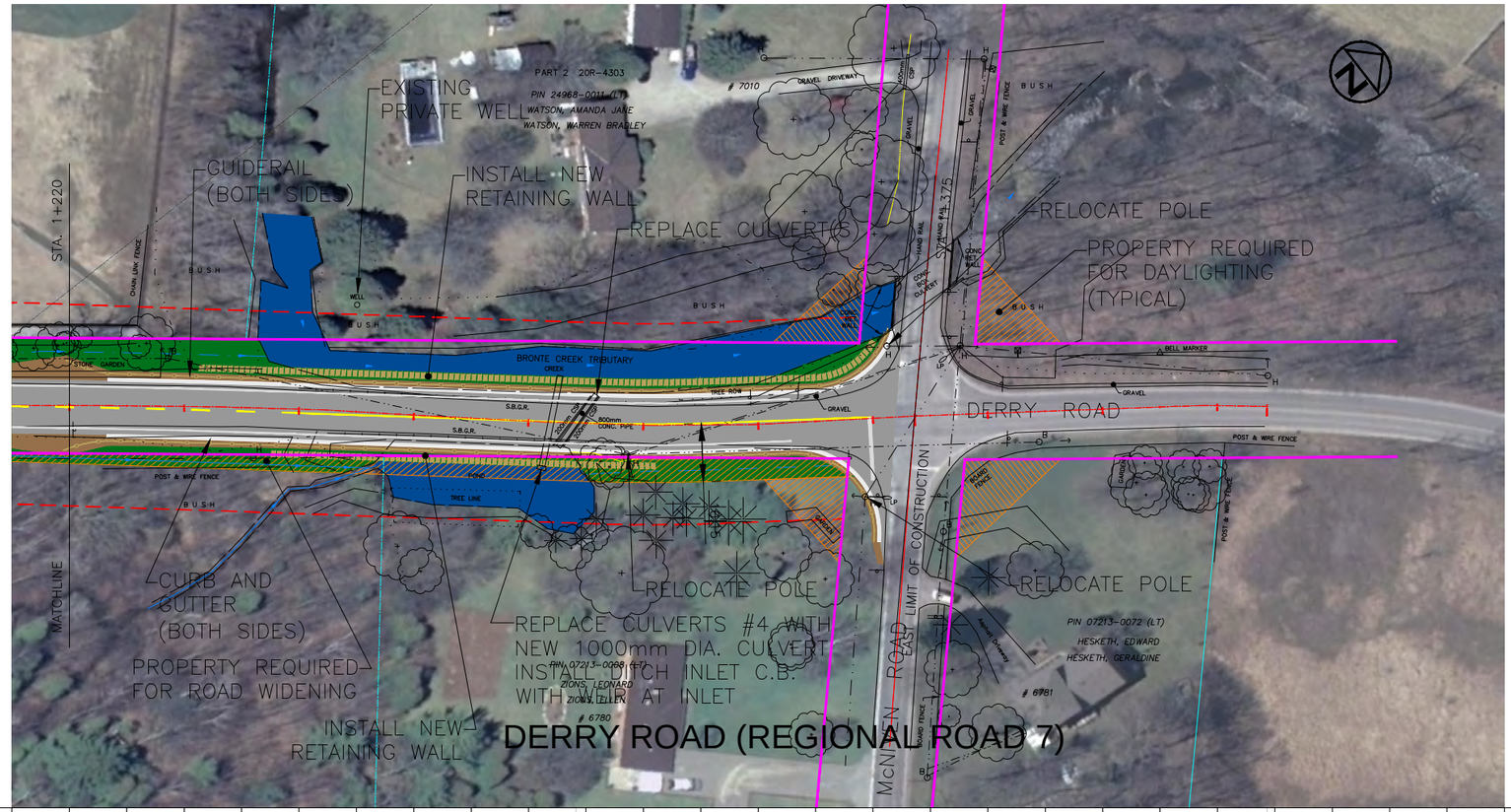
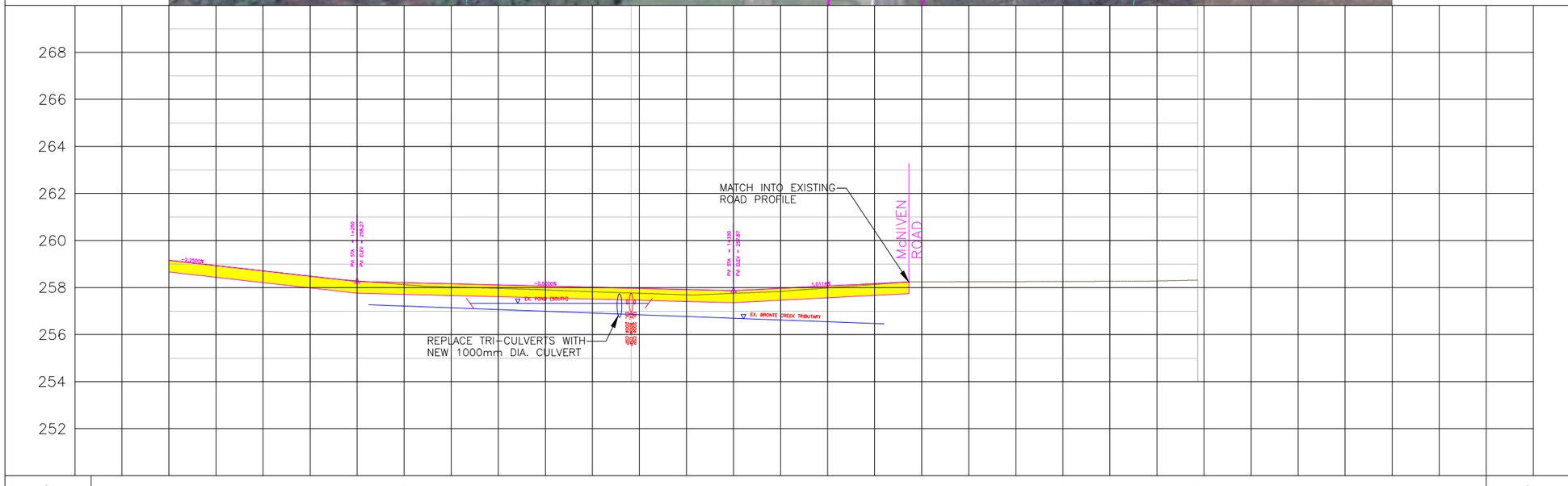
PROPOSED PLAN AND PROFILE DERRY ROAD (REGIONAL ROAD 7)

FROM MILBUROUGH LINE (REGIONAL ROAD 24) TO McNIVEN ROAD

Consultant File № FIGURE 6-1E	Regional Drawing №
CONTRACT № RR-09-019	Drawing № SHEET 5 OF 7





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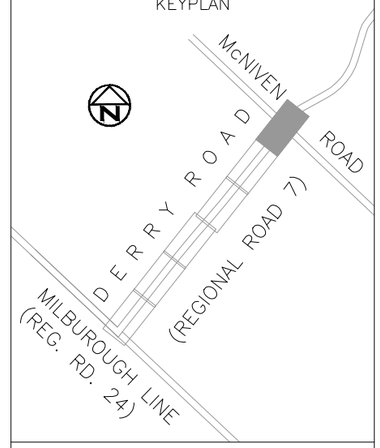

LEGEND

- PROPOSED ASPHALT
- PROPOSED GRANULAR
- PROPOSED BOULEVARD
- PROPOSED PROPERTY REQUIREMENTS
- PROPOSED DITCH
- EXISTING PROPERTY LINE
- PROPOSED CURB AND GUTTER
- PROPOSED STORM SEWER AND MAINTENANCE HOLE (MH.1)

℄ ELEVATIONS	259.59 259.592	259.14 259.142	259.03 259.030	258.33 258.329	258.12 258.117	258.03 258.030
CHAINAGE	1+200	1+240	1+280	1+320	1+360	1+400

257.90 257.897	257.89 257.890	258.10 258.100	258.25	258.26	258.28	258.32
						℄ ELEVATIONS
						CHAINAGE

NO	Date	By	REVISIONS	MANU CAD

Design		Ch'kd		Date NOVEMBER 2010
Drawn		Ch'kd		
Scale Horiz.				References
Vert.				

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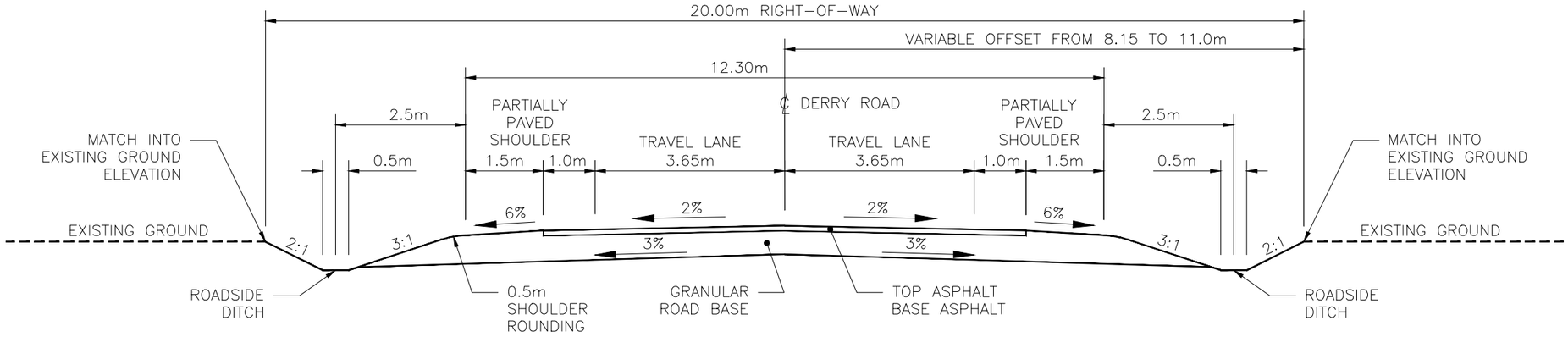
Halton REGION

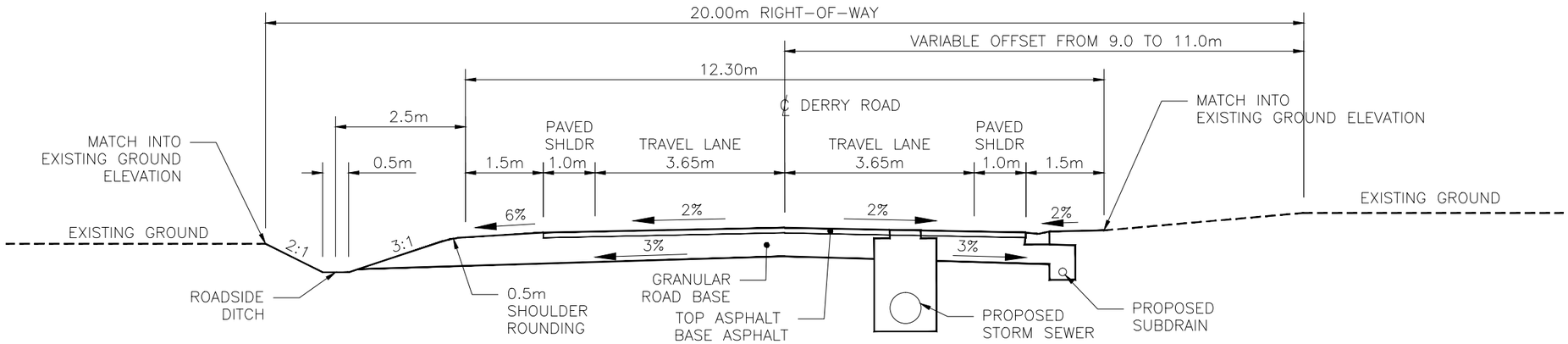
PROPOSED PLAN AND PROFILE
DERRY ROAD (REGIONAL ROAD 7)
FROM MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD

Consultant File NO. FIGURE 6-1F	Regional Drawing NO.
CONTRACT NO. RR-09-019	Drawing NO. SHEET 6 OF 7



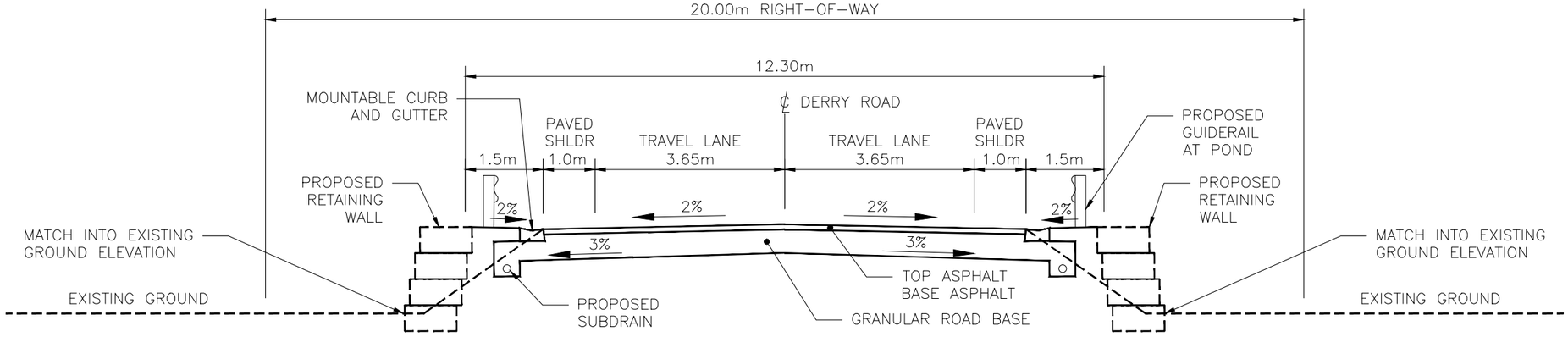
DERRY ROAD TYPICAL RURAL ROADWAY CROSS-SECTION

STATION 0+000 to 1+220



DERRY ROAD TYPICAL SEMI-URBAN ROADWAY CROSS-SECTION

STATION 0+340 to 0+680



DERRY ROAD TYPICAL URBAN ROADWAY CROSS-SECTION

STATION 1+220 to 1+370

NO	Date	By	REVISIONS	MANU	CAD

Design		Ch'kd		Date NOVEMBER 2010
Drawn		Ch'kd		
Scale Horiz.				References
Vert.				

APPROVALS

Municipal

Regional

Director, Engineering Services

Manager, Design Services

Field Notes

TYPICAL CROSS-SECTIONS
DERRY ROAD (REGIONAL ROAD 7)
FROM MILBUROUGH LINE (REGIONAL ROAD 24)
TO McNIVEN ROAD

Consultant File NO	Regional Drawing NO
FIGURE 6-2	
CONTRACT NO RR-09-019	Drawing NO SHEET 7 OF 7

6.1.7 Drainage and Stormwater Management

The drainage and storm water management strategy for Derry Road improvements is based on ultimately directing stormwater runoff to roadside drainage ditches that conveys runoff to four separate roadway watercourse crossings. The drainage within the study area generally flows from west to east. Runoff within the proposed urban and semi-urban sections of Derry Road will be collected via ditch inlets and catch basins and conveyed through a storm sewer system to roadside drainage ditches in the east. The existing drainage ditches in the rural section (mainline section) will be regraded to provide improved drainage. Further details of the drainage system are discussed in Sections 6.1.7.3 and 6.1.7.4.

As part of the stormwater review, the existing storm drainage areas were determined. The proposed drainage areas are anticipated to remain the same as the existing drainage areas. Additional details on the drainage reaches are provided in Section 6.1.7.1. No stormwater diversions are expected. Culverts will be replaced where the existing structure is deficient either hydraulically, structurally or does not meet current minimum size criteria. Additional details on the culvert replacements are provided in Section 6.1.7.2. Throughout the urban and semi-urban sections, storm sewers will be provided to capture the roadway runoff and direct it to the grassed swale located on the south side of Derry Road. Additional details regarding the proposed storm sewer system are provided in Section 6.1.7.3.

Controlling the post stormwater flow quantities to pre stormwater flow quantities will not be an issue since the existing roadway will not be widened beyond its current two-lane configuration. Quantity control will therefore not be required as there is no major increase in impervious area. Localized lane/shoulder widening is considered to be insignificant in terms of generating additional stormwater flows. The need for formal stormwater management facilities is not anticipated within the study area; however, it is recommended that minor stormwater management controls be investigated during the detail design stage. All drainage design flow criteria will follow the Ministry of Transportation Directive B-100.

Stormwater quality control will be incorporated where feasible through enhanced grassed swales (Section 6.1.7.4).

6.1.7.1 Drainage Reaches

The study area was divided into several drainage reaches from the west to the east limit of the study. The proposed drainage system for each reach is detailed as follows:

<u>Mainline Section (Station 0+000 to Station 1+220)</u>

This 1.2 kilometre section of roadway consists of a rural cross section. Runoff from the roadway and adjacent properties is conveyed through roadside grassed ditches on each side of the

roadway, which will aid in the treatment of runoff water. There is an existing culvert at Station 0+040 which drains the ditch flows from the south side onto private property to the north. There is an existing culvert at approximately Station 0+580 which drains the fields from the north to the south side of the roadway. There is an existing culvert at approximately Station 1+060 which provides the drainage outlet for a private pond on the north side of the roadway.

One section of storm sewer will be installed to preserve an existing row of trees along the south streetline. For this section of storm sewer (Station 0+340 to 0+680), the small external drainage area to the southwest will drain to a ditch inlet catchbasin at Station 0+330. Catchbasins within the curb and gutter section will collect the roadway runoff and convey them through a storm sewer with pipe sizes ranging from 300 mm to 600mm in diameter. A maintenance hole over the replaced culvert at Station 0+580 will provide an outlet for the storm sewer flows.

Eastern Section west of McNiven Road (Station 1+220 to 1+370)

This 150 metre section of roadway consists of an urban cross section. Concrete curb and gutter will be constructed to capture the roadway runoff. A tributary of Bronte Creek is located adjacent to this section of Derry Road on the north side. Between Stations 1+250 and 1+320, there is a private pond on the south side of Derry Road which collects the drainage from the west (culverts located at Stations 0+580 and 1+060). There are existing tri-culverts (one 800 mm diameter and two 200 mm diameter CSP relief culverts) located at Station 1+310, which drain from the south to the north side of Derry Road. At the upstream side of the tri-culverts, there is a rudimentary weir structure to regulate the pond water elevation.

The existing weir structure is constructed of wooden planks against the culvert openings. This structure would be replaced with a double ditch inlet catch basin consisting of a concrete base and riser section and a standard angled ditch inlet catch basin grate. The riser section would contain cutouts or weirs of specific dimensions, sized for different storm events. The weir would maintain the pond at a select level while allowing excessive runoff to overflow into the 1000 mm diameter culvert under Derry Road. Under high flow conditions (i.e. a rainfall event coupled with snow melt or a heavy summer thunderstorm) the pond level would rise, flow through the various weir openings and eventually spill over the top of the grate. The top of grate elevation would be selected to ensure the water does not rise to the road elevation for all storm events up to and including the 100 year and Regional storm events. Further calculations would be completed during the detailed design stage.

Based on the road grade just west of McNiven Road, there may be a need for a pair of catchbasins or double catchbasins (one on each side at the low point at Station 1+330) and a short length of pipe to connect the south catchbasin to the north catchbasin with an outlet to the tributary. The last catchbasin could include an oil/grit separator or some other end-of-pipe treatment prior to draining the runoff to the creek. The intent is to collect the dirty, salty runoff

water from the road and treat it before it is drained into the tributary. Currently, the roadway runoff is allowed to sheet flow directly into the tributary and pond.

The overall drainage reaches for the various tributaries within the study area are noted in Table 6-2 in hectares.

6.1.7.2 Culverts

Existing culverts, located within the Derry Road study area, will be replaced as shown in **Table 6-2**. All proposed culverts are designed to accommodate the 25-year storm event. The culverts are listed by location, tributary drainage area, proposed culvert diameter and estimated length. Presently, the existing culverts are located as follows:

- Existing 600 mm diameter CSP at Station 0+040 (just east of Milburough Line), approximately 15 metres in length will be replaced with a new 600 mm diameter culvert;
- Existing 500 mm diameter CSP at Station 0+580 (between # 1101 and #1175 Derry Road), approximately 15 metres in length will be replaced with a new 600 mm diameter culvert;
- Existing 600 mm diameter CSP at Station 1+060 (at #1275 Derry Road), approximately 13 metres in length will be replaced with a new 800 mm diameter culvert.
- Existing tri-culverts at Station 1+310 (just west of McNiven Road, one 800 mm diameter and two 200 mm diameter culverts), approximately 12 metres in length will be replaced with a new single 1,000 mm diameter culvert.

Table 6-2: Proposed Culverts

Existing Culvert Location	Tributary Drainage Area (Hectares)	Culvert Diameter (Millimetres)	Estimated Culvert Length (Metres)
Station 0+040 (to replace existing 600 mm diameter culvert)	0.5	600	16
Station 0+580 (to replace existing 500 mm diameter culvert)	8.1	600	16
Station 1+060 (to replace existing 600 mm culvert)	18.2	800	16
Station 1+310 (to replace existing tri-culvert configuration)	80.4	1000	16

6.1.7.3 Storm Sewers

Preliminary storm sewer design flows for the 5-year storm event were calculated using the Rational Method and the Town of Milton rainfall intensity with a time of concentration of ten minutes. Preliminary pipe slopes follow the proposed road grade, which is very close to the existing road grade, in order to reduce the amount of required rock excavation. The storm sewers were set to a minimum cover depth of 1.2 metres for frost protection.

Table 6-3 summarizes the proposed storm sewer system including the drainage section, location from maintenance hole (MH) to maintenance hole, the length/grade, and the pipe diameter.

Table 6-3: Preliminary Storm Sewer Design Summary

Drainage Section	Location (MH to MH)	Length and Grade (m at %)	Diameter (mm)
Mainline Section (Station 0+340 to 0+680)	1 – 2	120 at 0.5	450
	2 – 4	120 at 1.0	450
	3 – 4	97 at 0.5	300
	4 – Outlet	6 at 1.5	600
Outlet	#4 outlets at 600 mm diameter culvert (replaces existing 500 mm diameter culvert)		
Urban Section (Station 1+220 to 1+370)	Catchbasins Or Double Catchbasins	Less than 10m	300
Outlet	Catchbasins or Double catchbasins will outlet to pond or creek (to be confirmed during detailed design)		

The preliminary storm sewer design sheet and drainage area plan are included in **Appendix L**.

6.1.7.4 Drainage Ditches

Flat bottomed grassed swales and flat bottomed enhanced grassed swales were selected as the method of controlling stormwater within the proposed rural cross-section areas since the road drainage areas are relatively small in size and stormwater management ponds are not required.

The Ministry of the Environment's (MOE) *Storm Water Management Planning and Design Manual* (2003) identifies grassed swales as an appropriate measure for water quality enhancement for drainage areas less than two hectares in size provided that the peak flow velocity for the 4-hour 25 millimetre Chicago storm event is not greater than 0.5 metres per second. In addition, the velocity generated by the 100 year design storm should not exceed 1.5

metres per second at which point rock protection should be provided to prevent erosion within the swales. The guideline results in a requirement for wide, flat swales for larger drainage areas and all grass swales must be evaluated under major system and minor system events to ensure that the swale can convey these storms effectively.

In addition to grassed swales and enhanced grassed swales the vegetated roadside embankment provides a substantial amount of treatment before the runoff enters the swale. The minimum recommended bottom width of the grassed swale is 0.75 metres. The widths of the enhanced swales will be greater, ranging typically from 1.0 metre up to 5.0 metres. The maximum width of the enhanced swale will be dictated by the available land within the designated road right-of-way.

6.1.7.5 Salt Management

Roadway embankments provide the same function as Vegetated Filter Strips (VFS) which have been demonstrated to be very effective in trapping sediments. Vegetated filter strips are best utilized adjacent to a buffer strip, watercourse or drainage swale since the discharge will be in the form of sheet flow, making it difficult to convey the stormwater downstream in a normal conveyance system (swale or pipe).

VFSs have been found to be particularly effective in trapping contaminants under sheet flow conditions where runoff is conveyed through the grass. As runoff passes through the grass, velocities are reduced and sediment transport capabilities are diminished, resulting in high removal efficiency for sediments and attached pollutants. Although some removal of soluble pollutants contained in the overland flow can also be achieved due to infiltration on the vegetated strip, chlorides cannot be removed from the runoff. Chlorides will be carried in surface flow directly or infiltrated to the ground water, but will eventually discharge into to the stream flow as runoff. The use of salt as a de-icing agent during the winter season will follow the Region's *Salt Management Plan* (2003). The Salt Management Plan strives to minimize the amount of salt entering the environment by including best management practices (BMPs), and using new technologies to ensure its most effective use over the road system.

6.1.7.6 Considerations during Detail Design

The detailed assessment of impacts along Derry Road will be refined through additional detailed impact assessments during the detail design stage and through further consultation with Conservation Halton and other agencies, as required. The following measures should be considered during the detailed design stage:

- Open bottom culverts for those watercourses that constitute direct fish habitat or for which the future rehabilitated condition will likely represent direct habitat and mitigation of potential groundwater disruptions; and

- The type of end-of-pipe treatment for the storm sewer outlet(s) directed to the creek along the north side of Derry Road (Station 1+220 to 1+370) should be further investigated to determine the required configuration needed to manage the stormwater discharge from the storm sewer.

6.1.8 Geotechnical and Pavement

Applied Research Associates Inc. (ARA) was retained by Halton Region to provide pavement engineering services in support of the Derry Road (Regional Road 7) Transportation Corridor Improvements Class Environmental Assessment study. The pavement evaluation was undertaken to determine the existing condition of the in-situ pavement and subgrade materials, estimate the remaining life of the in-place pavement structure, identify potential rehabilitation options, and recommend a cost-effective pavement rehabilitation strategy.

The pavement surface condition survey was carried out in October 2009. The survey consisted of an examination of the pavement surface noting the condition of the pavement and identifying areas of visual pavement distress and distortion. The survey was completed in general accordance with the MTO Manual for Condition Rating of Flexible Pavements for Municipalities.

The geotechnical work for this investigation was carried out in November 2009 and comprised four pavement cores and eight boreholes advanced to a depth of 1.5 metres below existing grade. Representative samples of the granular base/subbase and subgrade materials encountered in the boreholes were retained for detailed visual examination and laboratory classification testing. Routine laboratory testing consisted of grain size analysis and moisture content determination.

The pavement surface on Derry Road was found to be in relatively very good condition, with almost no distresses. Similarly, Milburough Line and McNiven Road were also found to be in good condition; however, the pavement surface on McNiven Road appeared to be surface treatment. Although currently in good condition, the flexible pavement section on Derry Road was generally considered to be structurally deficient to support anticipated future traffic loadings. It is expected that the pavement structure will deteriorate at an increased rate due to the structural deficiencies.

In consideration of the structural deficiencies, and thin granular base/subbase of the existing pavement structure, full reconstruction of the existing pavement section should be considered. The recommended rehabilitation of the existing pavement structure (including the partially paved shoulder) on Derry Road should comprise full reconstruction, the placement of the following:

- 50 mm Superpave 12.5 FC1
- 70 mm Superpave 19

- 150 mm Granular A Base
- 300 mm Granular B Subbase

The existing pavement structure should be pulverized (Full Depth In-Place Reclamation), with the pulverized material rusted as granular subbase material. Beyond the portion of the paved shoulder, the new shoulder should consist of the following:

- 270 mm Ganular A Base
- 300 mm Granular B Subbase

Additional details related to the geotechnical investigation and pavement design, including transition treatments, pavement drainage, the use of new construction materials, and recycling of existing materials is provided in **Appendix K**. As part of the detail design stage, it is recommended that a supplemental detailed investigation and assessment be carried out prior to design of the proposed long-term corridor improvements for Derry Road.

6.1.9 Utilities

The following summarizes the required utility modifications within the study area based on a review of the recommended plan. It is anticipated that the overhead Hydro, Bell and Cable TV cables within the existing Derry Road right-of-way will remain in place with the exception of the following:

- At the S-bend location (Station 0+570 to Station 0+810), there are several poles that will require relocation due to the shifted road alignment;
- Within the urban eastern section, several poles may require relocation. Some poles within this section have been upgraded or replaced recently. To avoid further relocation, it is recommended that guiderail be installed to protect the poles where feasible;
- There is no existing gas main buried along Derry Road through the entire study area. The gas company could be considering the installation of new gas mains as part of their regular scheduled expansion program. Coordination with the gas company will be important to ensure no delays during road reconstruction.

Early coordination with all utility companies during the detail design will help reduce delays during the detailed design process.

6.1.10 Illumination

It is anticipated that the existing partial illumination located at the intersection of Derry Road and Milburough Line (southwest side of Milburough Line), approximately 285 meters east of Milburough Line (north side of Derry Road), and at the intersection of Derry Road and McNiven Road (southwest and northeast intersection quadrants) will be retained.

6.1.11 Property Requirements

A minor amount of property is required to accommodate the reconfiguration of the existing horizontal curves at the S-bend location to 250 metre radii curves near the centre of the study area and to accommodate the installation of the retaining wall system on the south side of Derry Road, west of McNiven Road. Property is also required to accommodate daylighting at the intersections of Milburough Line and McNiven Road. The extent of the property requirements are indicated on **Figure 6.1**.

The proposed property requirements will form the basis for property purchases from the affected property owners by Halton Region subsequent to the Environmental Assessment Approval. It should be noted that the proposed property requirements shown in Figure 6.1 are preliminary only and should be reviewed and confirmed during the detail design stage.

6.1.12 Temporary Traffic Conditions

Derry Road is a major arterial roadway, and as such, any potential traffic disruptions during construction will need to be minimized. Since the existing roadway profile is generally being maintained, it is anticipated that through traffic will continue to use the existing roadway platform as Derry Road is improved. During periods of construction, a single lane of traffic should be maintained in accordance with the procedures and requirements as set out in the Ontario Traffic Manual Book 7 – Temporary Conditions. Outside of the construction periods, two lanes of traffic should be maintained at all times where feasible.

The contractor will supply traffic management and construction staging plans prior to the start of construction, including a Traffic Protection Plan as required. Construction staging and traffic control plans should be cognizant of the need to maintain access for emergency vehicles at all times without undue delay.

6.1.13 Construction Timing

Roadway improvements for Derry Road (Regional Road 7) from Milburough Line (Regional Road 24) to McNiven Road are anticipated to begin in 2012 as identified in the current 10-year Regional Capital Budget.

6.1.14 Preliminary Cost Estimate

A preliminary construction cost estimate was prepared as part of this study. The construction cost estimate for this study is based on preliminary estimated quantities, and unit prices provided by Halton Region and the consultant. The cost estimate includes preliminary cost estimates for Roadworks and Drainage, Structures (retaining walls), Landscaping/Mitigation, Electrical, Utilities and Services, Contingency and Engineering, and Property for the mainline

and eastern sections of the study area as well as the total estimated costs. The preliminary cost estimate is summarized in **Table 6-4**. The complete preliminary cost estimate is provided in **Appendix M**.

Table 6-4: Preliminary Cost Estimate Summary[10]

Item	Derry Road Mainline Section	Derry Road 150 metres west of McNiven Road	Totals
Length (m)	1220	150	1,370
Improvement Type	2-lane Rural Cross-Section	2-lane Urban Cross-Section	
A. Roadworks and Drainage	$858,404	$458,846	$1,317,250
Reconstruction Costs	$43,989	$5,408	$49,397
Subtotal (Item A)	**$902,393**	**$464,254**	**$1,366,647**
B. Structures	$0	$445,588	$445,588
C. Landscaping/Mitigation	$0	$53,300	$53,300
D. Electrical	$0	$0	$0
E. Utilities and Services	$89,051	$39,491	$128,542
Subtotal (Items A to E)	**$991,444**	**$1,002,633**	**$1,994,077**
20% Contingency	$198,288	$200,527	$398,815
15% Engineering	$178,460	$180,474	$358,934
F. Property	$319,658	$39,302	$358,960
Local Municipality Items	$0	$0	$0
Total	**$1,687,850**	**$1,422,936**	**$3,110,786**

[10] Estimated costs in Table 6-4 are shown as rounded values.

7. POTENTIAL ENVIRONMENTAL EFFECTS, MITIGATION MEASURES AND COMMITMENTS TO FUTURE WORK

This section of the ESR describes the potential effects on the environment (both positive and negative) as a result of the undertaking and the mitigation measures and commitments made to either minimize or offset those effects. The actions taken to reduce the effects of the undertaking on the environment are referred to as "Mitigating Measures". The monitoring program developed during the planning process (to be carried out during construction) is also described.

7.1 Transportation

The proposed roadway improvements within the Derry Road corridor as described in *Section 6* support the transportation goals and objectives of Halton Region. The associated fundamental benefits of the improvements include the following:

- Upgrading Derry Road to Regional standards with geometric improvements and the provision of wider shoulders allowing for an improved roadway structure and alignment with the accommodation of active transportation modes (cycling and pedestrians); and
- Provision of roadside drainage ditches and sewers to improve both drainage quality and quantity controls.

7.2 Natural Environment

7.2.1 Potential Impact Assessment and Mitigation Measures

It is anticipated that the proposed road improvements for Derry Road will be accommodated within the existing right-of-way wherever possible in order to minimize changes to the current roadway footprint and potentially reduce impacts on the adjacent lands and natural heritage features and functions. The preferred design alternative incorporates potential geometric restrictions based on the location of the existing residences, wetlands, natural areas, and watercourses.

There are a number of culvert replacements proposed to accommodate the road improvements that will assist with improved roadside drainage. These include the replacement of two smaller culverts located within the western portion of the study area, neither of which is associated with fish habitat. In the eastern portion of the study area, the existing 600 mm CSP culvert that conveys the water from the northern side of Derry Road to the southern side upstream of wetland area is proposed to be increased to an 800 mm CSP culvert. As well, the existing 800 mm concrete and two-200 mm CSP pipes that convey the waters from the wetland area into the main tributary of Kilbride Creek will be replaced with a 1000 mm concrete structure. Both of these proposed culvert improvements involve recognized fish habitat, such that a permit from

Conservation Halton will be required to proceed with any in-water works and Authorization from Department of Fisheries and Oceans Canada may also be required.

7.2.1.1 Fisheries and Aquatic Ecosystems

The secondary tributary of Kilbride Creek (i.e. Bronte Creek tributary) provides direct fish habitat as evidenced by the fish observed within the wetland pond. However, the current weir structure on the south side of Derry Road may limit fish movement into the main tributary of Kilbride Creek. The main tributary of Kilbride Creek, located adjacent to Derry Road, also provides direct coolwater fish habitat as indicated in the BCWS (2002). Conservation Halton has confirmed that the main tributaries are designated as cool and coldwater fisheries. The conclusions of the field evaluations completed for this report and the information provided in the BCWS (2002) also suggest that these tributaries currently support and/or contribute to coldwater fishery, and that watercourse conditions are non-impaired/minimally impaired.

Based on the proposed design alternatives and the current orientation of the watercourses, there does not appear to be any requirement to alter the existing channel orientation. However, improving the stability of the channel banks along Derry Road was identified as a priority in the Bronte Creek Hydrology and Stream Morphology Study (PEIL, 2003). The preferred design alternative (Alternative 1) proposes a retaining wall, guiderail protection and curb and gutter along both the northern and southern sides of Derry Road adjacent to the wetland feature and main tributary of Kilbride Creek (i.e. tributary of Bronte Creek). While the proposed retaining wall will maintain the current orientation of the channel, the works will require in-water construction which will be regulated under a CH permit and DFO Authorization and will be subject to timing restrictions for completion of the construction.

As previously discussed, the wetland located along the southern side of Derry Road is currently maintained with a weir structure at the inlet to the existing culvert. While water could be heard moving through the culvert, the weir is functioning to maintain the water levels within the pond/wetland feature and releases water into the channel at a reduced and/or controlled rate. Both the wetland and the channel have adapted to these flows. As such, in order to maintain the wetland hydrology and rate of flow into the main tributary of Kilbride Creek, a similar flow control may be required at the inlet of the proposed culvert. It is assumed that such a structure will be included in the detailed design phase once the preferred alternative has been determined.

Alternative 1-A proposes an earthen/gravel slope from the roadway to the channel toe of slope. While the earthen portion of the slope would allow for vegetation planting along the slope, the earthen/granular slope would likely extend into the existing channel and wetland feature in order to achieve a stable slope grade, resulting in a loss of area in the wetland and may affect the channel cross-section and hydraulic behavior.

Table 7-1:
Summary of Preferred Design Concept Work Proposed and Potential Impacts

Natural Heritage Feature	Existing Culvert/ Structure or Conditions	Habitat Type	Proposed Work Required	Potential Impact and/or Changes
Wetland adjacent to Derry Road	• Wetland buffer limited to road shoulder and 2:1 gravelly vegetated slope to water's edge (approximately 1.5 m from road edge) • Direct road runoff input into wetland	• Fish, amphibian, mammalian and vifaunal	• Retaining wall constructed at pond (east) and wetland (west) edge with a guiderail protection and curb and gutter • Urban cross-section	• Marginal loss of existing wetland edge vegetation and habitat • Increased sedimentation during construction • Temporary noise disturbance through construction period • Loss of direct road drainage input • Potential change in wetland hydrology based on control structure
Main Tributary of Kilbride Creek (Bronte Creek)	• Stable channel bed with gravel/cobble substrate • Steep slope adjacent to Derry Road • Multiple culverts from wetland area	• Direct fish, amphibian and benthic invertebrate	• Replace culverts with 1000 mm concrete culvert • Retaining wall constructed at pond (east) and wetland (west) edge with guiderail protection and curb and gutter • Urban cross-section	• Potential change to the channel morphology • Increased sedimentation during construction • Potential increased flow capacity in culvert post-construction
Woodlands and Roadside Trees	• Woodlands within northern portion of study area adjacent to wetland and watercourse • Mature canopy and diverse habitat for wildlife	• Amphibians, insects, and mammals	• Minor tree removal of street trees along the southeastern edge of Derry Road (southern portion of study area), outside of the natural wooded areas	• No change in woodland function or wildlife habitat in proximity to the wetlands or watercourses • Temporary disturbance during construction

A summary of the potential impacts to the watercourse, wetland and adjacent woodland habitat is presented in **Table 7-1** above. The proposed changes are primarily focused on the Preferred Design Alternative (Alternative 1) as the culvert replacement, curb and gutter requirements and minor tree clearing and trimming is consistent among the proposed alternatives. The preferred alternative was selected in order to minimize the proposed road footprint beyond the existing road.

Installation of a retaining wall adjacent to the watercourse and wetland features at the northeastern end of the study area in combination with the urban cross-section will reduce the existing vegetation coverage. However, improved channel bank stability and reduced direct runoff will also result from the proposed alternative. Once the retaining wall is installed, aquatic plantings at the base of the wall is recommended to increase the in-water shade and habitat for aquatic organisms. As well, the substrate within the channel should not be altered. The proposed curb and gutter will minimize erosion and runoff directly into the wetland and watercourse, redirecting the runoff into the channel downstream. Potential impacts and habitat loss in the wetland and watercourse associated with the retaining wall can be addressed through additional plantings and habitat edge creation along the base of the wall.

Harmful alteration to fish habitat can be reduced through appropriate construction practices and through the use of bioengineering strategies for bank stabilization. The following mitigation measures will further assist in reducing a potential HADD to fish habitat:

- All work areas should be delineated with construction fencing to restrict the equipment and construction from potentially sensitive areas;
- All in-water construction activities should be implemented in the permitted time period to ensure that spawning fish and spawning habitat, eggs and fry are protected through the critical period. No work should occur in the water between September 15th to June 30th in any calendar year or as determined by the review agencies;
- Heavy equipment should be limited to stable areas and away from potentially soft banks;
- All culvert extensions should be countersunk to the depth of the existing culvert and backfilled with native material;
- All work should be completed under low flow and dry conditions and work areas should be isolated from flows during the construction phase;
- Fish should be removed from any area that may be isolated during the construction phase and released into the watercourse beyond the work area; and
- Best management practices related to materials storage, machinery operation and the movement of earth should be implemented during construction.

Although, the mitigation strategies detailed above will assist in reducing the potential harm to fish habitat, replacement of the culvert will not likely result in a loss to fish habitat. As such, compensation should not be required.

7.2.1.2 Stormwater Management and Erosion and Sedimentation Control

Currently, the stormwater from Derry Road enters the unnamed watercourse and wetland via direct runoff where there is no roadside ditch. The proposed road improvements will increase the amount of impermeable surface throughout the study reach. The preferred alternative design incorporates the installation of a curb and gutter collection system adjacent to the natural features. In order to control the runoff and maintain water quality, it would be beneficial for the road runoff to pass through a vegetated area prior to reaching the wetland and watercourse. A combination of engineered works and natural drainage attenuation on the downstream outlet portion of the watercourse may be effective in treating the excess storm water.

Increased erosion due to the exposure of soil is common through the construction phase, resulting in increased suspended sediments, which can have detrimental effects on the watercourse and wetland if conveyed by surface water runoff. Suspended and deposited sediment can have negative impacts on amphibian breeding pools, fish, fish habitat, and spawning areas. As well, increased sediment loads can result in changes in the channel equilibrium that may translate into downstream problems. For these reasons it is important that erosion and sediment control practices are clearly established and practiced throughout the construction phases to minimize the construction-related impacts on aquatic habitats and water quality.

Temporary erosion and sedimentation control measures may include, but are not limited to the following:

- Soils exposure time should be kept to a minimum;
- Silt fencing should be installed along the stream margins in areas of soil disturbance to minimize disturbance of these areas and to restricte the dumping of waste/fill materials in a potential erosion zone;
- Use of an erosion control blanket in areas of soil disturbance should be used to provide slope protection and stabilization; seeding, sodding, and mulching material can also be effective if applied appropriately; and
- In sensitive areas associated with the riparian buffers, the placement of the vegetation mats of native materials is effective at reducing erosion while quickly establishing stability to the bank.

Long-term strategies that control the overland flows, such as vegetated swales, rock check dams and rip-rap linings in ditches can also be effective at controlling excessive sediments from reaching the watercourses and will provide continued maintenance of the fish habitat and water quality for the watercourses within the study limits.

All temporary measures should remain in place until the natural vegetation is established on any exposed soils. Provided that the erosion and sedimentation control strategies are established

before construction begins, maintained throughout the construction phase and removed once the system is stable, there should only be minor effects on the surface water quality.

7.2.1.3 Terrestrial Ecosystems and Wildlife Habitat

There are no significant changes in the ecological form and function of the wetland and watercourse anticipated as a result of the proposed road improvements, and no rare, threatened or endangered plant species were identified directly within the proposed road improvements along Derry Road. Installation of the retaining wall at the wetland will incur minimal loss of habitat for local flora and fauna.

Based on field assessments, trees within NAI 9A will not be impacted by the proposed road improvements. The Preferred Design Alternative suggests that some trees in the southern portion of the study area may require trimming to accommodate the road improvements. Roadside trees consist primarily of sugar maple, Green Ash, Red Oak and Basswood. Given that the mature roadside trees are relatively close together, tree removal should be completed in a manner such that residual trees are not impacted through the removal phase.

The Migratory Bird Convention Act is federal legislation that is intended to protect and conserve migratory birds — as populations and individ¬ual birds — and their nests. Under the legislation, the protection of migratory birds and their nesting sites is regulated and may impact the construction windows for this project, specifically avoid the spring months when most birds are nests. Should the construction require the removal of a tree, it should be verified prior to removal that the tree does not provide for migratory bird nesting habitat.

Additional details related to the natural environmental features are provided in the *Natural Sciences Report* contained in **Appendix H**.

7.2.2 Environmental Monitoring

Environmental monitoring would occur in response to the request of applicable agencies and stakeholders in association with the in-water works to ensure compliance with Fisheries Act authorization and permits from Conservation Halton. It is recommended that all interested parties be included in the detail design process as they pertain to the potential alteration of fish habitat prior to initiating the construction phase of this project.

Environmental monitoring is proposed to ensure that mitigation measures are implemented before and during construction and to ensure the effectiveness of the measures to reduce or eliminate adverse impacts. In this regard, a qualified Environmental Inspector will be assigned to oversee the environmental components of construction. It will be the responsibility of the Environmental Inspector to:

- Advise construction personnel on environmental matters;
- Schedule and conduct on-site inspections of the construction zone to ensure that best management practices are instituted and in compliance with current environmental legislation, regulations, standards and policies and are being adhered to during construction and that construction activities comply with the project permits and the Region's environmental policies; and
- Monitor mitigation measures to ensure their efficacy, respond to unanticipated problems and take corrective actions.

In the event that the Environmental Inspector identifies activities or actions that are either causing environmental harm or are in contravention of legislation, permits or Regional policy, the Environmental Inspector will report these activities to Regional Staff for further action.

Upon completion of construction, a final clean-up of the site will be completed and a post-construction environmental inspection will be undertaken one year after completion to confirm that disturbed areas have been restored to their original condition and that storm water management facilities are functioning.

7.3 Social Environment

In terms of the existing residential and business community, the proposed undertaking would maintain overall access from Derry Road and provide accommodation for active transportation modes through the installation of partially paved shoulders within the limits of the undertaking.

The following are descriptions of those social environmental effects, the proposed mitigation measures and commitments that the Region will undertake as part of implementation.

7.3.1 Property Requirements and Access

Proposed access and property requirements are discussed in Section 6.1.5 and 6.1.11, respectively. Affected property owners will be consulted during the detail design stage to address mitigation measures, property purchase and additional project details, as required. Due to the minor amount of property that is required to accommodate the roadway improvements, it is anticipated that mitigation measures for property impacts will be minor in nature.

7.3.2 Community/Recreation

As there are no existing community facilities within the limit of the undertaking potential impacts will be limited to the existing residential homes fronting Derry Road. Residents will experience some disruption during the construction stage; however, these disruptions should be short-term, with access maintained at all times.

7.3.3 Noise

As part of an Environmental Assessment Study for a new or widened road, an assessment of potential noise impacts is required. The assessment is done in accordance with the Ministry of Transportation (MTO)/Ministry of the Environment (MOE) Noise Protocol.
For the purpose of assessing noise as part of a road expansion project, MTO defines a Noise Sensitive Area (NSA) as a noise sensitive land use with an outdoor living area, which includes:

- Single family house – typical backyard;
- Townhouse – typical backyard;
- Multiple unit buildings such as apartments with outdoor living areas for use by all occupants;
- Hospitals, nursing homes, where there are outdoor living areas for the patients.

Based on the MTO and MOE Noise Protocol, where a new or expanded roadway is proposed adjacent to a NSA, it is required that the future noise level with and without the facility be compared. Where increases in noise levels are predicted, the following actions are recommended:

- 0 to 5 dBA increase – no action required; and
- Greater than 5 dBA – investigate noise control measures within the right-of-way.

Where introduced, noise control measures should achieve a minimum of 5 dBA attenuation over the first row of receivers. Noise control measures should mitigate to ambient, as administratively, economically and technically feasible.

Roadway noise, like most noise, varies throughout the day. Therefore, the noise descriptor used in Ontario to assess noise is the equivalent sound, Leq. Leq is identified as the continuous sound level which has the same energy as a time varying noise level over a specified time period. The Ministry of the Environment (MOE) uses the 16 hour period between 7 a.m. and 11 p.m. for the assessment of municipal roadway noise.

Traffic volume data was utilized from the traffic analysis as prepared by R and R Associates Inc. provided in **Table 7-2**. The AADT and 7 a.m. to 11 p.m. traffic forecasts were estimated from this data by adjusting the forecasts for the peak hour to give 16 and 24 hour averages using daily traffic variation assumptions provided in the traffic assessment.

Table 7-2: Traffic Volume Data
Derry Road Corridor
Conservation Road to 1 km north of Derry Road

Characteristic	Existing (2008)	Future 2021
Existing (km/hr)	60	-
Future (km/hr) [11]		60
ADT (vpd)	3,250	4,630
AM Peak Hour (vph)	300	430
PM Peak Hour (vph)	380	540
Cars (%)	97.2	96.0
Small Trucks (%)	1.2	2.0
Medium Trucks (%)	1.0	1.0
Heavy Trucks (%)	0.6	1.0

Calculations were performed using the MOE Stamson (Version 5.0) prediction at the outdoor living areas. *Points of Reception* were selected typical of the NSAs along the both sides of Derry Road which are adjacent to the Study area.

Two scenarios were compared under the future conditions:

- 2021 future conditions without any improvements to Derry Road; and
- 2021 future conditions with improvements to Derry Road.

Table 7-3 summarizes the results from the noise modelling.

[11] Assumed future speed limit.

Table 7-3: Noise Assessment Results

Receptor Location	Existing Year 2008 Leq (dBA)	Future Year 2021 (With Improvements) Leq (dBA)	Future Year 2021 (Without Improvements) Leq (dBA)
R1	37	39	39
R2	45	47	47
R3	46	48	48
R4	46	48	48
R5	46	48	48
R6	44	46	46
R7	44	46	46
R8	40	42	42
R9	49	51	51
R10	42	44	44

The projected noise level changes as a result of reconstructing Derry Road are calculated to be less than a 2dBA increase at all Receivers. As the change in noise levels is predicted to be less than 5 dBA, consideration of noise mitigation is not required based on MTO and MOE criteria.

7.3.3.1 Ambient Sound Levels

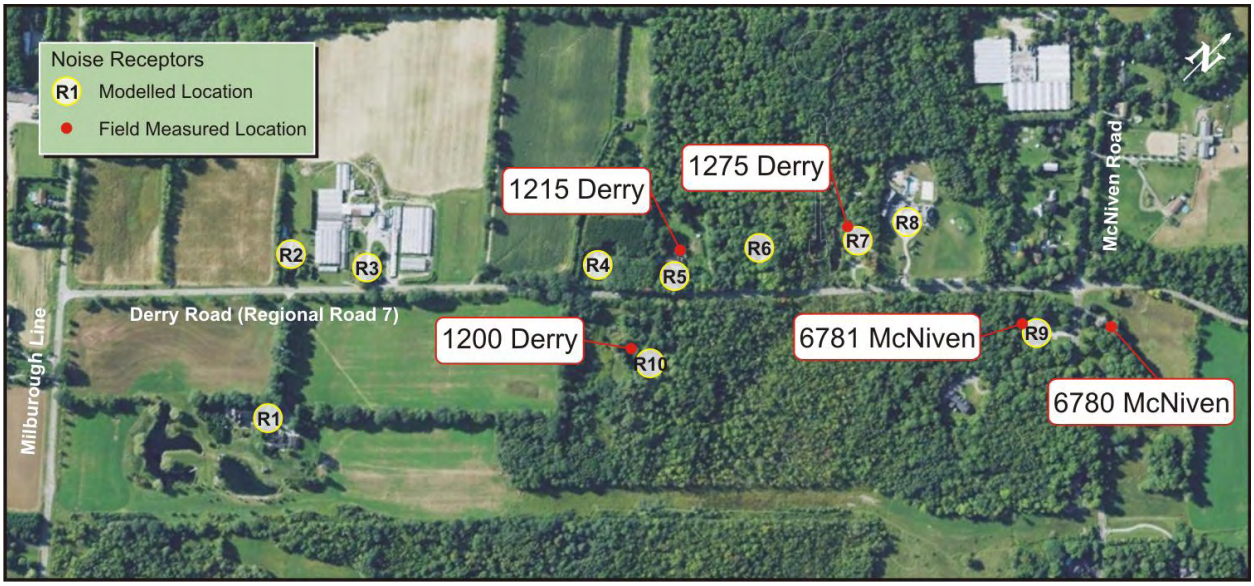
Based on input received from the public during the second PIC, ambient sound level monitoring was carried out at five locations on June 8, 2010. The locations were chosen based on responses to written permission to enter requests sent to residents within the Derry Road study limits. The monitoring was undertaken with the purpose of confirming the computer-modelled estimates of the daytime (Leq Day) sound exposures in the rear yard amenity area. Additional 24-hour traffic counts were also undertaken and used to correlate the field measured results against the computer-modelled ambient noise levels. The location of the modeled and noise receptors as measured in the field are illustrated in **Figure 7-1**.

The measurement results and the sound exposure prediction results (i.e. computer-modelled results) for the same time period, using the traffic count information indicated the following:

- The noise prediction model tended to overestimate the resultant sound exposures although the results correlated very well with the field measured sound exposure levels;
- At a few locations for a few time periods, the field measured sound exposure levels were higher than the predicted sound exposure levels. This was likely due to other sound sources that were present during the measurement period; and

- The measured sound exposure levels were consistent with the existing sound exposure levels calculated using STAMSON V5.04-ORNAMENT, the computerized road traffic noise prediction model of the Ministry of the Environment (MOE)

Figure 7-1: Location of Modelled and Field Measured Noise Receptors



The results of the ambient sound monitoring indicated that the sound levels discussed in Section 7.3.3 were accurately predicted and therefore noise mitigation is not required in accordance with the MOE/MTO Protocol and Halton Region's Noise Abatement Policy. The ambient sound level measurements are provided in **Table 7-4**.

In almost every case, the field measured noise readings closely matched the existing noise levels as modelled. The predicted future noise levels were determined based on future traffic volumes anticipated for the Derry Road corridor (i.e. a 3% growth rate per year).

Table 7-4: Ambient Sound Measurement Results

Receptor	Address	Existing eqL (dBA)	Time Period	Predicted eqL (dBA)	Measured eqL (dBA)
R5	1215 Derry Road	46	1115 to 1145	47	46
			1145 to 1215	47	45
			1215 to 1245	43	42
			1245 to 1315	44	45[(1)]
			1315 to 1345	45	44
			Average[(5)]	**45**	**44**

Table 7-4: Ambient Sound Measurement Results

Receptor	Address	Existing eqL (dBA)	Time Period	Predicted eqL (dBA)	Measured eqL (dBA)
R7	1275 Derry Road	44	0820 to 0850	47	49(1)
			0850 to 0920	44	45(1)
			0920 to 0950	46	46
			0950 to 1020	47	45
			1020 to 1050	47	45
			Average(5)	**46**	**46**
R9	6781 McNiven Road	49	0830 to 0900	52	50
			0900 to 0930	50	48
			0930 to 1000	52	48(2)
			1000 to 1030	52	49(2)
			1030 to 1100	53	48(2)
			Average(5)	**52**	**49**
R10	1200 Derry Road	42	1130 to 1200	43	43
			1200 to 1230	41	41
			1230 to 1300	42	42
			1300 to 1330	40	44(1)
			1330 to 1400	43	40
			Average(5)	**42**	**42**
New	6780 McNiven Road	49	0800 to 0830	56	53
			0830 to 0900	52	52
			0900 to 0930	50	51
			0930 to 1000	51	51
			1000 to 1030	52	52
			Average(5)	**52**	**52**

Notes:

(1) Existing sound exposure from the original noise report.
(2) Predicted sound exposure for the indicated time period using the ORNAMENT model and the actual traffic counts.
(3) Measured sound exposure for the indicated period of time.
(4) Measured sound levels are higher than predicted due to noise sources other than road traffic on Derry Road. Aircraft activity was observed.
(5) The average is the numerical average of the above five results.
(6) Predicted levels are 3 dBA or greater, more than the measured levels. It is likely that there is more acoustical screening, likely due to dense woods, than has been accounted for in the assessment.

Additional information related to the ambient noise level measurements is provided in **Appendix I**.

7.3.3.2 Construction Noise

Construction noise is temporary noise and depends on the type of work required. The impact of construction noise depends on the type of equipment used, number of pieces of equipment, time and duration of operation and the proximity to noise sensitive receivers in question. Derry Road, along the extent of the project, is located at the boundary between the City of Burlington and the Town of Milton. Therefore, the noise control by-laws for the City of Burlington (By-law Nos. 19-2003 and 49-2008) and the Town of Milton (By-law No. 16-84) apply.

The following summarizes the applicable sections of the City of Burlington Noise Control By-law concerning construction noise:

> *5.(1) "No person shall emit or cause or permit the emission of sound resulting from any act listed in Schedule 1 – General Prohibitions, and which sound is clearly audible at a point of reception."*

Item 7 in Schedule 1 prohibits *"the operation of any item of construction equipment without effective muffling devices in good working order and in constant operation"*.

> *5.(2) "No person shall emit or cause or permit the emission of sound resulting from any act listed in Schedule 2 – Time and Place Prohibitions, if clearly audible at a point of reception located in any area of the municipality specified within a prohibited time shown for such an area".*

Item 8 in Schedule 2 prohibits *"the operation of any construction equipment in connection with construction"* between 7:00 p.m. and 7:00 a.m. and all day on Sunday and Statutory holidays.

> *6.(2) No person shall emit or cause or permit the emission of any sound from any piece of construction equipment referred to in Schedule 4 – Publications, Publication NPC-115, at a work site, any part of which is located within 600 m of a residential area, unless:*
>
> *a) the piece of construction equipment was put into use prior to January 1, 1979; or*
>
> *b) the piece of construction equipment bears a label affixed by the manufacturer or distributer which states:*
>
> *i) the year of manufacture; and*
>
> *ii) that the item of equipment complies with the residential sound emission standards set out in Schedule 4 – Publications, Publication NPC-115, as applicable to that type of equipment and date of manufacture; or*

c) the owner, operator, manufacturer or distributor provides proof that the item of equipment complies with the residential sound emission standard set out in Schedule 4 – Publications, Publication NPC-115 as applicable to that type of equipment and date of manufacture."

The following summarizes the applicable sections of the Town of Milton Noise Control By-law (No. 16-84) concerning construction noise:

3 q) "Any noise that disturbs or is likely to disturb persons in any office, hospital or in any dwelling, hotel or other type of residence, or of any persons in the vicinity arising between the hours of 2100 hours of one day and 0700 hours of the next following day from an excavation, quarry or construction work whatsoever, including the erection, demolition, alteration or repair of any building."

7.3.3.3 Construction Noise Mitigation Measures

- It is recommended that the noise control by-law for the City of Burlington (By-law Nos. 19-2003 and 49-2008) and Town of Milton Noise Control By-law (No. 16-84) be obeyed. Exemptions, where required, will be applied for through the municipality and should be included in the construction contract documents.
- General noise control measures will be referred to, or placed into construction contract documents. The following constraints addressing construction equipment operation and maintenance should be included in the construction contract documents:
    - *Equipment Maintenance*: Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffling systems, properly secured components and the lubrication of moving parts; and
    - *Equipment Operation*: Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
- Any initial complaint from the public will require verification that the general noise control measures agreed to are in effect, any noise concerns will be investigated, and the contractor warned of any problems.
- Notwithstanding compliance with the "general noise control measures", a persistent complaint will require a contractor to comply with the MOE sound level criteria for construction equipment contained in the MOE Model Municipal Noise Control By-law. Subject to the results of field investigation, alternative noise control measures may be required, where these are reasonably available.

Additional information on the *Environmental Noise Assessment Reports* is provided in **Appendix I**.

7.3.4 Air Quality

As part of Halton Region Transportation Master Plan (HTMP) 2004, the Region has developed an *Air Quality Management Strategy* to proactively address air quality as part of its overall roadway system rather than on a project specific basis. The strategy includes a number of initiatives. It is the Region's intent that the initiatives be taken together in addressing air quality issues as part of their air quality management strategy.

7.4 Cultural Environment

7.4.1 Archaeological Assessment

As part of the Derry Road Transportation Corridor Improvements Class EA study, a Stage 1 Archaeological Assessment (background research and property inspection) was undertaken to determine potential impacts to existing archaeological resources.
The Stage 1 Archaeological Assessment determined that six archaeological sites have been registered within one kilometre of the Derry Road study corridor, none of which are located immediately adjacent to it. Additionally, a review of the general geography and local nineteenth century land use of the study corridor suggested that it has potential for the identification of Aboriginal and Euro-Canadian archaeological sites.

Based on the results of the property inspection, it was determined that the Derry Road right-of-way has been subject to extensive and deep land alterations. Portions of the study corridor, adjacent to the right-of-way consist of rocky uneven terrain or can be characterized as low and wet. However, minimal disturbances have occurred along portions of the study corridor.

7.4.1.1 Mitigation Recommendations

Based on the Stage 1 Archaeological Assessment results, recommendations were made as follows:

- The existing Derry Road right-of-way does not retain archaeological site potential due to previous ground disturbances. Portions of the study corridor, adjacent to the right-of-way consist of rocky uneven terrain or can be characterized as low and wet. Additional archaeological assessment is therefore not required along these portions of the study corridor; and
- If construction extends beyond the disturbed right-of-way, a Stage 2 assessment is recommended on any lands within the study corridor where there is potential for archaeological sites, in accordance with Ministry of Culture's *2009 Draft Standards and Guidelines for Consultant Archaeologists*.

In addition, compliance with the following legislation was recommended as follows:

- 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
- The Cemeteries Act requires that any person discovering human remains must immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Consumer Services.
- As part of the Class Environmental Assessment process, the Stage 1 Archaeological Assessment was provided to the First Nations for information purposes. In the event that aboriginal remains or significant artifacts are uncovered during the construction phase, all work activities will be ceased to minimize further disturbance to the area and the appropriate authorities will be notified, including the First Nations, of the archaeological discovery. Halton Region will not resume work activities until all issues have been satisfactorily addressed.

The details of the *Stage 1 Archaeological Assessment Report* is provided Section 3.4.1 and in ***Appendix J***.

7.4.2 Built Heritage Assessment

As part of the Derry Road Transportation Corridor Improvements Class EA study, a Cultural Heritage Resource Assessment was undertaken to determine potential impacts to existing heritage resources.

A review of background historical research and heritage inventories maintained by the City of Burlington, Town of Milton and City of Hamilton confirmed that the study corridor is historically located on part of Lots 10 and 11, Concession I and II, in the former Township of Nelson, Halton County and retains a select number of cultural heritage resources. The Township of Nelson experienced Euro-Canadian settlement activities in the early nineteenth century, and by the end of the century, the township had flourished as an ideal place for agricultural land use activities. The 1877 historical atlas maps confirms that lands adjacent to the study corridor had been cleared and developed for agricultural and industrial purposes and features a range of structural and landscape features, such as a lime kiln, a mill or manufactory, a water crossing, farmsteads, and orchards.

The results of the field review confirmed that the study corridor retains visual, landscape, and structural reminders of this rural nineteenth century land use history. Four cultural heritage resources were identified adjacent to the Derry Road right-of-way (Refer to *Table 2* in **Appendix**

J of the *Cultural Heritage Resource Assessment Report* for a complete description of the existing heritage resources). The following provides a summary of the field review findings:

- A total of four cultural heritage resources were identified in the study corridor which included four cultural heritage landscapes (CHL);
- Identified cultural heritage resources include two farmsteads (CHL 1 and CHL 2) and two tree and fence lines (CHL 3 and CHL 4).
- A total of two cultural heritage resources located in or adjacent to the study corridor have been listed on the City of Hamilton's and City of Burlington's heritage inventories (CHL 1 and CHL 2);
- Two cultural heritage resources located in the study corridor were identified during the field review based on their contribution to the setting and context of the corridor (CHL 3 and CHL 4); and
- No properties located in the study corridor have been designated under the Ontario Heritage Act.

7.4.2.1 Mitigation Recommendations

Based on the results of the field review and identification of potential impacts, the following mitigation measures are recommended:

- Road improvements should be suitably planned in a manner that avoids identified, above ground, cultural heritage resources;
- Wherever possible, historic roadscapes should be maintained through the use of landscaping with historic plant materials for berms or vegetative screens, and hedge rows should be preserved where in existence; and
- When detailed road improvements plans are complete, specific impacts of the undertaking should be identified and appropriate mitigation measures developed, where required.

The details of the *Cultural Heritage Resource Assessment Report* are provided in Section 3.4.2 and **Appendix J**.

7.5 Design and Construction Considerations

The mitigation of construction impacts will follow the *Environmental Construction Guidelines for Municipal Road, Sewage and Water Projects*, issued by the Municipal Engineers Association.

7.5.1 Potential Impacts During Construction

The following sections describe the potential environmental impacts during construction and the proposed mitigation measures. The following potential adverse effects were identified, where applicable:

- Protection of existing vegetation;
- Construction noise and air quality;
- Disruption to vehicular traffic during construction; and
- Mud and dust control during construction.

The mitigation and monitoring conditions included in the following sections indicate a commitment on the part of the Region to mitigate potential environmental impacts and undertake a monitoring program during and after construction.

During the detail design stage and prior to the construction stage, the Region will be responsible for obtaining approval from the Ministry of the Environment for stormwater management works. Permit approval may be required from Conservation Halton for all culvert installations within regulated areas pursuant to Ontario Regulation 162/06.

All works associated with the proposed undertaking will be executed in such a manner, which to the fullest extent possible, minimizes any adverse effects on the natural environment within the project area. The Contractor will be responsible to ensure that his personnel are sufficiently aware and instructed that the work is to be carried out in a manner consistent with minimizing environmental impacts. Environmental monitoring of the Contractor's activities and compliance with environmental objectives will be undertaken by the Region's Environmental Inspector (Refer to Section 7.2.2).

7.5.2 Disposal of Excess Material

Surplus excavated material shall be removed to locations arranged by the Contractor. Prior to the disposal of any surplus excavated material, the Contractor will provide the Engineer with a sketch of the dumping site(s) and indicate how and when the site can be accessed including any required site restrictions. A written statement from the property owner(s) agreeing to allow the disposal of fill on the property must be approved by the Engineer. Furthermore, the placement of fill within any swamp, ravine or floodplain will require the written approval of Conservation Halton.

The Contractor will be responsible for obtaining all approvals from applicable authorities.

Upon completion of the disposing, levelling and grading of surplus excavated material on any property, the Contractor shall obtain a written statement from the property owner(s) releasing

the Contractor and Region from any claims and accepting the condition of the property as satisfactory.

7.5.3 Measures for Proper Tree Removal and Preservation of Residual Plant Communities

Minimum measures for proper tree removal and preservation of residual plant communities shall include the following:

- A Tree Protection Plan should be developed during the detail design stage. This plan will provide guidelines for protecting trees during construction, as well as minimizing soil compaction and making wise use of the removed timber resource. The plan should also include recommendations for during and post-construction maintenance including hazard tree monitoring, pruning, insect and disease control, aerating, watering and mulching;
- The Contractor shall not damage or remove any trees or shrubs on the road allowance or adjoining lands unless the Engineer or his/her representative shall otherwise direct. Trees and shrubs which require trimming or tying back should be trimmed or tied back in advance of construction under the direction of the Engineer;
- Adjacent to vegetated areas, the cut and fill slope limits will be identified and a temporary fence should be erected. This will restrict the construction work area, protect the root zone of trees from damage and avoid soil compaction during construction. Temporary fence will be erected around the drip line of trees to be retained; and
- Any trees to be removed from properties in Halton Region, the Town of Milton or City of Burlington will require prior approval in accordance with applicable Region, Town or City by-laws and procedures. Trees will be felled away from the residual stand to avoid damage. Tree removal should be conducted by a qualified firm experienced in the tree cutting operations.

7.5.4 Mud and Dust Control

The Contractor shall take such steps as may be required to prevent dust nuisance resulting from construction operations. The Contractor shall be responsible for all dirt and mud that is tracked onto the roadways from vehicles entering or leaving the job site. The contractor shall, upon request from the Engineer, immediately proceed with clean-up operations, or in the opinion of the Engineer, the Contractor has not or cannot sufficiently remove the mud from the road, the Engineer will proceed with the necessary clean-up.

7.5.5 Traffic Control

Construction Staging – It is anticipated that Derry Road will be constructed in one or two stages. Temporary, short-term lane closures may be required during the construction stage.

Local Traffic – The Contractor shall provide access for local residents and businesses who currently have access from Derry Road and Milburough Line/McNiven Road (where applicable).

Construction Signs – The Contractor shall apply, place and maintain all barricades, warning signs, delineators and flashing lights necessary for the protection of the public and the work, including warning signs of construction operations in accordance with the Ministry of Transportation's Temporary Condition Manual (March 2001), Book 7 for all temporary traffic control issues for both short and long term durations.

Flagging – The Contractor shall, when directed by the Engineer, supply an adequate number of traffic control persons to direct traffic during construction, also in accordance with Ministry of Transportation's Temporary Condition Manual (March 2001), Book 7 and as directed by the Engineer.

7.6 Monitoring and Maintenance

The Region will ensure that the environmental protection recommendations described in Sections 7.2 through 7.5 and other subsequent agency approval conditions are complied with during the construction stage.

7.7 Mitigation Measures and Detailed Design Commitments

Environmental concerns, anticipated impacts, and proposed mitigation measures as they relate to the project, have been described in Section 7. Many of the environmental concerns have been mitigated through the process by which the recommended design was selected, as described in the ESR. This section provides a detailed list of specific commitments to be carried forward into Phase 5 of the Municipal Class EA process—Implementation Phase. These commitments have been developed through consultation with various agencies throughout the study process.

Specific mitigation measures have been selected and committed to by Halton Region to address potential impacts as discussed throughout Section 7. It is recommended that these commitments, as presented in the ESR, become part of the contract package so that contractors are aware of the requirements prior to tendering. Monitoring of construction activities must ensure that all environmental standards and commitments for construction are met. Halton Region will work with Conservation Halton and other authorities, during detail design and prior to the start of construction to ensure that the proposed works are acceptable and to obtain required permits.

Environmental monitoring will be combined with construction supervision to include periodic site visits and inspections throughout the course of the work.

Table 7-5: Detailed Design Commitments

No.	Description of Detailed Design Commitment
	Fisheries and Aquatic Ecosystems
1.	All work areas should be delineated with construction fencing to restrict the equipment and construction from potentially sensitive areas.
2.	All in-water construction activities should be implemented in the permitted time period to ensure that spawning fish and spawning habitat, eggs and fry are protected through the critical period. Any in water work must occur between July 1st and September 15th.
3.	Heavy equipment should be limited to stable areas and away from potentially soft banks.
4.	All culvert extensions, where applicable, should be countersunk to the depth of the existing culvert and backfilled with native material.
5.	All work should be completed under low flow and dry conditions and work areas should be isolated from flows during the construction phase.
6.	Fish should be removed from any area that may be isolated during the construction phase and released in the watercourse beyond the work area.
7.	Best management practices related to materials storage, machinery operation and the movement of earth should be implemented during construction.
	Stormwater Management and Erosion and Sedimentation Control
8.	Soils exposure time should be kept to a minimum.
9.	Silt fencing should be installed along the stream margins in areas of soil disturbance to minimize disturbance of these areas and restricted dumping of waste/fill materials in a potential erosion zone. Silt fencing should also be installed along wetland areas, where required. The document, "Sediment Control Guideline for Urban Construction" should be consulted during the detailed design phase.
10.	Use of an erosion control blanket in areas of soil disturbance should be used to provide slope protection and stabilization; seeding, sodding, and mulching material can also be effective if applied appropriately. Slopes should be revegetated with locally native, non-invasive species suitable for the site condition.
11.	In sensitive areas associated with the riparian buffers, the placement of the vegetation mats of native materials is effective at reducing erosion while quickly establishing stability to the bank.
12.	For longer term requirements in controlling the overland flows, vegetated swales, rock checks and rip-rap linings in ditches should be used for controlling excessive sediments from reaching the watercourses. Other alternative measures for controlling overland flows and salt removal prior to entering the natural heritage areas should be investigated during the detailed design phase. The need and use of oil/grit separators as pipe end treatments for the storm sewer and culverts should be investigated during the detailed design phase.
13.	All temporary measures should remain in place until the natural vegetation is established on any exposed soils.
14.	The contractor will identify a contingency plan for accidental sediment release.
15.	A hydrogeotechnical study should be undertaken during the detailed design phase as part of the roadway geotechnical evaluation to examine potential impacts to drainage infrastructure and provide mitigation measures to prevent any negative surface groundwater interactions where required. The geotechnical investigation should also investigate overburden, bedrock depth, groundwater table depth, and the potential for karst formations. Where required, groundwater protection measures will be recommended to ensure that the groundwater resources are not harmed or impacted.
16.	As part of the detailed design, the installation of a new culvert (located west of the existing culvert at approximate Station 1+310 – Preliminary Design) should be investigated to connect the watercourse on the south side of Derry Road directly with the watercourse on the north side of the road with the existing pond taken offline with the exception of an overflow connection for higher water level conditions. The existing culvert should then be removed.
	Terrestrial Ecosystems and Wildlife Habitat

Table 7-5: Detailed Design Commitments

No.	Description of Detailed Design Commitment
17.	A Tree Preservation Plan should be prepared during the detailed design stage, identifying the amount of vegetation to be removed throughout the project limits. Tree removal should be completed in phases so as to not pre-stress the interior trees. Tree removal from the woodlot edge should not involve any heavy equipment to minimize damage to the remaining trees.
18.	Opportunities to minimize the amount of vegetation to be removed from adjacent wetlands/woodlands should be investigated. This may include minimizing grading works and limiting side slope dimensions.
19.	Consideration should be given to the provision of an ecopassage(s) where feasible. Design details of the ecopassage(s) should be determined in consultation with Conservation Halton and the Ministry of Natural Resources.
20.	The timing of construction works should adhere to the Migratory Bird Convention Act, particularly with respect to breeding bird season.
	Environmental Monitoring
21.	The Region will commit to have an Environmental Inspector on site during the construction phase as a condition of any required permits issued by CH or other permitting authorities.
	Construction Noise Mitigation Measures
22.	The noise control by-law for the City of Burlington (By-law Nos. 19-2003 and 49-2008) and the Town of Milton (By-law No. 16-84) should be obeyed. Exemptions, where required, will be applied for through the municipality and should be included in the construction contract documents.
23.	General noise control measures will be referred to, or placed into construction contract documents. The following constraints addressing construction equipment operation and maintenance should be included in the construction contract documents: • Equipment Maintenance: Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffling systems, properly secured components and the lubrication of moving parts; and • Equipment Operation: Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
24.	Any initial complaint from the public will require verification that the general noise control measures agreed to are in effect, any noise concerns will be investigated, and the contractor warned of any problems.
25.	Notwithstanding compliance with the “general noise control measures”, a persistent complaint will require a contractor to comply with the MOE sound level criteria for construction equipment contained in the MOE Model Municipal Noise Control By-law. Subject to the results of field investigation, alternative noise control measures will be required, where these are reasonably available.
	Air Quality
26.	Apply water and dust suppressants during construction to protect air quality due to dust.
	Archaeology
27.	If construction extends beyond the disturbed right-of-way, a Stage 2 assessment is recommended on any lands within the study corridor where there is potential for archaeological sites, in accordance with Ministry of Culture’s 2009 Draft Standards and Guidelines for Consultant Archaeologists.
28.	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
29.	In the event that aboriginal remains or significant artifacts are uncovered during the construction phase, all work activities will be ceased to minimize further disturbance to the area and the appropriate authorities will be notified, including the First Nations, of the archaeological discovery.
	Built Heritage

Table 7-5: Detailed Design Commitments

No.	Description of Detailed Design Commitment
30.	Historic roadscapes should be maintained through the use of landscaping with historic plant materials for berms or vegetative screens, and hedge rows should be preserved.
31.	Specific impacts of the undertaking should be identified and appropriate mitigation measures developed, including, but not limited to, requirements for heritage impact assessments, documentation reports, and/or buffering strategies.
	Materials Management
32.	A construction work plan should be developed which designates locations for stockpiling of soils and other materials including fuel. Prior to the commencement of construction, the limits of protection areas will be delineated and fenced to avoid inadvertent intrusion of machinery or other activities such as stockpiling of excess materials. This fencing should be maintained and remain in place until final grading and landscaping has been completed. There will be no dumping of excess fill within Conservation Halton's regulated area.
33.	All excavated materials requiring stockpiling will be in accordance with OPSS 180.07.06 and placed in predetermined locations. The perimeters of stockpiles will be encircled with silt fencing, according to OPSD 219.110.
	Other
34.	Utility relocations should be undertaken in consideration of the sensitivity of the surrounding natural environment and be carried out in such a way so as to minimize any negative impacts to the environment.
35.	Development within Conservation Halton's regulated area requires permission pursuant to Ontario Regulation 162/06 and must meet the policies within Conservation Halton's Policies, Procedures and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document, April 27, 2006. All required permits, including any Department of Fisheries and Oceans (DFO) Authorizations, will be obtained prior to the commencement of the construction phase.
36.	Contractors should be certified in Erosion and Sedimentation Control as a condition of any required permits issued by CH or other permitting authorities.
37.	A detailed survey should be undertaken as part of the detailed design process, indicating the exact proximity between adjacent watercourse(s) and the roadway. The detailed survey should be utilized during the design process to determine the location of the proposed retaining wall adjacent to Kilbride Creek.
38.	As part of the detailed design phase, other approaches should be explored to minimize the potential impacts to Kilbride Creek including shifting of the horizontal road alignment, vegetative approaches to bank stabilization, incorporating vegetative cover into the design of the proposed retaining wall, and the exploration of the potential to improve the width to depth ratio of Kilbride Creek adjacent to the roadway through a fluvial geomorphological study.
39.	Alternative construction methods related to the proposed retaining wall structure should be investigated during the detail design stage in order to avoid in-water works, wherever possible.