

FINAL REPORT

UEM PROJECT NO. 14-508

HALTON REGION PROJECT NO. PR2876

DATE: MAY 2016

PREPARED FOR:

HALTON REGION

HALTON REGION CONTACT:

ALICIA JAKAITIS, ACTING SENIOR TRANSPORTATION PLANNER

TRANSPORTATION PLANNING— INFRASTRUCTURE PLANNING AND POLICY

PUBLIC WORKS, HALTON REGION

ENVIRONMENTAL STUDY REPORT

SCHEDULE 'C' CLASS ENVIRONMENTAL ASSESSMENT STUDY
NINTH LINE (REGIONAL ROAD 13) TRANSPORTATION CORRIDOR IMPROVEMENTS
FROM HIGHWAY 407 TO 10 SIDE ROAD (REGIONAL ROAD 10)
IN THE TOWN OF HALTON HILLS, REGIONAL MUNICIPALITY OF HALTON





May 12, 2016
UEM Project No. 14-508

Alicia Jakaitis
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Dear Ms. Jakaitis:

**Re: Schedule 'C' Class Environmental Assessment Study – Final Environmental Study Report
Ninth Line (Regional Road 13) Transportation Corridor Improvements from Highway 407
to 10 Side Road (Regional Road 10), Halton Hills, Regional Municipality of Halton
Halton Region Project No. PR2876**

Attached please find the Environmental Study Report (ESR) for the Ninth Line (Regional Road 13) Transportation Corridor Improvements from Highway 407 to 10 Side Road (Regional Road 10). The Ninth Line Class EA Study was completed as a Schedule 'C' Class EA in accordance with the Municipal Engineer's Association (MEA) Municipal Class Environmental Assessment Document (October 2000, as amended in 2007 & 2011).

We thank you for the opportunity to assist Halton Region in the undertaking of this study.

Yours very truly
URBAN & ENVIRONMENTAL MANAGEMENT INC.

A handwritten signature in blue ink, appearing to read 'Alvaro L. Almuina', is written over the company name.

Alvaro L. Almuina, P.Eng., M.Eng., PMP, DCE
Project Manager

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List of Acronyms

AANDC	Aboriginal Affairs and Northern Development Canada
ANSI	Area of Natural or Scientific Interest
ATMP	Active Transportation Master Plan
BSC	Bird Studies Canada
Class EA	Class Environmental Assessment
COSSARO	Committee on the Status of Species at Risk in Ontario
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CO ₂ e	Carbon Dioxide Equivalent (a unit of measure)
dba	Decibels
EA	Environmental Assessment
EA Act	Environmental Assessment Act
ESA	Environmentally Sensitive Area
ESR	Environmental Study Report
GGH	Greater Golden Horseshoe
GHG	Greenhouse Gas
GTHA	Greater Toronto and Hamilton Area
HHCP	Halton Hills Cycling Plan
IO	Infrastructure Ontario
LOS	Level of Service
MAA	Ministry of Aboriginal Affairs
MEA	Municipal Engineers Association
MOECC	Ministry of Environment and Climate Change
MNRF	Ministry of Natural Resources and Forestry
MTCS	Ministry of Tourism, Culture and Sport

MTO	Ministry of Transportation
NHIC	Natural Heritage Information Centre
NSA	Noise Sensitive Area
OBBA	Ontario Breeding Bird Atlas
OLA	Outdoor Living Area
OPIF	Ontario Partners in Flight
ORNAMENT	Ontario Road Noise Analysis Method for Environment and Transportation
OTM	Ontario Traffic Manual
Phase I ESA	Phase I Environmental Site Assessment
PIC	Public Information Centre
PPS	Provincial Policy Statement
PSW	Provincially Significant Wetland
RGA	Rapid Geomorphic Assessment
ROW	Right-of-Way
ROPA	Regional Official Plan Amendment
RR	Regional Road
RTP	Regional Transportation Plan
TAC	Technical Agency Committee
TDM	Travel Demand Management
TMP	Transportation Master Plan
UAB	Urban Area Boundary
v/c Ratio	Critical Volume-to-Capacity Ratio

EXECUTIVE SUMMARY

Environmental Assessment Study

In April 2014, Halton Region (the Region) commenced a Schedule 'C' Class Environmental Assessment (EA) to identify roadway improvements for the Ninth Line (Regional Road 13) corridor in the Town of Halton Hills, pursuant to the Municipal Class EA process (MEA October 2000, as amended in 2007 & 2011), which is an approved process under the Ontario Environmental Assessment Act (EA Act). The purpose of the Class EA study was to address roadway improvements, taking into consideration the future transportation needs within the corridor and the potential impacts on the natural, socio-economic and cultural environments.

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 2007 & 2011) for Schedule 'C' projects. The ESR documents the planning and decision making process, including public consultation, to determine the preferred design. The ESR also sets out the mitigation measures proposed to avoid or minimize environmental impacts. Specifically, this ESR documents:

- Study Background;
- Need and Justification;
- Identification of Problem and Opportunities;
- Identification of the Analysis and Evaluation of Preliminary Design Alternatives;
- Preferred Design;
- Public Consultation; and
- Mitigating Measures and Future Commitments.

Study Background

Ninth Line is a rural north-south oriented two-lane arterial road beginning at Upper Middle Road in the Town of Oakville extending north to 10 Side Road in the Town of Halton Hills. Located near the eastern limits of Halton Region, Ninth Line traverses from the Town of Oakville in the south to rural in the Town of Halton Hills to the north providing Regional connection.

There are several planning projects in the vicinity of the study area that were considered as part of this study, which include the following:

Vision Georgetown	In response to the requirements of the Growth Plan, Provincial Policy Statement (PPS), and Greenbelt Plan, the Town of Halton Hills initiated the Vision Georgetown study to develop a growth management and land use response to these provincial planning policy frameworks. The Preferred Growth Option projects that the area will see population growth of 20,000 residents. The Vision Georgetown study area is located northwest of the Ninth Line corridor.
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Premier Gateway Employment Area	The southernmost portion of the study area surrounding Steeles Avenue is designated as the second phase of development in the Town of Halton Hills <i>Premier Gateway Employment Area</i> (Official Plan Amendment (OPA) 10) / Halton Region <i>401/407 Employment Area</i> for prestige industrial uses (Regional Official Plan Amendment (ROPA) 38). This area was added to the Town's urban area to receive municipal servicing as a result of OPA 10 and ROPA 38.
GTA West Transportation Corridor Route Planning and Environmental Assessment Study	The Ninth Line Class EA study area is located within the GTA West Corridor Route Planning and EA Study Area. The GTA West Corridor EA Study commenced in February 2014 and is scheduled to be completed in 2018. It is yet to be determined if the Ninth Line Transportation Corridor will be incorporated into GTA West Corridor Plans in the future. The proposed GTA West corridor will be a new 400-series highway with transitway and goods movement priority features. The Town of Halton Hills and Halton Region are protecting the GTA West Corridor Study area (including a portion of the Premier Gateway Employment Area) from development pending the completion of Phase 2 of the GTA West Corridor EA.

Problem and Opportunities

As a result of the proposed expansion of Georgetown South and development proposed in the Vision Georgetown and Premier Gateway Employment Area, Ninth Line will not be able to accommodate the travel demand anticipated by 2031. Improvements will be necessary for the Ninth Line corridor between Highway 407 to 10 Side Road to improve:

- North-south transportation capacity
- Traffic operations and safety
- Accessibility to existing and future developments
- Alternative modes of travel – active transportation

Preferred Design Alternative

Based on findings from the analysis and evaluation of alternative design concepts discussed in **Section 4.0** of the ESR, the preferred design consists of a combination of widening about the centerline and widening to the east and west to mitigate impacts to residents and surrounding natural features. In constrained areas of the corridor, a modified cross-section is proposed to reduce the width of Ninth Line to mitigate environmental and residential impacts while still maintaining acceptable functional design standards. In the constrained areas of the corridor, a modified cross-section is proposed while still maintaining a center-left turn lane for easier access to local driveways and accommodation for both on and off-road active transportation. There will also be improvements to the vertical and horizontal alignments of the roadway to improve safety. The intersection of Ninth Line at 5 Side Road will be upgraded to include turning lanes for all approaches to maintain acceptable levels of service.

Drainage and Stormwater Management

The study area consists of gently rolling hills with a higher elevation at the northern most limit of the study area. The study area is located within the East Branch catchment of Sixteen Mile Creek and drainage in the road right-of-way is largely in the roadside ditches on both sides of the road. However, drainage channels originating up-gradient of the road corridor enter the roadside drainage network and traverse

the corridor through a series of culvert crossings under Ninth Line. Of these crossings, there is one major crossing (referred to as the “main crossing” and Discharge Outlet #4 in this ESR) of a small headwater tributary that traverses Ninth Line in the lower portion of the study area. This headwater tributary presents a flooding and erosion hazard as defined by the Conservation Authorities Act.

Stormwater quality and quantity control is proposed through the maintenance and enhancement of the existing rural ditches where possible. A treatment train approach that includes trapezoidal vegetated ditches to increase water infiltration rates to offset the increased impermeable surface area posed by the road widening, wet swales and sediment traps, check dams, oil grit separators, and porous asphalt bicycle lanes in select sections of the corridor are proposed in the preliminary preferred design. Drainage within the modified cross-section areas will be generally through surface flow, however, sewers will be installed where necessary to channel water to ditches.

Property Requirements

Property totaling approximately 28.3 acres will be required to widen the Ninth Line corridor.

Construction Cost and Schedule

The Region proposes that Ninth Line from Steeles Avenue to 10 Side Road be constructed to a four lane roadway. The preliminary construction cost estimate (including property cost) is estimated at approximately \$36.6 million. The tentative commencement of construction is in 2020.

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 team and the public and agencies, allowing an exchange of ideas and the broadening of the information base, leading to better decision-making process.

The following are highlights of the consultation process carried out for the project:

- Two Public Information Centres;
- Extensive liaison, including six meetings, with Conservation Halton to discuss environmental issues related to the project and two Technical Agency Committee meetings;
- Individual property owner meetings with those identified as having significantly property impacts;
- Agencies involved in the study included: Town of Halton Hills, Ministry of Environment and Climate Change, Ministry of Tourism, Culture and Sport, and Infrastructure Ontario. Communication with these agencies was maintained throughout the study process;
- Other major stakeholders notified about the study and invited to provide input included: other federal and provincial ministries and agencies, municipal agencies, utilities, First Nations and property owners (a full list of agency contacts is provided in **Appendix J.2**).

Public notification and opportunity for comment was provided and all comments received to date have been addressed. Subject to comments received as a result of the Notice of Study Completion, public review of the ESR, and the receipt of necessary approvals, at the completion of the mandatory 30-day public review period following the Notice of Study Completion and the filing of this ESR, this project will have met the requirements of the Environmental Assessment Act and the Region intends to proceed with the construction of the proposed road improvement in 2020. The mitigation measures and the

implementation requirements identified in the ESR (as summarized in **Table 7-3**) will be considered during the detailed design phase of the project, in addition to further consultation with agencies and the public.

Environmental Impacts and Mitigating Measures

The preferred design has been developed to fulfill the objectives of the project while minimizing the negative impacts on the surrounding natural, cultural and socio-economic environment, adjacent property and utilities. As these impacts are unavoidable, the study team conducted a detailed impact assessment and consulted results of investigations and analyses with review agencies. Based on the assessment and input received from review agencies, specific mitigating measures were developed for the project. The ESR provides detailed description of the identified impacts and proposed mitigation measures for detailed design and implementation of the project. The details of the potential environmental effects, mitigation measures, detailed design commitments and permitting requirements are provided in **Section 7.0** of the ESR.

1.0 INTRODUCTION & BACKGROUND

Halton Region has completed a Schedule 'C' Class Environmental Assessment (EA) Study to identify transportation corridor improvements to satisfy future travel demands on Ninth Line (Regional Road 13), from 10 Side Road (Regional Road 10) to Highway 407, in the Town of Halton Hills pursuant to the Municipal Class EA process (MEA October 2000, as amended in 2007 and 2011). The Municipal Class EA is an approved planning process under the Ontario Environmental Assessment Act (EA Act). The Ninth Line (Regional Road 13), from 10 Side Road (Regional Road 10) to Highway 407, Class EA Study took into consideration the future transportation needs within the corridor while balancing the potential impacts on the natural, socio-economic and cultural environments.

The Halton Region Transportation Master Plan – *The Region in Motion (2004)* and Halton Transportation Master Plan – *The Road to Change (2011)*, herein referred to the TMPs, both concluded that the existing capacity of the Ninth Line transportation corridor would be insufficient to accommodate expected growth within the planning time horizons of the TMPs. Both TMPs recommended that Ninth Line be widened from two lanes to four lanes.

This Environmental Study Report (ESR) documents the Class EA study process undertaken, including:

- Study Background;
- Need and Justification;
- Identification of Problem and Opportunities;
- Identification of the Analysis and Evaluation of Preliminary Design Alternatives;
- Preferred Design;
- Public Consultation; and,
- Mitigating Measures and Future Commitments.

1.1. STUDY AREA

The Ninth Line Transportation Corridor (Ninth Line) is an important corridor connecting Georgetown to the north, with Milton, Oakville, Mississauga and Highways 401/407/QEW to the south. The study area includes Ninth Line from Highway 407 as the south limit to 10 Side Road as a north limit, as well as a section of Steeles Avenue, a length of approximately 7.2 kilometres. The approximate boundaries of the study area are shown in **Figure 1-1**.

Within the project limits, Ninth Line intersects with three roadways – 10 Side Road, 5 Side Road, and Steeles Avenue (as shown in **Figure 1-1**). In addition, residential driveways and agricultural equipment access routes connect to Ninth Line on both sides throughout the corridor. Ninth Line, within the study area, is designated as part of the Regional Road Network and is functionally classified as a Major Arterial in the November 2014 Regional Official Plan and also recognized as a major transportation corridor in the Town of Halton Hills Official Plan (2008).

The topography of the study area consists of gently rolling hills with a higher elevation at the northern most limit of the study area. The study area is located within the East Branch catchment of Sixteen Mile Creek and drainage in the Ninth Line Class EA Study corridor is largely in the roadside ditches. The surrounding landscape is generally agricultural with pockets of rural residential and is characterized by large open fields interspersed with small forests and wooded fencerows.



Figure 1-1: Ninth Line Class EA Study Area Boundaries

1.2. CLASS EA APPROACH

Municipal road projects in Ontario are subject to the provisions of the Environmental Assessment Act (EA Act) and the requirement to prepare an Environmental Assessment (EA). The Ontario Municipal Engineers Association (MEA) Municipal Class Environmental Assessment document (October 2000, as amended in 2007 and 2011) provides municipalities with a five phase planning process (approved under the EA Act) to plan and undertake all municipal transportation, stormwater management, water, and sewer projects that recur frequently, are usually limited in scale, and have a predictable range of impacts. The Municipal Class EA document also serves as a public statement of the decision-making process followed by municipalities in the planning and implementation of needed infrastructure.

Projects undertaken through the Municipal Class EA process are classified as one of four schedule types, Schedule 'A', 'A+', 'B' or 'C', based on the degree of environmental impact. An overview of each schedule type is provided below:

- | | |
|----------------------|--|
| Schedule 'A' | Projects are limited in scale, have minimal adverse environmental impacts, and are pre-approved and the proponent may proceed without public notification or documentation. |
| Schedule 'A+' | Projects are limited in scale, have minimal adverse environmental impacts, and are pre-approved. However, the public must be advised prior to project implementation. |
| Schedule 'B' | Projects have the potential for some adverse environmental impacts. Proponent must complete Phases 1, 2 and 5 of the Class EA planning process, which includes a screening process and mandatory consultation with the directly affected public and relevant review agencies. |
| Schedule 'C' | Projects have the potential for significant environmental impacts. Proponent must complete all five Phases of the Class EA planning process and documentation procedures (i.e. ESR). The ESR must be filed on the public record for review by the public and relevant review agencies prior to project implementation. |

This project was classified as a Schedule 'C' project. Schedule 'C' projects generally include the construction of new facilities or major expansions to existing facilities. As such, the first four phases of the Class EA process were completed as part of the Ninth Line Class EA Study. The fifth and final phase of the Class EA process will be initiated following the completion of the Ninth Line Class EA Study.

1.3. THE MUNICIPAL CLASS EA PROCESS

The Municipal Class Environmental Assessment (Class EA) is a five-phase planning and design process that guides proponents on how to identify potential positive and negative effects of a proposed project and determine an appropriate approach for implementing the project that mitigates any potential negative impacts.

The five phases of the Municipal 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. Determine the appropriate Schedule for the undertaking. |
| Phase 3 | Examine alternative methods of implementing the preferred solution, based upon the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing or eliminating negative effects and maximizing positive benefits of the project. |
| Phase 4 | Document, in an Environmental Study Report (ESR), a summary of the rationale and the planning, design, and consultation process 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; proceed to construction and operation along with the monitoring of construction activities and operations to ensure adherence to environmental provisions and mitigation. Where special conditions dictate, also monitor the operation of the completed facilities. *(Phase 5 is not part of the Ninth Line Class EA Study)*

An illustration of the Class EA process and its five phases is shown in **Figure 1-2**.

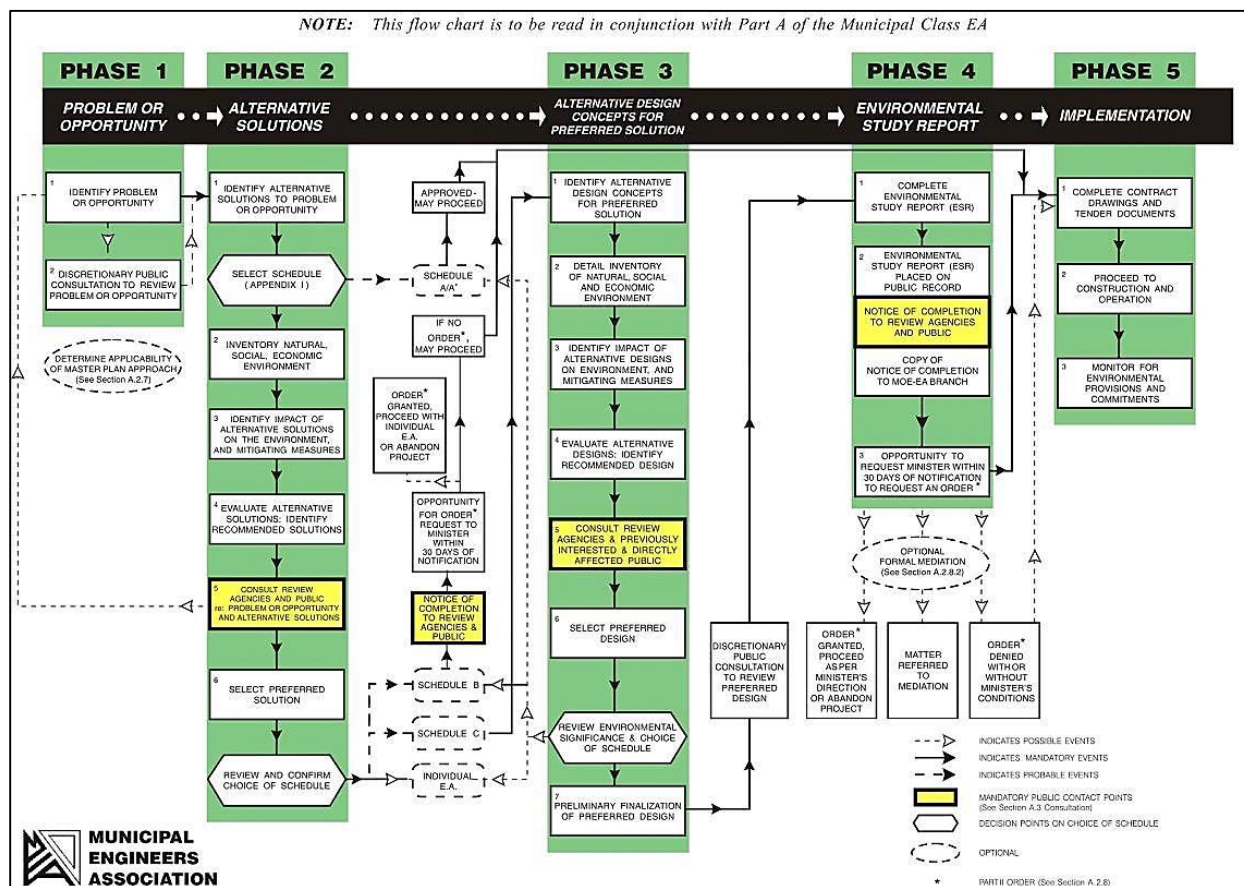


Figure 1-2: Municipal Class EA Planning and Design Process

(Source: Municipal Engineers Association Municipal Class Environmental Assessment Document, October 2000, as amended in 2007 and 2011)

Consistent with the Municipal Class EA requirements, the Ninth Line Class EA Study approach was designed to meet the following objectives:

1. Protection of the environment, including natural, social and economic components of the environment.
2. Minimal disruption during construction to existing residents and business owners who rely on this roadway.
3. Participation of a broad range of stakeholders in the Ninth Line Class EA Study process to allow for sharing of ideas, education and developing alternatives.
4. Documentation of the Ninth Line Class EA Study process in compliance with all phases of the Municipal Class EA process.

1.4. ENVIRONMENTAL STUDY REPORT

This Environmental Study Report (ESR) documents the Class EA planning and decision-making process, including consultation activities, used to arrive at the preferred solution and preliminary design for road improvements to Ninth Line. The ESR also sets out the mitigating measures proposed to avoid or minimize environmental impacts and the commitments that have been made by Halton Region.

The ESR has been made available for review and comment by the public and review agencies that showed an interest in the Ninth Line Class EA Study. Copies of the report are available for review and comment during normal business hours at the following locations:

Halton Hills Public Library Georgetown Branch	Halton Hills Public Library Acton Branch	Town of Halton Hills Clerk's Department	Halton Region Clerk's Department
9 Church Street Georgetown, ON L7G 2A3	17 River Street Acton, ON L7J 1C2	1 Halton Hills Drive Halton Hills, ON L7G 5G2	1151 Bronte Road Oakville, ON L6M 3L1

The beginning of the mandatory public review period was marked by the release of the Notice of Study Completion, which was posted on the Halton Region website and published in local newspapers on May 12, 2016.

1.5. PART II ORDER REQUESTS

The Class EA process contains a provision that allows for changing the status of a project from a Class EA to an Individual Environmental Assessment. This is called a 'Part II Order.' Members of the public, interest groups, government agencies and others may request that an Individual Environmental Assessment be prepared for a specific project if they feel their concerns have not been addressed through the Class EA planning process. The Minister of the Environment and Climate Change would respond to a Part II Order by deciding whether to deny the request, refer the matter to mediation or require the proponent to comply with Part II of the EA Act. There is one additional option available to the Minister, namely to deny the request with conditions placed upon the EA. Compliance with Part II of the EA Act refers to the completion of an Individual EA. If the Part II Order is granted, the project cannot proceed unless an Individual EA is prepared. The Individual EA is subject to a formal government review and approval process. Anyone wishing to request a Part II Order of this ESR must submit a written request by the end of the 30-calendar day review period to the Minister of the Environment and Climate Change at the following address, with a copy sent to Halton Region:

Ministry of Environment and Climate Change (MOECC)
Attn: Minister of the Environment and Climate Change
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, Ontario, M7A 2T5

Halton Region
Attn: Ms. Alicia Jakaitis
Acting Senior Transportation Planner
Transportation Services, Public Works
1151 Bronte Road
Oakville, Ontario, L6M 3L1
Telephone: (905) 825-6000 ext. 7556
Fax: (905) 847-2192
Email: alicia.jakaitis@halton.ca

If no requests are received by Monday, June 13, 2016, the proposed improvements to Ninth Line will proceed to detailed design and construction as outlined in the ESR.

1.6. PROJECT TEAM ORGANIZATION

Halton Region retained Urban & Environmental Management Inc. (UEM) as their primary consultant to undertake the Ninth Line Class EA Study on their behalf. The "Project Team" consisted of members from Halton Region, UEM and specialized sub-consultants required to address specific requirements of the Ninth Line Class EA Study. The Project Team consisted of the following members:

Halton Region	Transportation Planning, Maintenance & Operation Design & Construction Planning
UEM (Prime Consultant)	Project Management Environmental Assessment and Planning Transportation Management and Engineering Engineering Design
ARCADIS Canada Inc.	Air Quality Impact Assessment Noise Impact Assessment
Detritus Consulting Ltd.	Stage 1 Archaeological Assessment Cultural Heritage Impact Assessment
ELLIS Engineering Inc.	Structural Assessment of the Main Culvert
IDS Integrative Design Strategies	Landscape Architecture & Visual Renderings
Landtek Limited	Geotechnical Investigation
LCA Environmental Consultants	Natural Environment Assessment

1.7. PUBLIC & TECHNICAL AGENCY CONSULTATION

A key component of the Class EA process is public consultation and engagement throughout the course of the study. For the Ninth Line Class EA Study, the main components of the public consultation strategy included the following:

- Publish and distribute the Notification of Study Commencement;
- Two Public Information Centres (PICs), two Technical Agency Committee (TAC) meetings, and meetings with individual property owners most affected by the proposed road improvements;
- Receive and review public and stakeholder input regarding the problem/opportunity statement, alternative solutions, the preferred alternative design and associated mitigation measures;

- Provide copies of the draft ESR to relevant review agencies for review prior to placing the ESR on the public record; and
- Publish and distribute the Notice of Study Completion and inform members of the public that the ESR is available for review.

Halton Region also developed and maintained a public webpage on the Region's website to maintain up-to-date information on the Ninth Line Class EA Study. Details on all consultation activities undertaken are described in **Section 6.0** of this ESR.

1.8. FIRST NATIONS CONSULTATION

As part of the public consultation process, Halton Region first contacted First Nations by letter on November 5, 2014 to inform them of the Ninth Line Class EA Study. The recipients were invited to participate in the Ninth Line Class EA Study through invitations to participate in both PICs and by providing direct input to the Project Team. In addition, First Nations were provided with the Stage 1 Archaeological Assessment Report and received a Notice of Study Completion. Further detail is provided in **Section 5.4.6**.

1.9. MEDEI CLASS EA REQUIREMENTS

A property owned by the Ministry of Economic Development, Employment and Infrastructure (MEDEI) and managed by Infrastructure Ontario (IO) was identified within the study area. The proposed widening of Ninth Line will impact this property, as the frontage of this lot will need to be acquired prior to construction. The purchase of MEDEI owned Lands within the study area triggers the requirement for a Category 'B' EA under the Public Work Class EA. **Section 8.0** of the ESR discusses the requirements of the Category 'B' Class EA, particularly the "Seven Point Analysis" and how it was addressed in the Ninth Line Class EA Study.

Due to the project's impact to property owned by the provincial government, the Ministry of Infrastructure Public Work Class EA 2012 Office Consolidation (PW Class EA) for any and all realty undertakings on lands managed by Infrastructure Ontario (IO) was triggered. The PW Class EA applies to a wide range of realty activities including leasing or letting, disposition, granting of easements, demolition and property maintenance/repairs.

The Ministry of Economic Development, Employment and Infrastructure (MEDEI) will be required to dispose of and sever lands that it owns as a result of the proposed road improvements to Ninth Line.

2.0 PROBLEM BEING ADDRESSED & PLANNING ALTERNATIVES

2.1. INTRODUCTION & BACKGROUND

Ninth Line is currently a rural north-south two-lane arterial road beginning at Upper Middle Road in the Town of Oakville extending north to 10 Side Road in the Town of Halton Hills. Located near the eastern limits of Halton Region, Ninth Line traverses through urban area in the Town of Oakville in the south and then to rural residential in the Town of Halton Hills providing Regional connection.

A number of factors precipitated the need to undertake a Class EA for the Ninth Line Transportation Corridor. These factors included existing and future north-south transportation capacity, traffic operations and safety, accessibility to existing and future developments, accommodation of alternative modes of travel (i.e. cycling and walking) as identified by the Halton Region Transportation Master Plan (TMP) – *The Road to Change* (2011), the Active Transportation Master Plan (ATMP) (2015) and other Regional Studies as described in more detail in following sections of the ESR.

The Municipal Class EA planning process requires that the existing conditions within the study area be inventoried to provide a basis for comparison to future conditions and to assist in the evaluation of potential environmental impacts of the alternative solutions and alternative methods of implementing the preferred design. The following sub-sections of the ESR describe the planning framework and existing conditions relevant to the Ninth Line Transportation Corridor.

In response to the province's Places to Grow Plan, Provincial Policy Statement (PPS), and Greenbelt Plan, Halton Region established an initiative called *Sustainable Halton* to develop a growth management and land use response to these provincial planning policy frameworks. It involved research, public consultation, staff recommendations and Council approval of policy changes to the Region's Official Plan. In 2008, Halton Region launched a two-phase process to amend the Region's Official Plan, resulting in Regional Official Plan Amendments (ROPA) 37 and 38 (refer to **Figure 2-1** for more information on the implementation process and timeline). A part of the Preferred Growth Option presented in ROPA 38 included the Vision Georgetown Secondary Plan area in the Town of Halton Hills.

The Vision Georgetown study area is shown in **Figure 2-2**. The study area is located just west of the Ninth Line Transportation Corridor study area; 10 Side Road and Eighth Line mark the south and east boundaries. Vision Georgetown is forecasted to have a population of 20,000. In order to accommodate the population growth, 370 hectares of residential/mixed use land adjacent to the Georgetown Urban Area and 340 hectares of employment land adjacent to the Premier Gateway Employment Area (south of the Ninth Line Transportation Corridor study area) must be developed by 2031 thus placing additional capacity pressures on the surrounding road network, including Ninth Line.

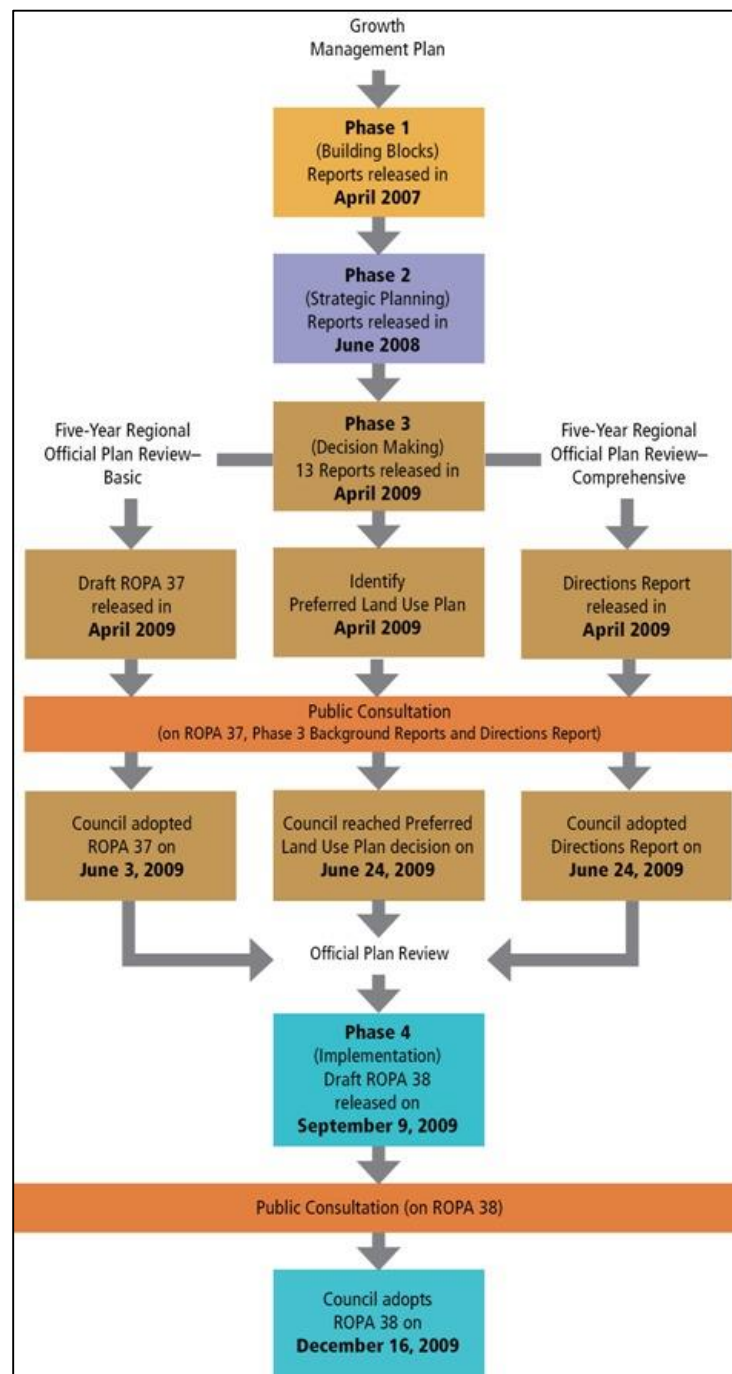


Figure 2-1: Halton Region Timeline for Implementing Provincial Plans
 (Source: Halton Region Sustainable Halton Background Webpage)

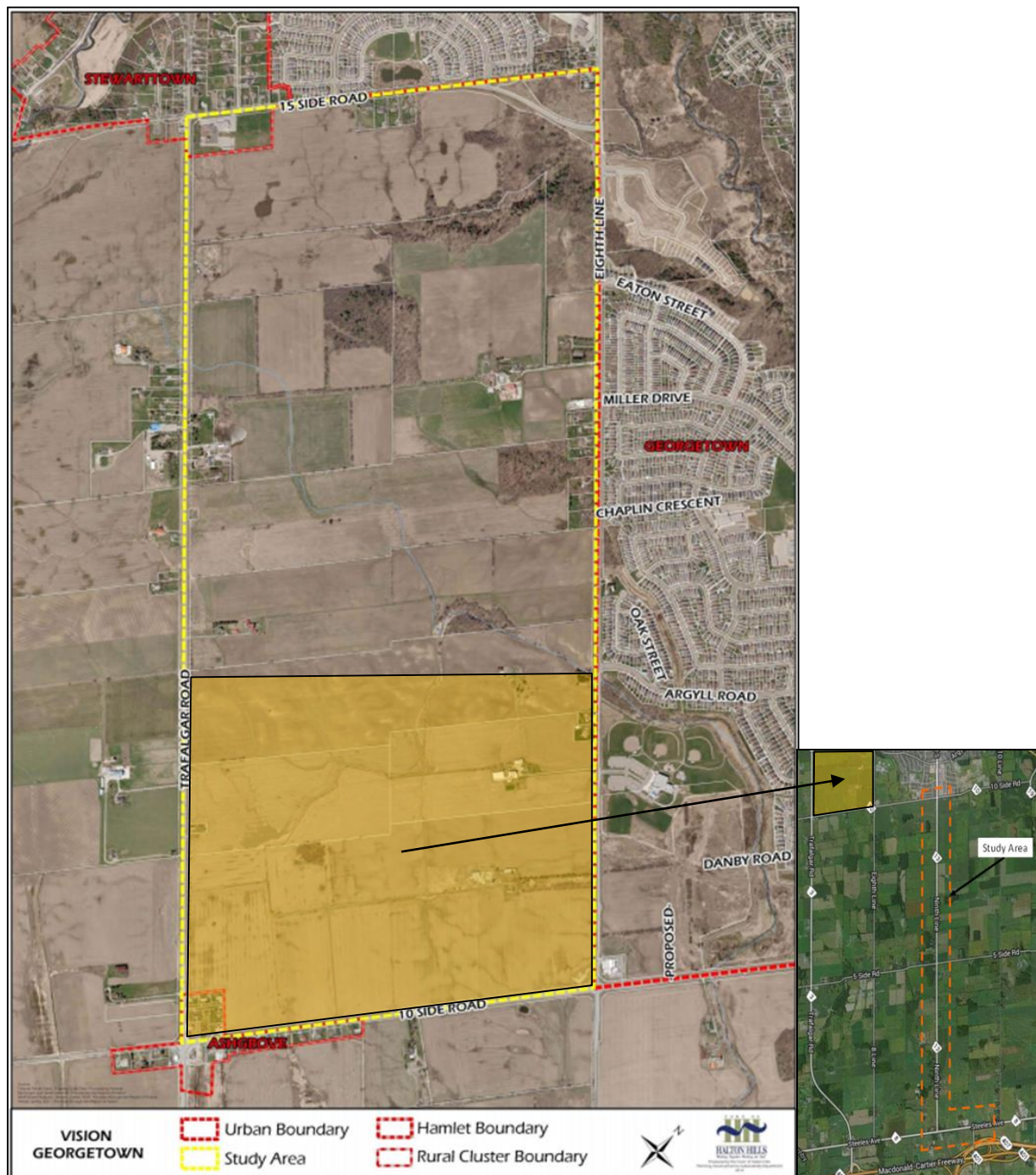


Figure 2-2: Boundaries of the Vision Georgetown Study Area

2.1.1. HALTON TRANSPORTATION MASTER PLAN – THE REGION IN MOTION (2004)

The 2004 Halton Transportation Master Plan (TMP) – *The Region in Motion* was approved by Regional Council in June 2004 and outlined the Region's transportation strategy to the year 2021. The 2004 TMP identified a need to widen Ninth Line from two lanes to four lanes.

Subsequent to the completion of the 2004 TMP, the Province introduced its Provincial Policy Statement entitled "Places to Grow," which impacted population and employment forecasts for the Region to 2031.

2.1.2. HALTON TRANSPORTATION MASTER PLAN – THE ROAD TO CHANGE (2011)

Halton Region's TMP – *The Road to Change* – details the Region's transportation strategy to 2031 in response to the Places to Grow legislation. Within that time frame, it was projected that the Halton Region population would grow from 492,000 people to approximately 780,000 and that employment would increase from 262,000 jobs to approximately 390,000 by 2031. *The Road to Change* is a multi-modal integrated strategy for Halton Region with a strategic direction for policy, program and infrastructure priorities for all modes of transportation (vehicles, transit, cycling, walking). The preferred transportation strategy to 2031 for Halton Region includes policies and initiatives to support Transportation Demand Management and Active Transportation, enhanced transit services and additional capacity in the Regional roadway network.

Five Guiding Principles were applied to all decisions made developing the 2011 TMP:

1. Balanced Needs – provide choice for the travel needs of residents;
2. Healthy Communities – support a healthy and active lifestyle;
3. Economic Vitality – transportation will be a major contributor to the Region's prosperity;
4. Sustainability – balance economic, social and environmental goals; and
5. Well-Maintained Infrastructure – keep the Region's infrastructure in a good state of repair.

The conclusion of the 2004 TMP to widen the Ninth Line transportation corridor was reaffirmed during the development of the 2011 TMP.

2.1.3. HALTON REGION ACTIVE TRANSPORTATION MASTER PLAN (2015)

Active transportation is any form of human-powered transportation, including walking, cycling, roller-blading, skateboarding and moving with mobility devices. Currently, Ninth Line does not accommodate active transportation in the section between Steeles Avenue and 10 Side Road.

The 2011 TMP had recommended the development of a Region-wide Active Transportation Plan. Halton Region recently completed a new Active Transportation Master Plan (ATMP) to the year 2031 with strategies, infrastructure requirements, initiatives and programs to promote active transportation throughout the Region. The vision for Active Transportation includes developing a Regional Walking and Cycling Network in combination with other initiatives and updates to policies and guidelines. The final ATMP document is dated May 2015 and recommends that the Ninth Line corridor include one multi-use path.

2.1.4. TOWN OF HALTON HILLS ACTIVE TRANSPORTATION PLAN (2010)

In July 2010, the Town of Halton Hills completed a comprehensive Cycling Master Plan to guide the implementation of a Town-wide cycling network over the next ten years. For the section of Ninth Line between 32 Side Road (north of Georgetown) and Steeles Avenue, the Halton Hills Cycling Plan (HHCP)

proposes an on-road, paved shoulder route. Paved shoulder bikeways are typically recommended for rural cross section roads (no curb and gutter) where traffic volumes and speed are high, where sight lines are poor and/or where truck volumes are higher than average. The paved shoulder bikeway should be demarcated with signage that identifies the facility as a cycling route.

The HHCP notes that adding or improving existing paved shoulders can be the best way to accommodate cyclists in rural areas and paved shoulders also benefit other road users by providing a wider pavement width (e.g. police officers enforcing the speed limit).

2.2. PROBLEM/OPPORTUNITY – NEEDS & JUSTIFICATION (PHASE 1 OF CLASS EA)

2.2.1. EXISTING TRAFFIC

Based on 2013 ATR data, Ninth Line carries approximately 5,000 vehicles on a daily basis between Steeles Avenue and 5 Side Road, and approximately 6,000 vehicles on a daily basis between 5 Side Road and 10 Side Road. The maximum traffic volume was observed during the PM period for both the northbound and southbound directions; whereas, the maximum traffic volume between the 5 Side Road and 10 Side Road northbound direction was observed during the PM peak period and for the southbound direction was observed during the AM peak period. Two-way traffic volumes on Ninth Line are approximately 1,200 vehicles per hour during the weekday (PM) peak hour, and are expected to increase to approximately 2,600 vehicles per hour by 2031 for the same period (which exceeds the capacity of a two lane road).

A summary of the 2014 turning movement counts along the study corridor is presented in **Figure 2-3**.

It is important to note these traffic volumes were obtained prior to the commencement of the Steeles Avenue construction. The traffic patterns indicate avoidance of the Steeles Avenue and Ninth Line intersection in the morning period due to poor service levels. The improvements under construction will address this issue.

A review of existing conditions was undertaken to evaluate current operation performance and the historical collision history as documented in **Appendix A – Traffic and Safety Assessment**.

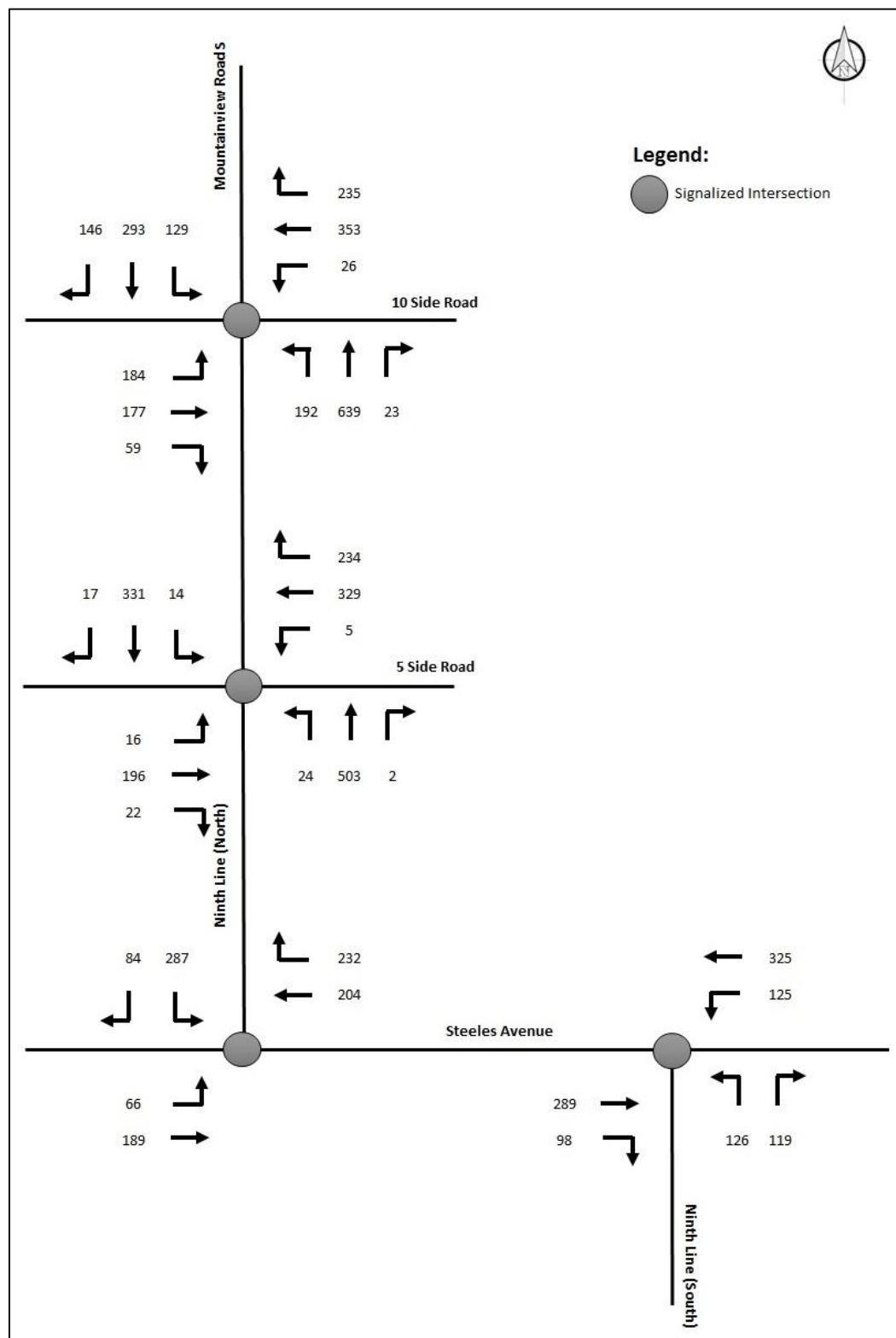


Figure 2-3: Existing 2014 Weekday PM Peak Hour Traffic Volume

2.2.2. PHYSICAL DESCRIPTION

Ninth Line, within the study area boundaries, has relatively narrow shoulders and ditches on either side. Predominantly farm lands are located on both sides of Ninth Line between the section of Steeles Avenue and 10 Side Road along with some residential pockets within the study area. Passing is mostly permitted for both northbound and southbound traffic but is prohibited in some sections of the corridor (i.e. near the driveway locations). There is no sidewalk on either side of the roadway within study limits. Narrow gravel shoulders are currently provided on both sides of the roadway.

The key features of Ninth Line through the study area are as follows:

- Ninth Line has a typical rural paved, two lane cross-section with a soft shoulder that varies in width up to approximately 2 metres;
- The existing Ninth Line ROW varies from 30-35 metres;
- Ninth Line is offset at Steeles Avenue and is controlled by traffic signals at both approaches;
- There are a number of driveways providing access to adjacent residential and farming properties along the corridor; and,
- The posted speed limit is 80 km/hr.

Within the project limits, Ninth Line intersects with three roadways – 10 Side Road, 5 Side Road, and Steeles Avenue (two locations):

10 Side Road (Regional Road 10) has an east-west alignment and extends from Regional Road 25 in the west to Winston Churchill Boulevard in the east. It is a two-lane roadway without a median and has a rural cross section within the study area and changes to a two-lane cross section with raised median and an exclusive left turn lane for westbound traffic at the intersection with Ninth Line. It has gravel shoulders on both sides of the roadway. Curb starts on the north and south side of east and west approach closer to the intersection with Ninth Line. Posted speed for eastbound and westbound traffic is 80 km/h within the study area limit. 10 Side Road from Ninth Line to Tenth Line was scheduled for reconstruction, from Fall 2014 – Fall 2015, from a two lane rural cross section to a two lane semi-urban cross section.

5 Side Road is a two-lane roadway without a median and has a rural cross section within the study area limit. It has gravel shoulders on both sides of the roadway. Posted speed for eastbound and westbound traffic is 80 km/h within the study area.

Steeles Avenue (Regional Road 8) was under construction during the development of this Class EA study. As of the writing of this ESR, Steeles Avenue is being widened from two lanes to four lanes. The two intersections with Ninth Line are being upgraded as part of the Steeles Avenue construction and are controlled by traffic signals.

2.2.3. EXISTING OPERATIONAL PERFORMANCE

The concept of capacity and Level of Service (LOS) are central to the operational analysis of intersections. Capacity analysis is a process that is used to describe how well an intersection will perform under various traffic conditions and the results can assist in evaluating the need for improvements. At signalized intersections, capacity is normally evaluated using the volume-to-capacity (v/c) ratio, which describes the extent of available capacity used by vehicles either within the intersection as a whole or for specific lanes or movements. The overall intersection sufficiency is measured using a composite v/c ratio for the sum of the critical lanes or movements within the intersection. The v/c ratio is measured by a fractional value

between zero and one. A v/c ratio near one suggests fully utilized capacity. Additionally, the movements or lane groups with a v/c ratio in excess of established thresholds were identified as “critical” movements. The thresholds correspond to:

- a v/c ratio of 0.85 for individual through movement and for shared through movements; and
- a v/c of 0.95 for exclusive turning movements.

LOS is a qualitative concept used to define the quality of service of traffic condition at an intersection and/or road section. Six measures of LOS are defined with LOS A representing the best operating condition and LOS F the worst.

Figure 2-4 shows the existing lane configurations and traffic signal control within the study area boundaries. As the study intersection is a signalized intersection, capacity analysis involved measuring the overall intersection sufficiency using a composite v/c ratio; and, LOS was determined by assessing the average control delay per vehicle for various movements within the intersection.

Therefore, the overall operational performance of the study intersection was measured by the intersection overall v/c ratio. **Table 2-1** summarizes the overall intersection control delay, the overall intersection v/c ratio and the intersection overall LOS obtained from operational analysis of the weekday PM peak hour traffic volume using Synchro/SimTraffic operational analysis software¹ which uses Highway Capacity Manual methodology. The detailed Synchro operational analysis reports for the exiting condition are provided in the Traffic and Safety Assessment Report presented in **Appendix A** of the ESR.

Table 2-1: Existing (2014) Weekday PM Peak Hour Operational Performance

Ninth Line @	Movement	Weekday PM Peak Hour		
		Control Delay (seconds)	v/c Ratio	LOS
10 Side Road		<i>No critical movement</i>		
	Overall	18.5	0.62	B
5 Side Road		<i>No critical movement</i>		
	Overall	24.9	0.73	C

¹ Synchro/SimTraffic Planning and Analysis software is used for traffic analysis, optimization and simulation applications using Highway Capacity Manuals methodology (2000 and 2010 methods).

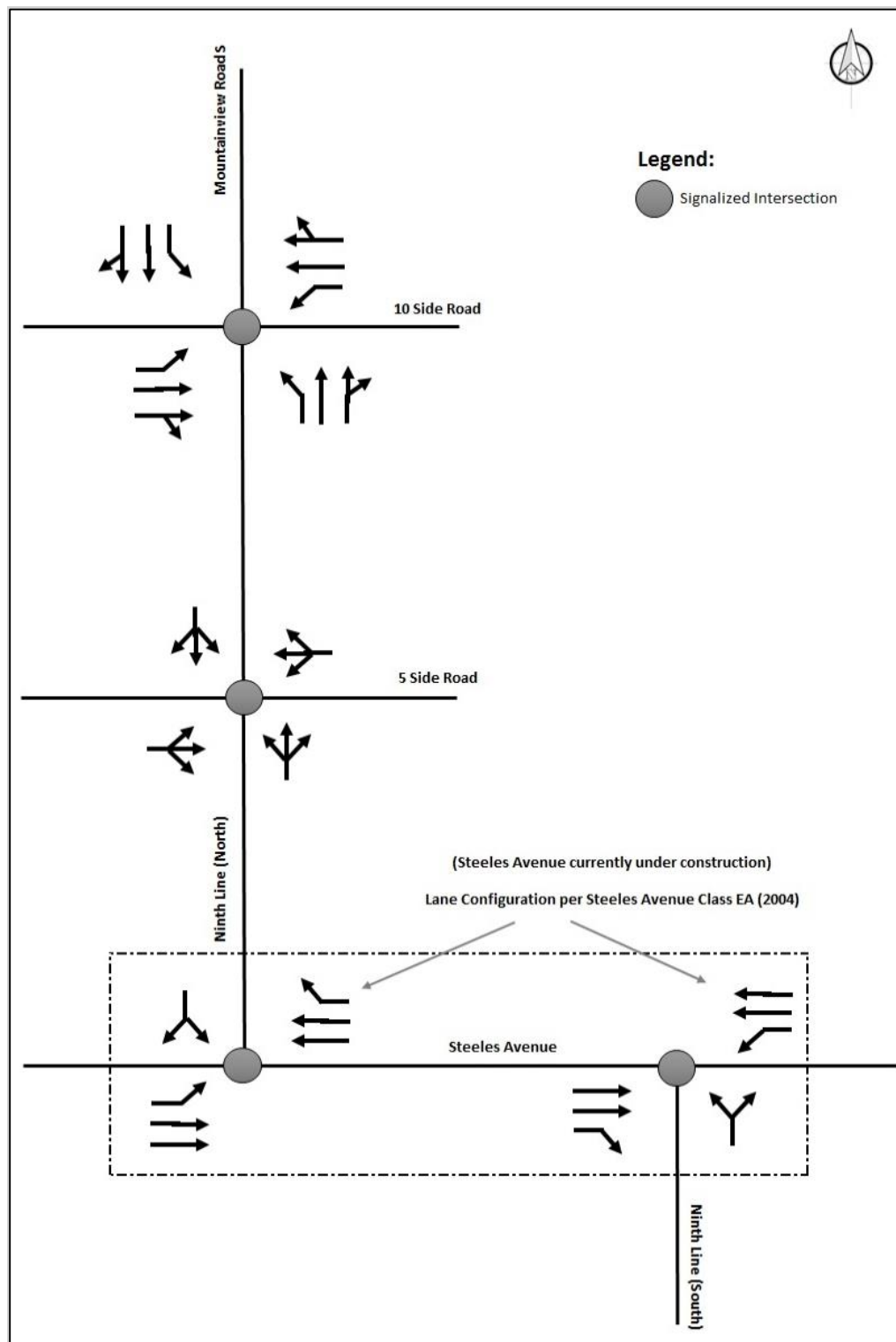


Figure 2-4: Existing Lane Configuration and Traffic Signal Control

2.2.4. ROADWAY SAFETY

A preliminary review of collision history from 2010 to 2015 was undertaken for each intersection on Ninth Line as well as the mid-block sections within the corridor. The collision experience along the Ninth Line corridor is typical of a commuter route that is more heavily travelled during the weekdays, experiencing highest traffic volumes during the weekday morning and afternoon peak periods. The predominant collision patterns suggest that some of the collisions may be avoided in the future through road improvements, such as widening (more capacity, provision of auxiliary lanes) and design improvements for visibility.

2.2.5. FUTURE TRAVEL DEMAND & CROSS-SECTION REQUIREMENTS

Traffic forecasting is an integral part of the transportation planning process. It serves as an analysis tool for transportation planners and aids decision-makers in the evaluation of transportation network. In addition to the analysis undertaken as part of the transportation master planning process, traffic projections for the study area were derived from existing traffic volumes and considered link volumes and growth factors for Ninth Line. Crossing roadways within the project limit were also forecasted based on data from the Halton Region Transportation Demand Forecasting Model.

The future traffic estimates for the study corridor were developed from the Regional Travel Demand Forecasting Model for the years 2021 and 2031. The land use reflected in the forecasts for each year includes the planned future developments within the Town of Halton Hills and generalized growth across Halton Region by 2031, as per the approved Best Planning Estimates. The Region's model forecast also reflect the approved roadway Capital Program as identified in the Halton Transportation Master Plan (2031) – The Road to Change.

The Region's model provides directional travel demands for weekday PM peak hour on modelled road sections ('links').

The land use reflected in the forecasts for each year includes the planned future developments within the Town of Halton Hills and generalized growth across Halton Region by 2031, as per the approved Best Planning Estimates.

The Region's model provides directional travel demands for weekday PM peak hour on modelled road sections (links). The following Screenlines relevant to the study area, presented in **Table 2-2**, were considered in the analysis. A screenline is an imaginary boundary that defines a broad corridor consisting of one or more roadway links.

Table 2-2: Descriptions of Screenlines Used in the Regional Travel Demand Forecasting Model

Screenline Identification No.	Screenline Name	Location	Direction
20	West Georgetown	Between Trafalgar Rd and Eighth Line	EB-WB
74	West of Winston Churchill	North of Tenth Line	EB-WB
15	West of Ninth Line	South of Ninth Line (between Eighth and Ninth Line)	EB-WB
59	Central Georgetown south of 17th Side Road	North of 10 Side Rd	NB-SB
58	Georgetown South	Between 10 Side Rd and 5 Side Rd	NB-SB
56	East Halton Hills North of Steeles Avenue	Between Steeles Av and 5 Side Rd	NB-SB

The travel demand model output and corresponding corridor and screenline growth rates are summarized in **Table 2-3**.

Table 2-3: Overview of Screenline Growth Rates

Standardized Screenline Growth Rates															
Eastbound / Westbound															
Tag	Screenline Name	Direction	Model Forecasts					Annual Growth Rates							
			2006	2011	2016	2021	2026	2031	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2011-2031	2016-2031
15	West of Ninth Line	EB	5212	6356	7144	9208	10318	11397	4.0%	2.4%	5.2%	2.3%	2.0%	3.0%	3.2%
		WB	7394	8409	8305	12169	12544	11689	2.6%	-0.2%	7.9%	0.6%	-1.4%	1.7%	2.3%
Tag	Screenline Name	Direction	Model Forecasts					Annual Growth Rates							
			2006	2011	2016	2021	2026	2031	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2011-2031	2016-2031
20	West Georgetown	EB	1177	1465	1694	1908	2094	2231	4.5%	2.9%	2.4%	1.9%	1.3%	2.1%	1.9%
		WB	1358	1531	1586	1552	1891	2599	2.4%	0.7%	-0.4%	4.0%	6.6%	2.7%	3.3%
Tag	Screenline Name	Direction	Model Forecasts					Annual Growth Rates							
			2006	2011	2016	2021	2026	2031	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2011-2031	2016-2031
74	West of Winston Churchill	EB	1236	1532	2104	1946	2285	1981	4.4%	6.6%	-1.5%	3.3%	-2.8%	1.3%	-0.4%
		WB	2082	2281	2898	2388	2157	1865	1.8%	4.9%	-3.8%	-2.0%	-2.9%	-1.0%	-2.9%
Northbound / Southbound															
Tag	Screenline Name	Direction	Model Forecasts					Annual Growth Rates							
			2006	2011	2016	2021	2026	2031	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2011-2031	2016-2031
56	East Halton Hills North of Steeles Avenue	NB	1675	2089	2708	2685	2956	8097	4.5%	5.3%	-0.2%	1.9%	22.3%	7.0%	7.6%
		SB	716	855	993	1053	1275	4976	3.6%	3.0%	1.2%	3.9%	31.3%	9.2%	11.3%
Tag	Screenline Name	Direction	Model Forecasts					Annual Growth Rates							
			2006	2011	2016	2021	2026	2031	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2011-2031	2016-2031
58	Georgetown South	NB	2875	3472	4242	4930	5718	11007	3.8%	4.1%	3.1%	3.0%	14.0%	5.9%	6.6%
		SB	951	1163	1383	1831	1952	4305	4.1%	3.5%	5.8%	1.3%	17.1%	6.8%	7.9%
Tag	Screenline Name	Direction	Model Forecasts					Annual Growth Rates							
			2006	2011	2016	2021	2026	2031	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2011-2031	2016-2031
59	Central Georgetown south of 17th Side Rd	NB	1578	3064	3400	3823	4213	4329	14.2%	2.1%	2.4%	2.0%	0.5%	1.7%	1.6%
		SB	1156	2243	2453	2481	3022	3124	14.2%	1.8%	0.2%	4.0%	0.7%	1.7%	1.6%

Output from the Region's Demand Forecasting model for Screenline Level Deficiency Analysis under 2016 PM traffic condition shows that Ninth Line will be exceeding the minimum capacity threshold and therefore would require improvements.

Figure 2-5 identifies predicted auto volume growth between 2016 and 2031.

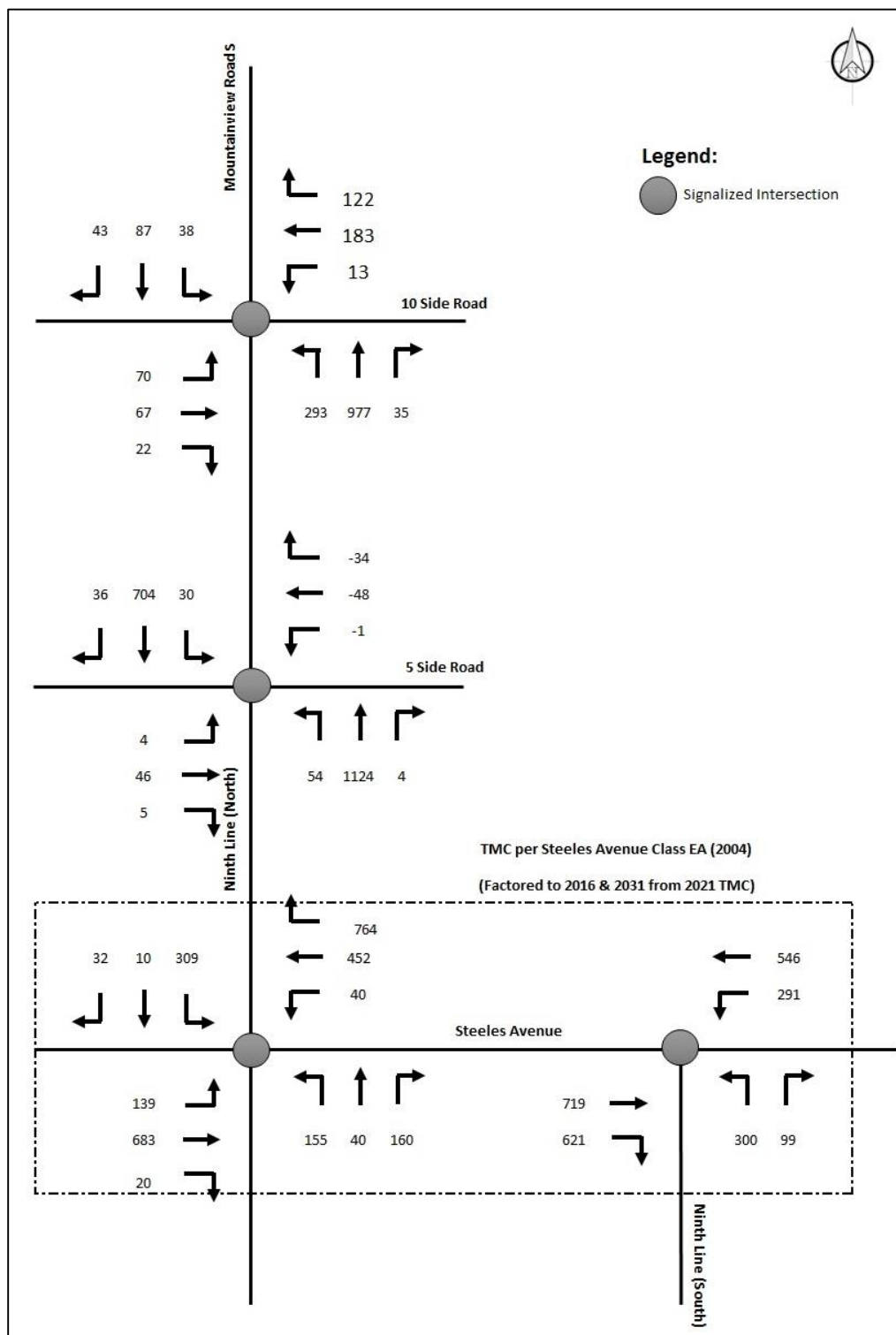


Figure 2-5: Predicted Auto Volume Growth between 2016 and 2031

The future volume, and planning and operational capacity of Ninth Line under 2016 and 2031 traffic condition is summarized in **Table 2-4**.

Table 2-4: Summary of Traffic Characteristics Under 2016 and 2031 Traffic Condition Scenarios

Roadway Section	Existing 2014 Volume	Planning Capacity	Operational Capacity	v/c Ratio (Planning)	v/c Ratio (Operation)
Ninth Line between 10 Side Road and 5 Side Road	830	950	1472	0.87	0.56
Ninth Line between 5 Side Road and Steeles Avenue	530	950	767	0.56	0.69
Ninth Line South of Steeles Avenue	421	950	-	0.44	-
Roadway Section	Future 2031 Volume	Planning Capacity	Operational Capacity	v/c Ratio (Planning)	v/c Ratio (Operation)
Ninth Line between 10 Side Road and 5 Side Road	2265 or 1695	950	1773 or 1473	2.38	1.28
Ninth Line between 5 Side Road and Steeles Avenue	1785	950	611	1.87	2.92
Ninth Line South of Steeles Avenue	820	950	-	0.86	-

The lane capacity of a major arterial as identified in the TMP (2011) is approximately 850 vehicles per hour. For long-range roadway planning in the Region, a roadway's level of service is defined as the ratio of volume-to-capacity (v/c). A road with a v/c is completely saturated and cannot theoretically accommodate more vehicles. This condition results in congestion and delays. The Region uses a critical volume to capacity ratio of 0.9 in its transportation master planning analyses to identify road segments in the Regional Road network, which may require improvement.

Based on traffic forecasts discussed above, traffic volumes on Ninth Line between Steeles Avenue to 10 Side Road will approach or exceed the critical capacity levels for a two-lane roadway in the peak direction in the 2021. This clearly indicates that improvements are required to provide acceptable level of service conditions in the future. Therefore, widening to 4 lanes is required in order to meet projected 2031 travel demand.

2.2.5.1. INTERSECTION PERFORMANCE (2031)

The development of the 2031 forecasts at the intersection level was developed from the existing TMC and the year 2031 approach and departure volumes as forecasted in the Region's transportation model.

The future 2031 weekday PM peak hour traffic volumes at all of the intersections within the Ninth Line Class EA study area are shown in **Figure 2-6**.

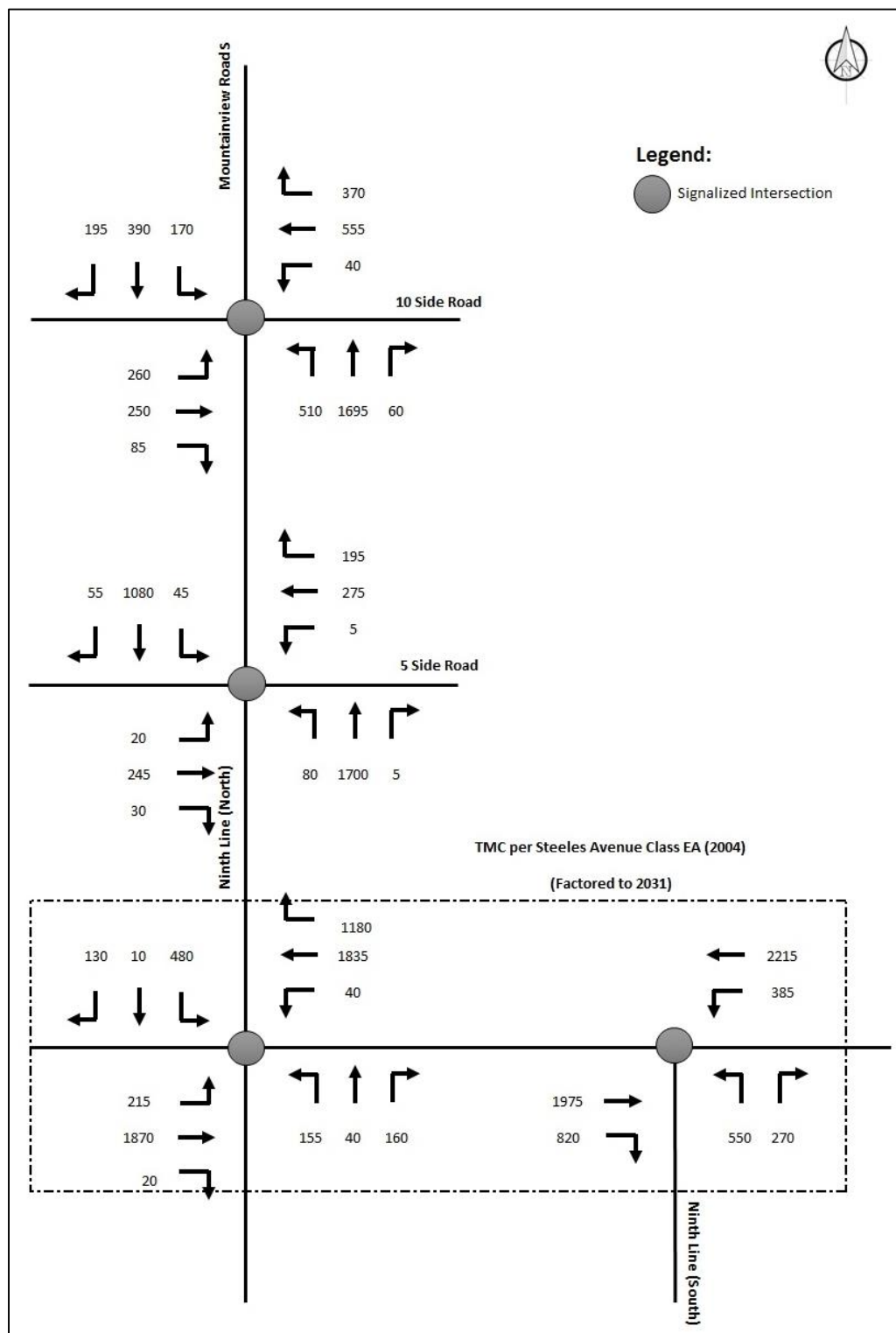


Figure 2-6: Future Total 2031 PM Peak Hour Traffic Volume

The operational performance of Ninth Line within the project limits was evaluated for the 2031 horizon year for the 'Do Nothing' scenario. **Table 2-5** summarizes the information about the control delay, v/c ratio and LOS for the critical movements and also for the overall intersection obtained from operational analysis of the weekday PM peak hour traffic volume using Synchro/SimTraffic operational analysis software. The detailed Synchro operational analysis reports for the future traffic condition without any improvements are presented in the Traffic and Safety Assessment Report (**Appendix A** of the ESR).

Table 2-5: Future (2031) Weekday PM Peak Hour Operational Performance (Do Nothing Scenario)

Ninth Line @	Movement	Weekday PM Peak Hour		
		Control Delay (seconds)	v/c Ratio	LOS
10 Side Road	Eastbound LT	444.7	1.88	F
	Northbound LT	358.9	1.72	F
	Northbound TH-RT	120.0	1.20	F
	Southbound LT	555.4	2.10	F
	Overall	139.8	1.99	F
5 Side Road	Northbound LT-TH-RT	935.0	3.01	F
	Southbound LT-TH-RT	548.5	2.15	F
	Overall	624.7	1.85	F

2.2.5.2. FUTURE TRAFFIC CONDITIONS (2031)

The operational analysis of the roadway network within the study area, taking into consideration the existing geometrics and no operational improvement, shows that the existing roadway capacity is insufficient to accommodate the projected 2031 future traffic. Additional capacity in the form of geometric improvement and traffic operations improvement are required to maintain the current level of service for the future conditions.

The conclusion of the 2004 and 2011 TMPs to widen the Ninth Line transportation corridor is supported by the results of the traffic analysis conducted for the Ninth Line Class EA Study.

2.3. PROBLEM STATEMENT

The purpose of the Ninth Line Class EA Study was to consider a wide range of options for transportation corridor improvements to satisfy future travel demands to 2031 on Ninth Line from Highway 407 to 10 Side Road. In order to best address travel demand along Ninth Line, a number of road improvement alternatives were examined as part of the study including widening of the roadway, cross-sectional improvements, overall traffic operations, as well as the impact of such improvements on the social, cultural, economic and natural environments.

As a result of the proposed expansion of Georgetown South and development proposed in the Vision Georgetown and Premier Gateway Employment Area, Ninth Line will not be able to accommodate the travel demand anticipated by 2031. Improvements will be necessary for the Ninth Line corridor between Highway 407 and 10 Side Road to improve:

- North-south transportation capacity
- Traffic operations and safety
- Accessibility to existing and future developments
- Alternative modes of travel – active transportation

These considerations are translated into the Problem Statement as follows:

As presently configured, Ninth Line (Regional Road 13) will not be able to accommodate the travel demand growth anticipated by 2031. To improve north-south transportation capacity, traffic operations and safety, accessibility to existing and future developments, and to support alternative modes of travel (i.e. active transportation), improvements to Ninth Line are required prior to 2031.

2.4. PLANNING ALTERNATIVES

2.4.1. ALTERNATIVE SOLUTIONS (PHASE 2 OF CLASS EA)

As identified in the problem statement in **Section 2.3**, additional capacity will be required for Ninth Line by the year 2031. All reasonable solutions (i.e. planning alternatives) to address the problem statement were identified and evaluated.

Alternative solutions are planning alternatives to address the problem or deficiency in the transportation network. The EA Act requires that all reasonable alternatives, including the “Do Nothing” alternative, be considered during the decision making process. The alternative planning solutions evaluated for this Class EA are summarized in **Table 2-6** below and are detailed further in **Sections 2.4.4 to 2.4.9**.

Table 2-6: Alternative Solutions Considered

Alternative Solution		Description
1	Do Nothing	The existing transportation system is not changed. <i>(A mandatory requirement of the Class EA process for comparative purposes)</i>
2	Limit Development	Restrict development of the surrounding land now and in the future.
3	Travel Demand Management Measures	Implement strategies intended to reduce vehicular demand during peak periods (e.g. carpooling).
4	Intersection and/or Operational Improvements	Improve intersection operations by optimizing traffic signal timing, adding through and turn lanes, and/or installing a roundabout.
5	Improvements to Other Roadways	Increase capacity of other corridors in the vicinity serving north/south traffic (e.g. widen Trafalgar Road).
6	Widen Ninth Line to Four Lanes	Increase capacity of Ninth Line by constructing two additional lanes. <i>(As recommended in the 2004 and 2011 TMPs)</i>

2.4.2. EVALUATION CRITERIA

The evaluation of alternative solutions considers the broad definition of the environment as identified in the EA Act. The criteria for evaluating alternative solutions are grouped into five major categories:

- i. Natural Environment
- ii. Socio-Economic Environment
- iii. Cultural Environment
- iv. Transportation/Technical
- v. Construction Cost

Table 2-7 provides a list of criteria, organized according to the five major categories listed above, used to evaluate and compare the alternative solutions proposed for this project. Information obtained from technical studies, literature review, site visits and dialogue with the Region and other stakeholders were used to complete the evaluation of alternative solutions. The evaluation criteria was reviewed and adjusted throughout the Class EA process to more accurately reflect the wants and needs of the existing and future users of Ninth Line.

Table 2-7: List of Proposed Evaluation Criteria and Indicators

Major Category	Evaluation Criteria & Description
Natural Environment <i>This grouping addresses effects of the alternative on the natural environmental features.</i>	Natural Heritage Features and Unique Landforms: Potential disruption or loss of the area, function or habitat of natural areas, terrestrial ecosystems or wetlands.
	Vegetation Communities and/or Species of Concern: Potential disruption or loss of existing vegetation and flora communities and species (e.g. significant woodlands).
	Wildlife, Wildlife Habitat, Habitat Linkages and Corridors: Potential effect on existing wildlife due to disturbance or loss of habitat.
	Watercourses, Fisheries and Aquatic Resources: Potential effect on watercourses and to fisheries or aquatic resources due to disturbance and/or loss of habitat.
	Natural Hazards: Identify natural processes that have the potential to damage property and injure humans and wildlife.
	Stormwater Management and Erosion Control: Potential effects on drainage ditches, quality of runoff and stormwater on and in the vicinity of the site.
	Air Quality: Potential effects on local air quality and sensitive receptors.
Socio-Economic Environment <i>This grouping addresses effects of the alternatives on the components of the environment that are 'man-made'. This grouping is a measure of the effects on community features.</i>	Existing and Future Land Uses: Compatibility with TMP and OP and potential effects on existing and future land uses on and within the vicinity of the site.
	Farms and Business Operations: Potential effect on owners on or in the vicinity of the site.
	Residential Areas: Potential effect on residents on or in the vicinity of the site.

Major Category	Evaluation Criteria & Description
	Institutional and Recreational Uses: Potential effect on users on or in the vicinity of the site.
	Potential Property Requirements: Footprint of each alternative (e.g. right-of-way requirements).
	Property Access: Maintaining driveway access.
	Noise: Potential effects on sensitive or other receptors due to use of the transportation corridor.
Cultural Environment <i>This grouping addresses the effects and extent of disruption of known archaeological and heritage sites within the study area.</i>	Archaeological Resources and Areas of Archaeological Potential: Potential effects on archaeological resources and areas of archaeological potential.
	Built Heritage and Cultural Landscape: Potential effects on built heritage resources and cultural landscapes.
	Compatibility with Official Planning Documents: Alternative conforms to the goals of applicable planning policies.
Transportation/Technical <i>This grouping identifies the extent to which an alternative can provide reasonable transportation services.</i>	Impact on Current and Projected Traffic Patterns: Potential effect on commercial transportation/agricultural routes, commuters and public transit vehicles. Potential effects on traffic levels, road conditions, safety, level of service and road access for existing landowners.
	Active Transportation: Ease of use for pedestrians and cyclists.
	Intersection Requirements: Safety of intersections and flow of traffic is optimized.
	Safety: Does the alternative provide for the safety of all road users?
Construction Cost <i>This grouping compares the estimated cost required to build the alternative.</i>	Appropriation of Land: Footprint of the alternative solutions.
	Capital Cost: Costs associated with the implementation of the alternative.

2.4.3. ALTERNATIVE SOLUTION #1: "DO NOTHING"

This alternative would not include any significant improvements and would mean that the existing transportation network would remain in place with no added vehicular capacity to Ninth Line within the defined study limits. The "Do Nothing" alternative would involve maintaining the existing transportation infrastructure and service in the subject corridor with no significant actions being taken to manage travel demands, to improve operations or to improve/expand infrastructure.

Therefore, the "Do Nothing" planning solution alternative is not viable because it does not adequately address the future operational needs of the corridor as presented in **Section 2.3**.

2.4.4. ALTERNATIVE SOLUTION #2: LIMIT DEVELOPMENT

This alternative involves restricting development plans such as the Premier Gateway Employment Area along Steeles Avenue just south of the study area and the Vision Georgetown growth area. This alternative would not include any significant roadway improvements and would mean that the existing transportation network would remain in place with no additional vehicular capacity.

Therefore, Alternative Solution #2 is not a feasible option to address the deficiencies identified in the Class EA problem statement.

2.4.5. ALTERNATIVE SOLUTION #3: TRAVEL DEMAND MANAGEMENT MEASURES

This alternative involves the use of Travel Demand Management (TDM) strategies to reduce vehicular demand on the transportation network. TDM strategies such as ride-sharing have had modest success in reducing vehicle demand in the Greater Toronto Area (GTA).

TDM measures may contribute to a reduction in vehicular demand along Ninth Line, however as a stand-alone option is not expected to mitigate capacity constraints in this corridor.

2.4.6. ALTERNATIVE SOLUTION #4: INTERSECTION AND/OR OPERATIONAL IMPROVEMENTS

This planning alternative involves either improving the signal timing plan of the signalized intersections within the study area to achieve optimal performance, adding additional through lanes and turning lanes at the intersections, or replacing signalized intersections with modern roundabouts.

This alternative has the potential to provide some relief from the anticipated capacity deficiencies; however, this planning alternative is not a reasonable alternative as a stand-alone option.

2.4.7. ALTERNATIVE SOLUTION #5: IMPROVEMENTS TO OTHER ROADWAYS

Given that planning for improvements to adjacent north/south corridors is already underway, this alternative solution forms part of Halton Region's overall transportation strategy.

2.4.8. ALTERNATIVE SOLUTION #6: WIDEN NINTH LINE TO FOUR LANES

This planning alternative involves increasing the width of the road right-of-way and reconstructing Ninth Line within the defined study area to add at least two more through lanes to the corridor (one for each direction of travel). Various preliminary alternative design concepts would be developed that would mitigate potential negative impacts associated with the reconstruction. The alternative design concepts would adhere to the Region's Roadway Design Standards, Regional Road Traffic Noise Control Policy and

Ontario Traffic Manual (OTM) 18. Input received from the public/stakeholders was also incorporated into the design where possible.

This planning alternative would offer the opportunity to provide improved pedestrian and bicycle safety within the study area along with capacity, drainage and roadway sub-grade improvements. Other safety enhancement opportunities include the addition of a painted median to provide refuge for motorists turning in and out of private driveways. This planning solution offers the greatest opportunity to address the problem statement and is a feasible option.

2.4.9. *SELECTION OF PREFERRED SOLUTION*

The preferred solution is a combination of the following alternative solutions:

- Intersection and other operational improvements (Alternative Solution #4); and,
- Widen Ninth Line to four lanes (Alternative Solution #6).

2.4.10. *CONFIRMATION OF CLASS EA SCHEDULE TYPE*

As required by the Class EA process, the proponent must review and confirm the Class EA schedule at the end of Phase 2. Based on the preferred planning solution, the Project Team confirmed that the project was a Schedule 'C' undertaking.

3.0 EXISTING & FUTURE CONDITIONS

3.1. STUDY APPROACH

3.1.1. BACKGROUND INFORMATION REVIEW & AGENCY CONSULTATION

Available background natural environment information in the vicinity of the study area was collected from a number of sources including the Ontario Ministry of Natural Resources and Forestry (MNRF) and its Natural Heritage Information Centre (NHIC), Conservation Halton, Halton Region and the Town of Halton Hills. The background information focused primarily on the lands within the study area that may be directly impacted or indirectly impacted by the proposed works (i.e. approximately 50m on either side of the existing Ninth Line ROW between Highway 407 and 10 Side Road).

3.1.2. FIELD STUDIES

The natural environment in and adjacent to the study area was assessed and documented through the spring and summer of 2014 and the spring of 2015, as outlined in **Table 3-1**.

Table 3-1: Summary of Natural Environment Fieldwork

Date	Purpose
May 14, 2014	<ul style="list-style-type: none"> Reconnaissance/safety assessment Study area characterization (natural areas, roadside vegetation, watercourses, surrounding land uses)
June 4, 2014	<ul style="list-style-type: none"> Bird inventory and habitat assessment Habitat and wildlife assessment Watercourse assessment
June 13, 2014	<ul style="list-style-type: none"> Bird verification assessment (SAR)
July 16, 2014	<ul style="list-style-type: none"> Habitat and wildlife assessment Watercourse assessment
August 27, 2014	<ul style="list-style-type: none"> Woodlot/wetland assessment and inventory
September 8, 2014	<ul style="list-style-type: none"> Street tree assessment and enumeration
April 14, 2015 & May 6, 2015	<ul style="list-style-type: none"> Amphibian inventories Site walk with Project Team and Conservation Halton Staff
May 28 and 29, 2015	<ul style="list-style-type: none"> Borehole drilling for geotechnical investigation
June 3, 2015	<ul style="list-style-type: none"> Stake the boundaries of the wetland southwest of the Ninth Line and 5 Side Road intersection
December 10, 2015	<ul style="list-style-type: none"> Fluvial geomorphology assessment

3.2. NATURAL ENVIRONMENT

The Natural Environment component of the Class EA is required to determine if the proposed improvements will have any impact on the existing 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).

The natural environment in and adjacent to the study area was assessed and documented through the spring and summer of 2014 and Spring of 2015, as described in **Appendix B – Natural Sciences Report**.

The study area encompasses a portion of the Sixteen Mile Creek Watershed (eastern branch – shown in **Figure 3-1**) and includes two small woodlot features, one of which is identified as a regionally significant wetland called the East Oakville Swamp (refer to **Figure 3-2**). The majority of the surrounding land use is active agriculture, which essentially limits the natural wildlife habitat available to sporadic street trees, a single channel crossing and the small woodlots, though some wildlife will actively use the agricultural open space for breeding and nesting.

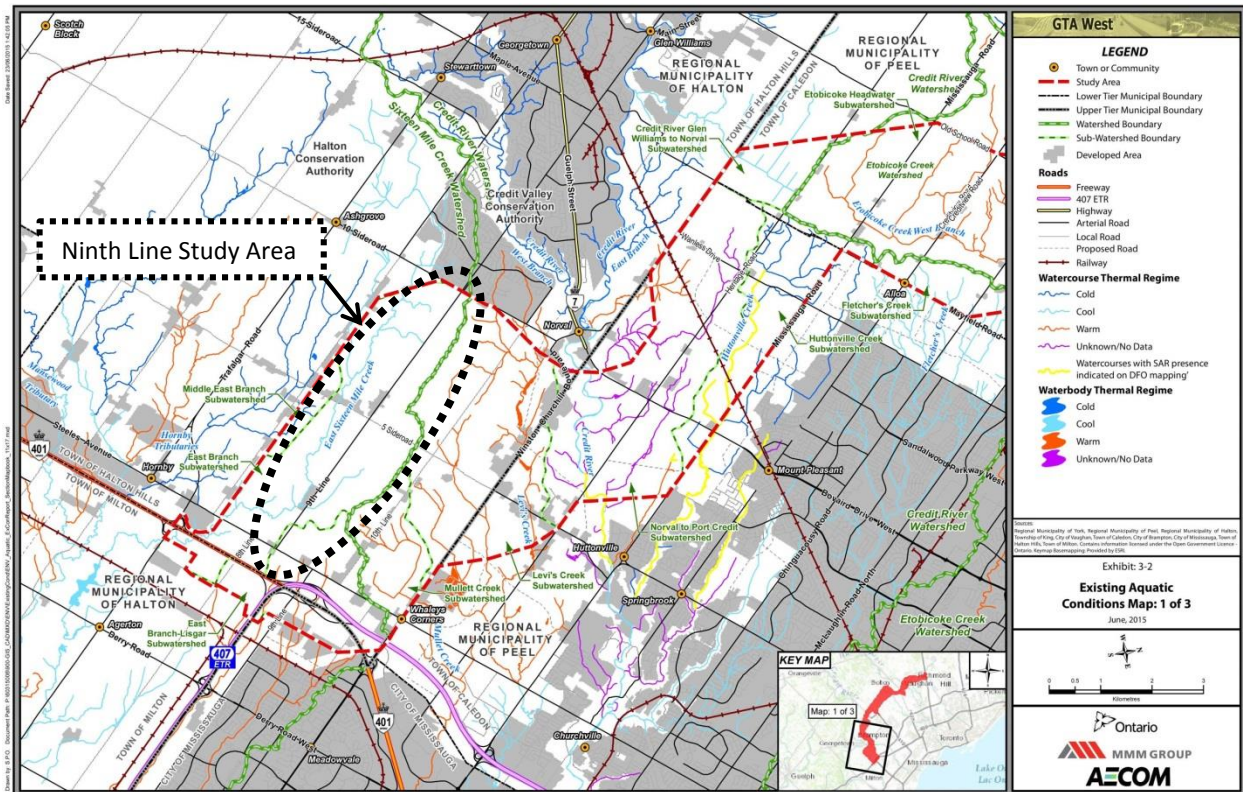


Figure 3-1: Map Depicting Watershed Features in the Vicinity of the Ninth Line Class EA Study Area

(Source: GTA West Transportation Corridor Planning and Environmental Assessment Study – Draft Overview of Environmental Conditions and Constraints – Working Paper Update (June 2015))



Figure 3-2: ELC Community Level Polygons with the Ninth Line Class EA Study Area

3.2.1. AQUATIC HABITAT AND FISHERIES

As noted previously, a headwater tributary of the East Sixteen Mile Creek traverses Ninth Line in the lower portion of the study area via an existing box culvert (referred to as Discharge Outlet #4 throughout the ESR). The upstream portion is relatively small and is surrounded by active agriculture with minimal riparian buffer. The downstream portion of the channel traverses manicured rural residential land before merging with a larger tributary southwest of the study area limits. The small tributary and downstream tributary are both identified as cool water or transitional water tributaries according to the GTA West Corridor Study (as shown on **Figure 3-1**). However, earlier studies suggest that there is limited data on small headwater tributary and the downstream tributary supported warmwater sportfish.

The fisheries habitat and channel morphology of the small tributary was assessed during field visits. As the channel is located on private property on both sides of the road, the assessment was limited to 30 metres upstream and 30 metres downstream in the channel and included an assessment of the substrate, banks and adjacent riparian vegetation. No fish sampling of the tributary was completed. Photographic records were taken to document the existing conditions within the channel (refer to **Appendix B**).

The small tributary of interest flows perpendicular to Ninth Line with a bend north approximately 200 metres upstream of the road. The channel is relatively small and shallow, exhibiting a wetted width ranging from 0.5 – 1.25 metres in the spring. While the bankfull width was relatively defined, there was no indication of high flows through this reach of the channel. The bank appears to be relatively stable with no signs of active erosion. The existing box culvert provides 3.0 metres inside dimension for conveyance of water and does not appear to be creating a hydrologic pinch point for the channel. Substantial sediment buildup at the upstream end of the culvert has altered the watercourse path slightly so the channel enters the culvert on an angle. The location of the sediment buildup suggests sediment origins from the roadside ditch to the north. The fluvial geomorphic assessment completed in December 2015 and included in the Stormwater Management Report (**Appendix E**) provides a complete assessment of the channel and culvert dimensions and current function.

OSAP protocols were applied to characterize the site features at the screening level for all suitable field measurements. The qualitative assessment included the rapid assessment for channel structure, however, benthic and fish sampling was not deemed required at the preliminary assessment stage based on the existing site features and limited fish habitat characteristics.

Substrate in the channel was comprised mainly of silt and clay (70-80%) with approximately 20% cobble providing relatively good benthic habitat. The instream vegetation was dense, consisting of both emergent vegetation and terrestrial species where the channel bottom was dry. There were notable sediment deposits on the downstream end of the channel by the culvert inlet giving rise to increased instream vegetation and braiding of the channel. Water was present during the June 2014 site visit with depths of 19 cm upstream at the culvert and 5 cm downstream; however, the channel was dry by mid-July 2014 with only small residual pools of water. There were only a few small minnows observed in the channel at the culvert inlet during the earlier site visit in June. The water chemistry within the channel and temperature were measured during field visits (results are presented in Section 2.2.1 of the Natural Sciences Report in **Appendix B**). The dry channel conditions likely affected the water quality and there were definite impediments to fish migration during the summer months. No minnows were observed during the July site visit.

The general water quality parameters fall within the preferred range for aquatic organisms during the spring months. The lack of water during the summer likely contributed to the higher concentrations of conductivity observed in the summer. Proximity to the road within roadside input and active agricultural land uses in the upstream reach may also contribute to variability in the water quality. Sampling following or during a major rain event may provide some additional information regarding the impact of the roadside drainage on the watercourse, however this will not affect the findings of this assessment.

A more comprehensive aquatic habitat assessment at the detailed design stage of the project, once the culvert and road details have been determined, may provide more complete baseline data for the post-construction monitoring, as well as, provide an indication of the channel features that need to be re-instated and/or enhanced. As well, fish habitat mapping as per the MTO Environmental Guide for Fish and Fish Habitat (2009) should be completed at the detailed design stage in order to determine the suitable natural channel design features that should be incorporated into the culvert and channel areas impacted by the chosen design. This information will assist in completing the risk assessment framework in terms of potential impacts which will be required for the Fisheries Authorization. Implementing an open bottom culvert design will eliminate the need to assess groundwater through the culvert area or the need for a benthic assessment provided that similar substrate is re-instated in the bottom of the channel.

The riparian buffer along the channel is relatively narrow both upstream and downstream of the main culvert, consisting primarily of a narrow swath of cultivated grasses and meadow species. Upstream of the culvert, the southern channel bank is adjacent to a narrow treed area, consisting of hawthorn, cedars, ash and willow species providing some shade and allochthonous matter to the watercourse. Further upstream, the surrounding lands are actively cultivated. The downstream riparian buffer is very narrow, consisting primarily of herbaceous vegetation and a few sporadic trees.

Based on the historical data provided in the existing reports and the field assessments completed for this study, the tributary of Sixteen Mile Creek is well defined and exhibits stable bank morphology and substrate characteristics. There is no current or historical information regarding the potential to support a fish community in this channel, and if so, the residence time would be limited to the spring months when there is water and connectivity. The water chemistry during the spring months falls within the range conducive to support an aquatic community. The narrow riparian buffers and proximity to road and roadside drainage inputs do expose the channel to both sediment and potential nutrient input.

3.2.2. TERRESTRIAL ECOSYSTEMS

The study area consists primarily of rural residential and active agricultural lands. The terrestrial natural heritage features within the study area are limited to two small woodlot/wetland features, including portions of the East Oakville Swamp (shown in **Figure 3-2**), at the intersection with 5 Side Road. All other small woodlot features within the length of the study area are located beyond 150 metres from Ninth Line and were not assessed as part of this study.

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 NAI-Detailed Ecological Land Classification (ELC) Mapping (2005) was undertaken for the general area as there were no identified NAI communities identified within the defined study area. Air photos were also used to interpret and determine the limits and characteristics of vegetation communities found adjacent to Ninth Line.

Due to limited access to the woodlot features, formal ELC assessments were completed based on roadside assessments. Field notes regarding the vegetation and soils in the wooded areas north of 5 Side Road were completed during the permitted field site visit to the small rectangular woodlot at the northwest corner and these notes provide the basis for the ELC applied to the forested areas at 5 Side Road, assuming similar conditions in the wooded areas further north and south of 5 Side Road.

The field evaluations completed for this study confirmed that the wooded natural area adjacent to Ninth Line at the intersection with 5 Side Road (northwest quadrant) can be described as Mixed Forest Ecosite (FOM7 – Fresh-Moist White Cedar-Hardwood Mixed Forest Ecosite) and Mineral Deciduous Swamp (SWD4) due to the predominance of Willow associated with the vernal pool areas (shown on **Figure 3-2**). The woodlot edge along Ninth Line primarily of white cedar, birch, elm, basswood and young ash trees. The interior vegetation was sparse with little understory, consisting primarily of buckthorn and red dogwood in the shrub layer and wild grape and ground ivy on the ground. Although the canopy cover was approximately 60%, there was substantial deadfall throughout the woodlot feature and the open canopy areas were re-vegetating with buckthorn and young ash. Soils in the upland area (with frontage on Ninth Line) were predominantly silt loam with little organic accumulation and clay with mottles at approximately 30 cm.

Further west of Ninth Line, the woodlot transitions to wetland characteristics in terms of the vegetation community and soils. In this area, the canopy trees are all dead and there is an increased abundance of willow species, dogwood and herbaceous vegetation such as purple loosestrife, jewelweed and a variety of sedges. The soils were saturated with organic depths of 30 to 40 centimetres and gley beneath. The Ecological Land Classification (ELC) community level polygons, requested by Conservation Halton and identified on **Figure 3-2** best describe the type of vegetation within these small forested blocks based on the information available.

Although the surface drainage patterns could not be clearly determined through the dense vegetation, it appeared that the wetland areas were sustained even through the dryer periods, which may indicate a high groundwater table and potential surface water groundwater interaction. The field assessment confirmed the presence of vernal pools that would be of sufficient depth to provide amphibian breeding through the spring months. It is unlikely that the vernal pool depth would support a salamander population and there was no detection of salamanders in the forested area on the northwest corner of the intersection based on a habitat sweep of logs and rocks.

The wetland area is located west of the right of way and it is not expected that there would be any direct impacts; however, the surface drainage patterns should be verified to ensure that any drainage contribution from Ninth Line is addressed. Although the wetland mapping for this woodlot was not verified and delineated as part of the field assessments, the vegetation in the at the corner is more indicative of upland features consisting of elm, birch and white cedar trees with sporadic black cherry and basswood. As such, it is recommended that the wetland polygon within the northwest woodlot be properly delineated to reflect the field conditions as the preliminary survey suggests that the wetland does not extend to the edge of the woodlot as depicted in the wetland mapping for this area.

There was a small polygon of trees associated with the southern bank of the primary channel (located in the southern portion of the study area) that consisted of large cedars, ash and willow with an understory of hawthorn, dogwood and wild cucumber. This area was assessed only from the edge of the channel due to limited access and private property. It can be assumed conservatively that the characteristics of the residual wooded area are similar to those identified in woodlots further north, which would classify the polygon as a Mixed Forest Ecosite (FOM7) based solely on the trees present. Soil assessments and polygons sweeps through the wooded feature are required to verify this ELC coding.

It should be noted that due to access constraints, the ELC codes presented in **Figure 3-2** are based on the data available and do not represent a comprehensive ELC survey of each woodlot feature.

There were no site visits or assessments completed on the wooded area at Steeles Road due to the active construction at the time of the field assessments.

A roadside vegetation inventory was conducted for all lands within twenty metres of the existing road in the fall of 2014 where access was possible. Along the remaining portions of the study area, the vegetation consisted primarily of roadside trees amidst agricultural and rural residential lands. The mature roadside trees were individually identified, as the road works will require selective removal of trees within the road allowance. It is estimated that there are approximately 191 trees along the western road allowance and 152 trees along the eastern road allowance. Only dead or dying trees were excluded from the survey. The list of trees is presented in the Natural Sciences Report in **Appendix B** of the ESR. There were no federally or provincially threatened or endangered vegetation species identified within the right of way.

3.2.3. WILDLIFE AND WILDLIFE HABITAT

The study area is divided by anthropogenic uses of rural farmland and rural residential which extend throughout the study area. The northern portion of the study area has no ecologically sensitive natural features. The small woodlots in the middle of the study area at 5 Side Road offer some wildlife habitat though the size of the woodlots do not provide for interior habitat.

The reports reviewed for this study confirmed that there are no Niagara Escarpment Commission (NEC) lands and no Areas of Natural and Scientific Interest (ANSI) in the study area. A GTA West Corridor report (2010) also indicated that there was no raptor nesting area or deer wintering areas identified within the study area limits.

The natural riparian area adjacent to the watercourse and the small woodlots 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, especially the noise and traffic associated with a busy road.

A review of the Natural Heritage Information Centre (NHIC) database indicated that there were historical records of a few Species at Risk recorded within the study area. Species at Risk identified included the Milksnake (*Lampropeltis triangulum triangulum*) which is listed as Special Concern and Bobolink (*Dolichonyx oryzivorus*) which is listed as a Threatened species under COSSARO and COSEWIC databases. With the exception of these species, no bird, amphibian or mammal species historically documented within the study area are considered to be of provincial significance according to the Natural Heritage Information Centre (NHIC) Provincial Rankings (COSSARO) and the COSEWIC status list.

Although the woodlot features are relatively small and isolated from larger contiguous tracks of forest, mast and berry producers in the woodlot areas provide a food source for various mammalian and avian species. Incidental wildlife observations included Northern Leopard Frog (*Rana pipiens*) which was observed at the channel culvert, Eastern Chipmunk (*Tamias striatus*), Grey Squirrel (*Sciurus carolinensis*), Northern Red-Bellied snake (*Storeria occipitomaculata occipitomaculata*), Raccoon (*Procyon lotor*), Striped Skunk (*Mephitis mephitis*), and Eastern Wild Turkey (*Meleagris gallopavo silvestris*).

Field assessments for amphibians were completed at dusk in the spring of 2015 at two locations: 1) adjacent to the watercourse and 2) adjacent to the woodlots at 5 Side Road. The field assessments indicated no amphibians calling within the woodlot features or along the watercourse based on the Marsh Monitoring Protocol. However, there is habitat available to support common amphibian species for portions of their life cycle. There was no detection of salamanders present in the northwestern woodlot based on a preliminary survey of rocks and logs.

The agricultural land uses, including active fields, mowed lawns and fallow fields provide suitable habitat for a variety of small mammals and a variety of birds; however, the small channel and limited associated riparian buffer provide little connectivity or cover for movement through the study area. Despite the constant traffic observed along Ninth Line, there was little evidence of road kill observed on the five field sampling dates in 2014.

An avifaunal survey was completed in the spring of 2014 to assess the potential habitat along Ninth Line and record any species of concern based on the existing database information and field confirmation. Weather details and survey locations are presented in the Natural Science Report (**Appendix B**). The surveys were limited to 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 improvements. The

avifaunal species present in the study area are primarily open country species and with some woodland species that prefer edge habitat. Species at Risk (including Candidate Species) were identified on the COSEWIC and SARO current website databases. These species were then cross-referenced with the Ontario Breeding Bird Atlas (OBBA) 2001-2005 database for Halton Squares 92 and 93 through which Ninth Line extends. Only those SARs and Candidate Species that appear in the relevant OBBA squares are included in **Table 3-2**.

Table 3-2: Potential SAR and Candidate Species

Potential SAR	Potential Candidates
<ul style="list-style-type: none"> • Common Nighthawk • Whip-poor-will • Chimney Swift • Red-headed Woodpecker • Eastern Wood-Pewee • Bank Swallow • Barn Swallow • Wood Thrush • Hooded Warbler • Bobolink • Eastern Meadowlark 	<ul style="list-style-type: none"> • American Kestrel • Killdeer • Black-billed Cuckoo • Belted Kingfisher • Least Flycatcher • Field Sparrow

Three (3) SAR and one COSEWIC Candidate Species were observed on June 4, 2014. Bobolink was observed singing and flying a territory in the hayfield southwest of 10 Side Road (Survey Point 1) just over 100m from the roadside. A Barn Swallow was also observed foraging over the hayfield at Survey Point 1 and Eastern Wood-Pewee was heard from behind the trees at Survey Point 2, well beyond 100m west of the roadside. As well, a single Barn Swallow was observed foraging at Survey Point 4 (west of Ninth Line roadside). One Candidate Species, Killdeer, was heard calling in the field from Survey Point 3, more than 100m east of Ninth Line roadside.

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 Candidate. 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.

Area-sensitive species are those species that typically require specific site characteristics such as 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. One of the observed bird species, the Eastern Wood Peewee, has been identified by OPIF and Bird Studies Canada (BSC) as a 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 Provincial Policy Statement (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.

In summary, with the possible exception of the Bobolink, no Species at Risk are expected to be negatively impacted within 120 metres of the proposed lane widening along Ninth Line. Eastern wood peewee uses the interior portions of the wood lot which are not expected to be altered by the road widening. Barn swallow habitat is associated with building structures which are also not impacted by the proposed works. Both species are aerial insectivores and there are adequate feeding areas in the surrounding fields. Neither species nests or feeds near the road. As such, the road widening will not impact the species behaviour or their associated habitat. The location of the observed Bobolink was at a distance well beyond the zone of impact associated with the road widening. There is no expected change in the extent of the various habitat types or quality as a result of any upgrades to Ninth Line.

3.2.4. DESIGNATED NATURAL AREAS

3.2.4.1. GREENBELT AND NIAGARA ESCARPMENT PLANS

According to the Natural Heritage System of the Greenbelt Plan (2005), the study area is located outside of the Greenbelt limits and not part of the Niagara Escarpment Plan Area.

3.2.4.2. GREENLANDS

The Halton Regional Official Plan (Interim Office Consolidation, 2015) was consulted to review the potential for identified Greenlands within the study limits. Both woodlots north and south of 5 Side Road were identified as woodlots greater than 0.5 hectares and the wetland feature northwest of the intersection is identified as Regional Natural Heritage System according to the Halton Region Official Plan Map 1 (Interim Office Consolidation, 2015).

3.2.4.3. ENVIRONMENTALLY SENSITIVE AREAS AND AREAS OF NATURAL OR SCIENTIFIC INTEREST

The Region of Halton designates Environmentally Sensitive Areas (ESA) based on criteria contained in the Regional Official Plan (Office Consolidation, 2006). There are no designated ESAs in the study area and there are no areas of natural or scientific interest (ANSI) located in or adjacent to (50 metres) the study area.

3.2.4.4. VALLEYLANDS

There are no significant valleylands associated with the watercourses within the study area.

3.2.4.5. WETLANDS

The small wetland woodlot feature located on the northwest corner of the intersection of Ninth Line and 5 Side Road is identified as a regionally significant wetland. There are no provincially significant wetlands (PSW) identified within the study area limits.

3.2.4.6. SIGNIFICANT WILDLIFE HABITAT

Four general types of significant wildlife habitat may be designated according to the PPS: migration corridors, seasonal concentration areas, rare or specialized habitat, and habitat for species of conservation concern. The SWH Criteria Schedules for Ecoregions 6E and 7E were reviewed and based on the field assessments completed for this report, the wetland areas, localized vernal pools and the surrounding woodlot areas may provide for Specialized Wildlife Habitat, particularly for amphibians, though none were heard during the amphibian monitoring in 2015.

3.2.4.7. SIGNIFICANT WOODLANDS

The OMNR Natural Heritage Reference Manual (2010) details the criteria, which define the relative significance of woodland features according to the Natural Heritage Policies of the Provincial Policy Statement (2005). The benefits include soil erosion protection, nutrient cycling, hydrological cycling, flood and erosion reduction, clean air and carbon storage, wildlife habitat, outdoor recreational opportunities and sustainable harvest of woodland products. According to the Manual, those woodlands that meet the size criteria or the criteria for ecological function or uncommon characteristics or provide for economic and social function are to be considered significant. The small woodlots within the study area do not meet the criteria defined by the MNRF Natural Heritage Reference Manual (2010). As such, the woodlots within the study area should not be considered Significant provincially. As noted in historical reports, there is no interior habitat, raptor nesting or deer wintering areas identified within the study area limits.

Both woodlots north and south of 5 Side Road were identified as woodlots greater than 0.5 hectares.

3.3. SOCIO-ECONOMIC ENVIRONMENT

The term socio-economic environment refers to components of the environment that are 'man-made', including property boundaries and planning policies (e.g. land use designations). All applicable planning policies (provincial, regional, municipal) were assessed to determine the impacts that the proposed road reconstruction may have on the socio-economic environment and vice versa.

The study area along Ninth Line from 10 Side Road to Steeles Avenue is rural with approximately 41 residences with driveway access to Ninth Line. The section northwest of 10 Side Road is located within the Georgetown Urban Area Boundary (UAB) and contains medium-density and low-density residential areas. The section of the study area that is southeast of Steeles Avenue is designated for 'prestige industrial' uses. There are approximately 13 residences within the study area with driveway access to Steeles Avenue. In addition, there are several farms, a church, and a cemetery with driveway access to Ninth Line and Steeles Avenue within the study area.

3.3.1. PROVINCIAL PLANNING FRAMEWORK

3.3.1.1. PROVINCIAL POLICY STATEMENT

The Provincial Policy Statement 2014 (PPS) provides policy direction related to land use planning and development on matters of provincial interest. The PPS sets the foundation for how development and use of land is regulated in Ontario and aims to enhance the quality of life for Ontarians over the long-term. All planning decisions made in the province must be consistent with the PPS.

The policies set out in the PPS represent minimum standards for land use planning in the province (Section 4.9 of PPS). The policies and guidelines of the other planning documents reviewed as part of this background study must also be considered during the planning of the Ninth Line Transportation Corridor Improvements.

Municipal Official Plans are considered to be the most important vehicle for the implementation of the PPS (Section 4.7 of PPS), as well as by-laws (Section 4.8 of PPS). It is assumed that the Region of Halton Official Plan and the Town of Halton Hills Official Plan are both in compliance with the policies set forth in the PPS.

Table 3-3 provides an overview of the PPS policies that are applicable to the Ninth Line Class EA Study and explains how the study has fulfilled these policies.

Table 3-3: Overview of Relevant Provincial Policy Statement Policies

PPS Policy	How the Ninth Line Class EA Addresses Each Policy
1.1.1 – Healthy, liveable and safe communities are sustained by: g) ensuring that necessary infrastructure, electricity generation facilities and transmission and distribution systems, and public service facilities are or will be available to meet current and projected needs.	The Ninth Line Class EA study was initiated by Halton Region to ensure that the corridor meets existing and future needs.
1.1.4.1 – Healthy, integrated and viable rural areas should be supported by: h) conserving biodiversity and considering the ecological benefits provided by nature.	Preserving and mitigating any negative impacts on the natural environment was a key consideration throughout the Class EA Study. Professionals knowledgeable of the natural environment and the impacts that the proposed undertaking would have on the natural environment were included on the project team and consulted throughout the study.
1.2.1 – A coordinated, integrated and comprehensive approach should be used when dealing with planning matters within municipalities, across lower, single and/or upper-tier municipal boundaries, and with other orders of government, agencies and boards including: d) infrastructure, electricity generation facilities and transmission and distribution systems, multimodal transportation systems, public service facilities and waste management systems.	The Ninth Line Class EA Study involved liaison between various parties including federal, provincial and municipal governments, local conservation authorities, utilities providers, and members of the public. As the proponent of this undertaking, Halton Region, is an upper-tier municipality, lines of communication were open with Town of Halton Hills staff throughout the course of the study.
1.2.2 – Planning authorities are encouraged to coordinate planning matters with Aboriginal communities.	Halton Region consulted with First Nations communities throughout the study (as described in Section 5.4.6 of the ESR).
1.3.1 – Planning authorities shall promote economic development and competitiveness by: d) ensuring the necessary infrastructure is provided to support current and projected needs.	The Ninth Line Transportation Corridor will service the Premier Gateway Employment Area (discussed further in Section 3.3.3.1 of the ESR). The Ninth Line Class EA study was initiated to ensure that the corridor meets existing and future needs.
1.6.3 – Before consideration is given to developing new infrastructure and public service facilities: a) the use of existing infrastructure and public service facilities should be optimized.	Methods of optimizing the capacity of the Ninth Line Corridor for both existing and future conditions were evaluated as part of the Ninth Line Class EA.

PPS Policy	How the Ninth Line Class EA Addresses Each Policy
<p>1.6.6.7 – Planning for stormwater management shall:</p> <ul style="list-style-type: none"> a) minimize, or, where possible, prevent increases in contaminant loads; b) minimize changes in water balance and erosion; c) not increase risks to human health and safety and property damage; d) maximize the extent and function of vegetative and pervious surfaces; and, e) promote stormwater management best practices, including stormwater attenuation and re-use, and low impact development. 	<p>A stormwater management assessment was undertaken for this Class EA Study (presented in Appendix E of the ESR). The stormwater management strategy presented in the ESR involves a treatment train approach, including low impact development techniques, to improve stormwater quality and infiltration. Calculations were completed to ensure that the proposed stormwater management system can handle severe storm events.</p>
<p>1.8.1 – Planning authorities shall support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and climate change adaptation through land use and development patterns which:</p> <ul style="list-style-type: none"> b) promote the use of active transportation and transit in and between residential, employment (including commercial and industrial) and institutional uses and other areas. 	<p>The provision of active transportation infrastructure (i.e. bicycle lanes and multi-use paths) was a key consideration throughout the course of the Ninth Line Class EA.</p>
<p>2.1.1 – Natural features and areas shall be protected for the long term.</p>	<p>The evaluation of alternatives included impacts to the natural environment. The project team engaged in extensive consultation with Conservation Halton to ensure the preservation of the natural features in the vicinity of the study area.</p>
<p>2.2.1 – Planning authorities shall protect, improve or restore the quality and quantity of water by:</p> <ul style="list-style-type: none"> h) ensuring stormwater management practices minimize stormwater volumes and contaminant loads, and maintain or increase the extent of vegetative and pervious surfaces. 	<p>The stormwater management strategy developed during the Class EA Study promotes stormwater infiltration and treatment where possible (discussed in Section 3.5 and Appendix E of the ESR).</p> <p>Along certain portions of Ninth Line, pervious asphalt is recommended.</p>
<p>2.6 Cultural Heritage and Archaeology</p>	<p>The study involved a Stage 1 Archaeological Assessment (Appendix C) and a Cultural Heritage Assessment (Appendix D).</p>

3.3.1.2. *GROWTH PLAN FOR THE GREATER GOLDEN HORSESHOE*

The Growth Plan for the Greater Golden Horseshoe (2006) (the 'Growth Plan') was prepared and approved under the Places to Grow Act (2005). This document guides decisions related to transportation, infrastructure planning, land use planning, urban form, housing, natural heritage and resource protection in the Greater Golden Horseshoe (GGH). The GGH spans from the Niagara Region in the south, to Waterloo Region to the west, Simcoe County to the north, and Northumberland to the east. The GGH is one of the fastest growing regions in North America, and the Places to Grow Act and the Growth Plan ensure that the growth of the region is properly managed. The Growth Plan works in conjunction with other provincial legislation, policies, plans and regulations.

As the population of the GGH continues to grow, smart transportation planning decisions are required to ensure that the needs of the residents of the area are met now and into the future as the GGH transportation system experiences increases in the volume of users. Improvements to the Ninth Line Transportation Corridor should consider the needs of commuters and various modes of transportation (vehicles, public transportation, cycling, and walking) throughout the planning process.

Similar to the PPS, the policies and targets within the Growth Plan represent minimum standards and decision-makers are encouraged to go beyond the minimum standards as long as doing so does not conflict with any other policy in the Growth Plan. Relevant Growth Plan for the Greater Golden Horseshoe policies applicable to the Ninth Line Class EA Study are provided in **Table 3-4**.

3.3.1.3. *GREENBELT PLAN*

The Greenbelt Plan (2005) is an extension of the Greater Golden Horseshoe Growth Plan strategy for land use planning in the fast growing Golden Horseshoe area. The Greenbelt Area includes all of the Niagara Escarpment Plan Area, Oak Ridges Moraine Conservation Plan Area, and the Protected Countryside Area.

The study area is located within the GGH; however, the study area is not within the Greenbelt Area. Therefore, the study area is not subject to this plan. This conclusion is confirmed by Schedule A2 of the Town of Halton Hills Official Plan, which offers more detail and was prepared in accordance with the contents of the Greenbelt Plan.

Table 3-4: Overview of Relevant Policies from the Growth Plan for the Greater Golden Horseshoe

Growth Plan Policy	How the Ninth Line Class EA Addresses Each Policy
2.2.1 – Growth Forecasts	Population and employment forecasts (to 2031) in Schedule 3 of the Growth Plan have been used by Halton Region and were provided to the Project Team at the outset of the study.
2.2.6 – Employment Lands: Policy 2d) Ensuring the necessary infrastructure is provided to support current and forecasted employment needs.	The Ninth Line Transportation Corridor will service the Premier Gateway Employment Area (discussed further in Section 3.3.3.1 of the ESR).
3.2.2 – Transportation – General: 1. The transportation system within the GGH will be planned and managed to: Policy 1b) offer a balance of transportation choices that reduces reliance upon any single mode and promotes transit, cycling and walking. Policy 1c) be sustainable, by encouraging the most financially and environmentally appropriate mode for trip-making. Policy 1d) offer multi-modal access to jobs, housing, schools, cultural and recreational opportunities, and goods and services. Policy 1e) provide for the safety of system users.	The problem statement for the Ninth Line Class EA supports the consideration of alternative modes of travel (i.e. active transportation). The alternative design concepts considered for this Class EA Study ensure the safety of all road users by adhering to the Region's Roadway Design Standards, Regional Road Traffic Noise Control Policy and Ontario Traffic Manual (OTM) 18.
3.2.2 – Transportation – General: 3. In planning for the development, optimization, and/or expansion of new or existing transportation corridors... municipalities will – Policy 3a) ensure that corridors are identified and protected to meet current and projected needs for various travel modes. Policy 3b) support opportunities for multi-modal use where feasible... Policy 3d) consider separation of modes within corridors, where appropriate.	The Ninth Line Class EA study was initiated by Halton Region to ensure that the corridor meets existing and future needs. Opportunities for promoting alternative modes of travel (i.e. cycling and walking) along Ninth Line were considered as part of this Class EA Study. The inclusion of bicycle lanes and a multi-use path along Ninth Line would separate automobiles from active transportation modes of transportation.
3.2.3 – Moving People 3. Municipalities will ensure that pedestrian and bicycle networks are integrated into transportation planning.	Pedestrian and bicycle networks have been integrated into the Region's TMPs and ATMP and the Town of Halton Hill's Active Transportation Plan, all of which were considered in the Ninth Line Class EA Study.

3.3.2. REGIONAL PLANNING FRAMEWORK

3.3.2.1. REGION OF HALTON OFFICIAL PLAN

The most current version of the Halton Regional Official Plan (ROP) is an Interim Office Consolidation dated September 28, 2015. According to the most up-to-date Regional Structure Map approved on September 2, 2015 (Map 1), the majority of the study area along Ninth Line is designated as 'Agricultural' with pockets of 'Regional Natural Heritage System' areas². The southernmost portion of the Ninth Line Class EA study area along Steeles Avenue is defined as 'Urban' and an 'Employment Area'. A portion of Map 1 that depicts the land use designations for the Ninth Line Class EA study area is shown in **Figure 3-3**.

According to Map 1C of the ROP, the southernmost section of the Ninth Line Class EA study area just north of the urban, employment area along Steeles Avenue, is designated as a 'Future Strategic Employment Area (Overlay)'. Refer to **Figure 3-4**, which presents a portion of Map 1C around the Ninth Line Class EA study area.

The majority of the Ninth Line Class EA study area, with the exception of the lands designated as Regional Natural Heritage System and Urban, is designated as a 'Prime Agricultural Area' according to Map 1E of the ROP as shown in **Figure 3-5**.

² The boundaries of the Regional Natural Heritage System may have been refined in accordance with Section 116.1 of the ROP.

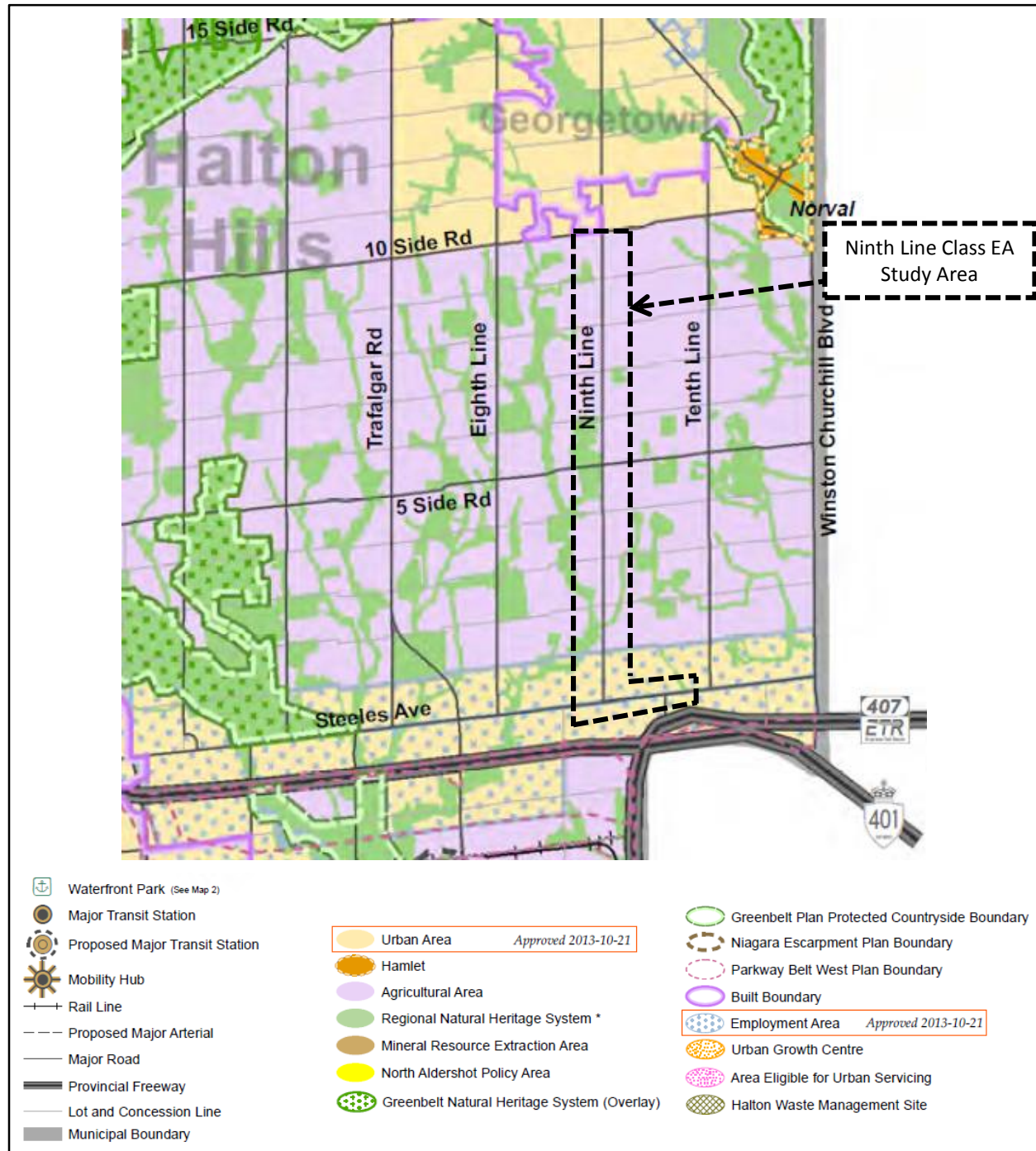


Figure 3-3: Regional Structure (Map 1) of the Regional Official Plan
 (Dated September 2, 2015)

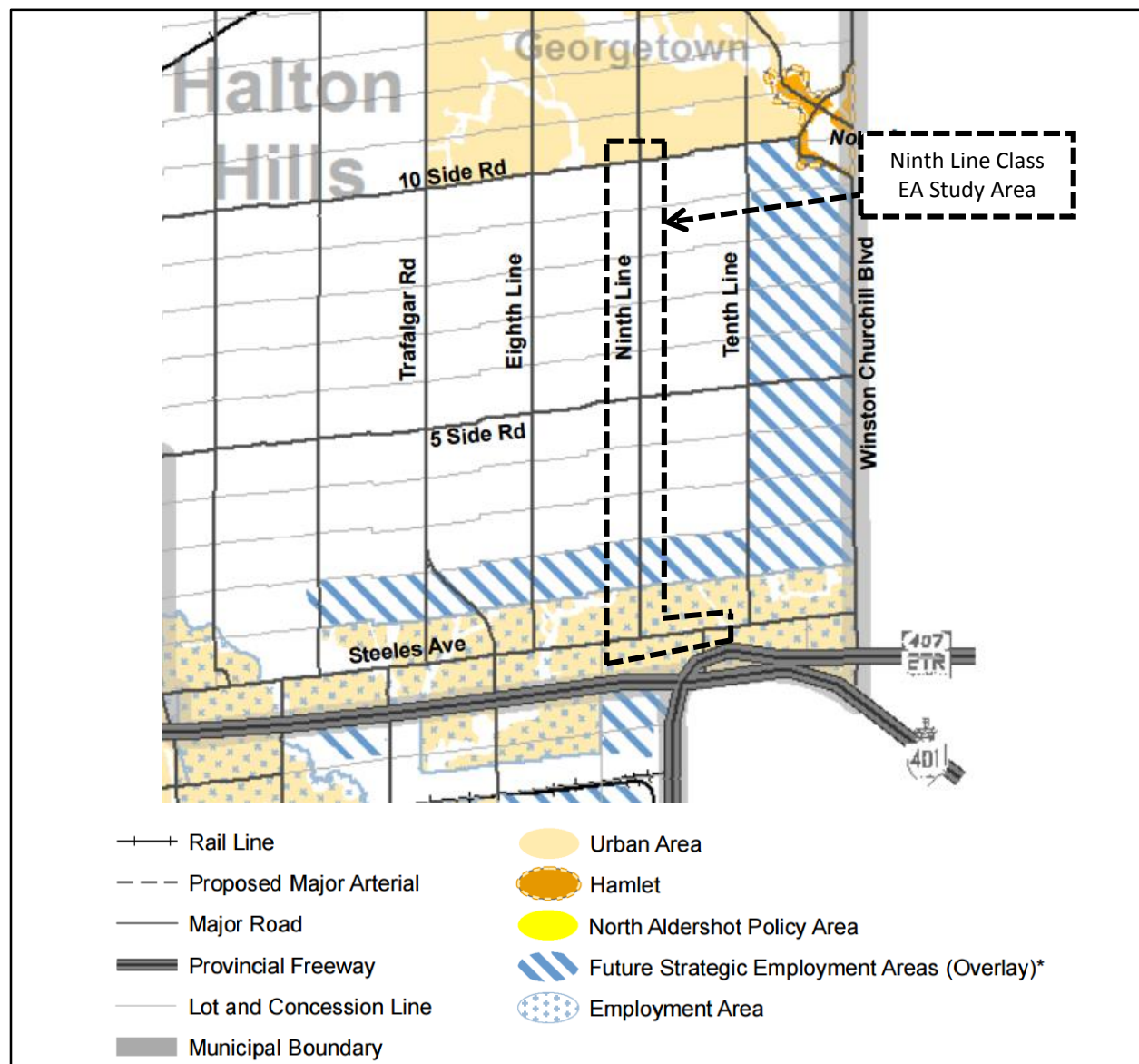


Figure 3-4: Future Strategic Employment Areas Map (Map 1C) from the Regional Official Plan
 (Dated October 9, 2014)



3.3.3. LOCAL PLANNING FRAMEWORK

3.3.3.1. TOWN OF HALTON HILLS OFFICIAL PLAN

The study area is designated as 'agricultural' in the Town of Halton Hills Official Plan (Schedule A1 of the Official Plan) (**Figure 3-6**). One quarter of the agricultural area along Ninth Line in the study area (the area southeast of 10 Side Road, south of Ninth Line, and northwest of 5 Side Road) is zoned as 'D1 – Living Area' under the Town's Official Plan. The remainder of the study area classified as agricultural along Ninth Line is zoned as 'D3 – Employment Area' under the Town's Official Plan.

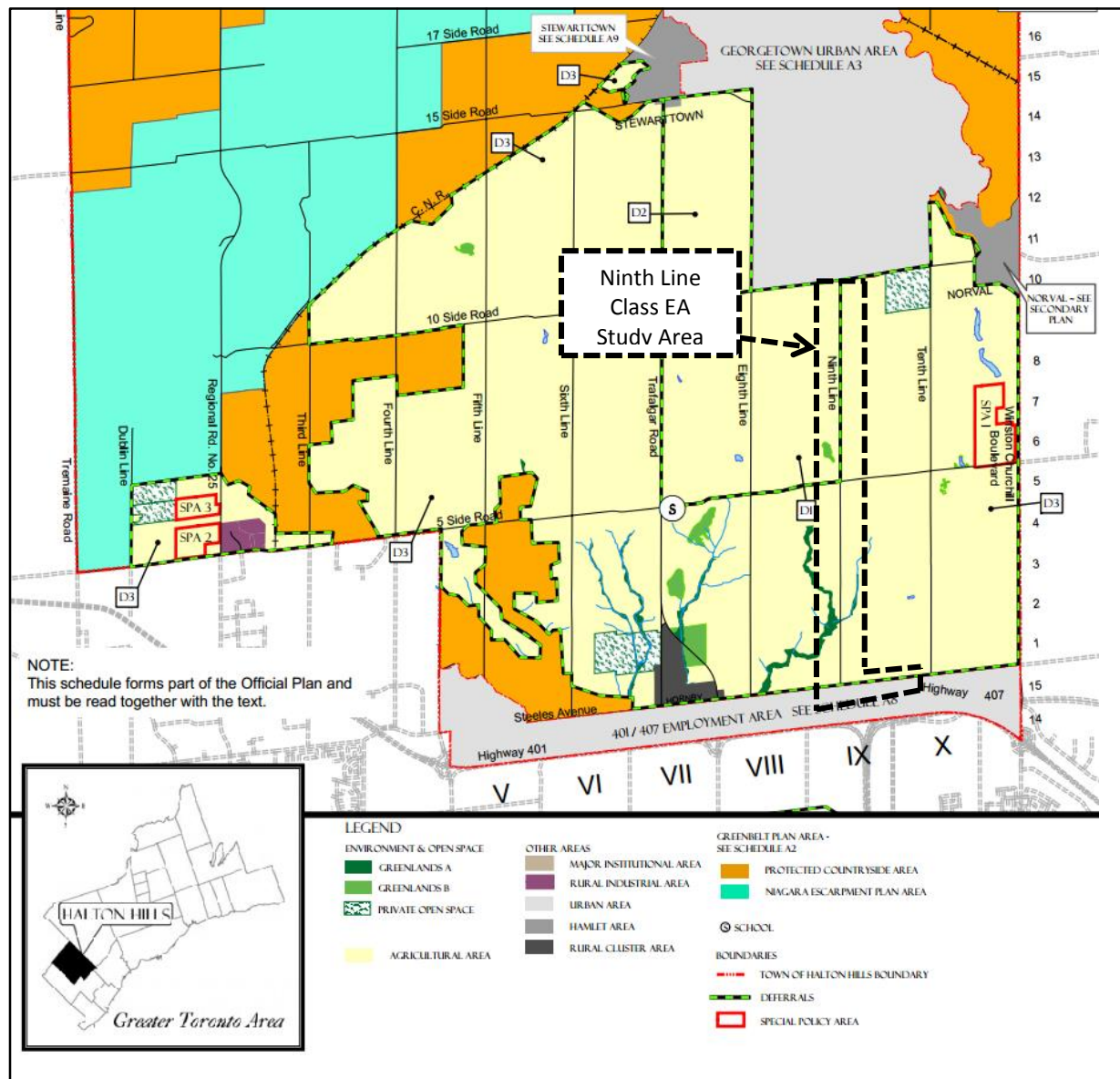


Figure 3-6: Schedule A1 of the Town of Halton Hills Official Plan

The southern portion of the study area is designated as part of the Premier Gateway Employment Area (also referred to as the 401/407 Employment Area for prestige industrial uses in the Region's Official Plan) in Schedule A8 of the Town's Official Plan (refer to **Figure 3-7**). Through Regional Official Plan Amendment (ROPA) 38 and the Town of Halton Hills Official Plan Amendment (OPA) 10, this land was added to the Urban Area in the Regional Plan and Official Plan respectively.

In June 2014, the Region of Halton adopted ROPA 43 to implement a corridor protection area and policies to protect for the Halton Peel Boundary Area Transportation Study/Greater Toronto Area West Corridor Study Area from development through the Town of Halton Hills and Milton to allow for the completion of the GTA West Corridor Environmental Assessment (EA) study being undertaken by the MTO. Following

the adoption of ROPA 43, the Town of Halton Hills created and adopted Official Plan Amendment No. 21, which protects the Halton Peel Boundary Area Transportation Study/GTA West Corridor Study areas from development pending the completion of Phase 2 of the GTA West Corridor EA and subsequent EAs. Bylaw No. 2014-0050 was passed on July 7, 2014 to adopt Official Plan Amendment No. 21.

The Corridor Protection Area Overlay freezes new development on all lands east of the Toronto Premium Outlets within the Town's Premier Gateway Employment Area, which includes the southern portion of the Ninth Line study area. These lands will now be unavailable for development until the GTA West EA study is completed and it is determined what lands are/are not required for the transportation corridor. As a result of the introduction of corridor protection (through ROPA 43 and OPA 21), and the re-phasing of employment lands by Halton Region (through ROPA 43) the Town has re-phased the employment lands in the Premier Gateway Employment Area (as shown on **Figure 3-7**).

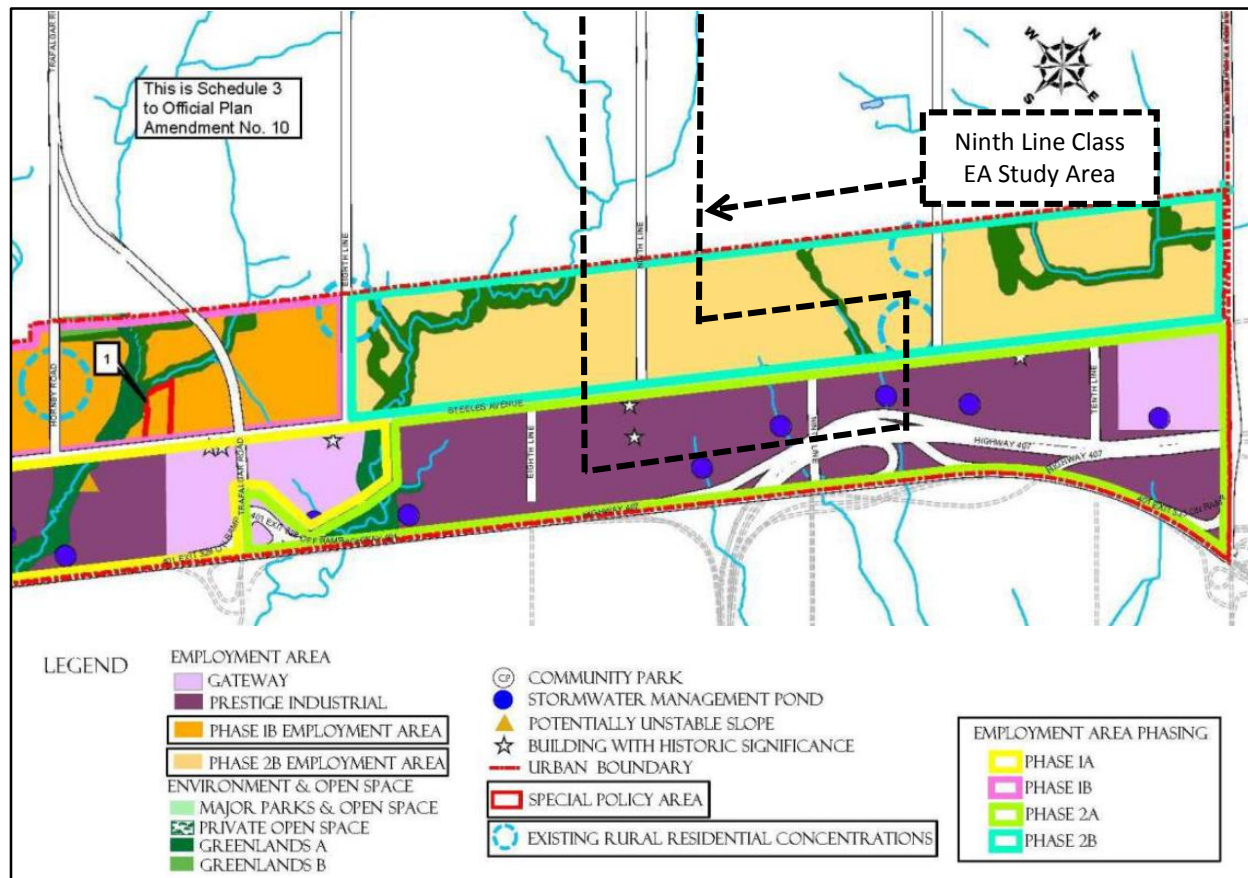


Figure 3-7: Schedule A8 of the Town of Halton Hills Official Plan

The small area northwest of 10 Side Road within the study area boundary is designated as a mix of low-density and medium-density residential areas (Schedule A3 of the Official Plan) (**Figure 3-8**). Most of this section of the study area has existing residences, with a few residences under construction north of the intersection at 10 Side Road and Ninth Line.

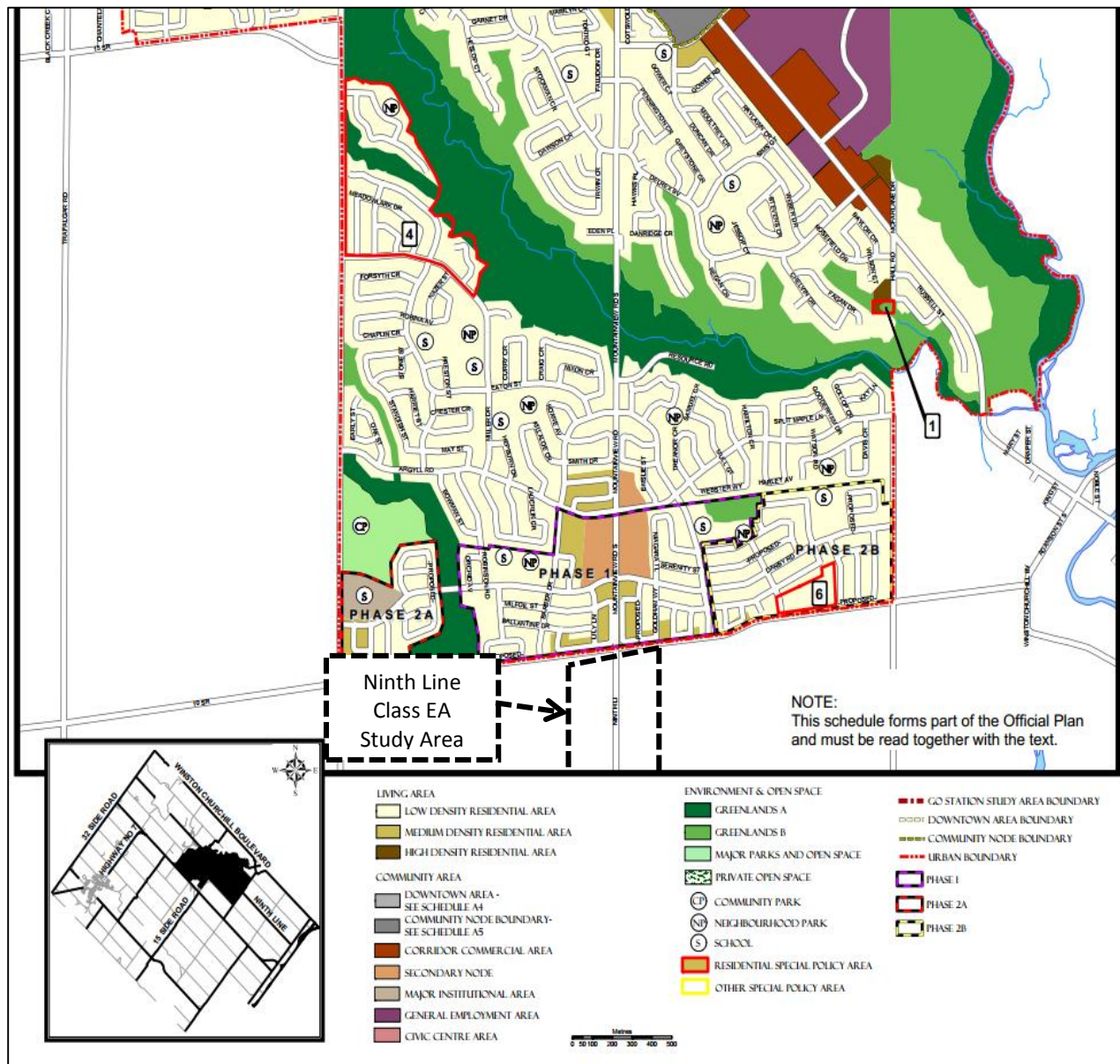


Figure 3-8: Schedule A3 of the Town of Halton Hills Official Plan

3.3.3.2. VISION GEORGETOWN SECONDARY PLAN

In response to the requirements of the Growth Plan, PPS, and Greenbelt Plan, Halton Region established an initiative called Sustainable Halton to develop a growth management and land use response to these provincial planning policy frameworks. In 2006 Sustainable Halton was tasked with identifying where growth will be targeted in the Region and in 2009 Sustainable Halton delivered a Preferred Growth Option which was adopted through Regional Official Plan Amendment No. 38. A part of the Preferred Growth Option concerns the Town of Halton Hills and the Vision Georgetown Secondary Plan was developed to achieve the planning goals for Georgetown laid out in the Preferred Growth Option.

The Vision Georgetown study area is shown in **Figure 3-9**. The study area is located just west of the Ninth Line Class EA study area; 10 Side Road and Eighth Line mark the south and east boundaries of the Vision Georgetown study area. The Preferred Growth Option projects that the area will see population growth of 20,000 residents. In order to accommodate the moderate population growth, 370 hectares of residential/mixed use land adjacent to the Georgetown Urban Area and 340 hectares of employment land adjacent to the 401/407 Employment Corridor (south of the Ninth Line Class EA study area) must be developed by 2031. The built-up areas of Acton and Georgetown are required to meet a minimum intensification target of 5,100 units by 2031.

The Vision Georgetown Secondary Plan repeatedly mentions the importance of preserving the small town character, rural feeling, and significant environmental features of the area while accommodating the moderate rate of population growth to 2031.

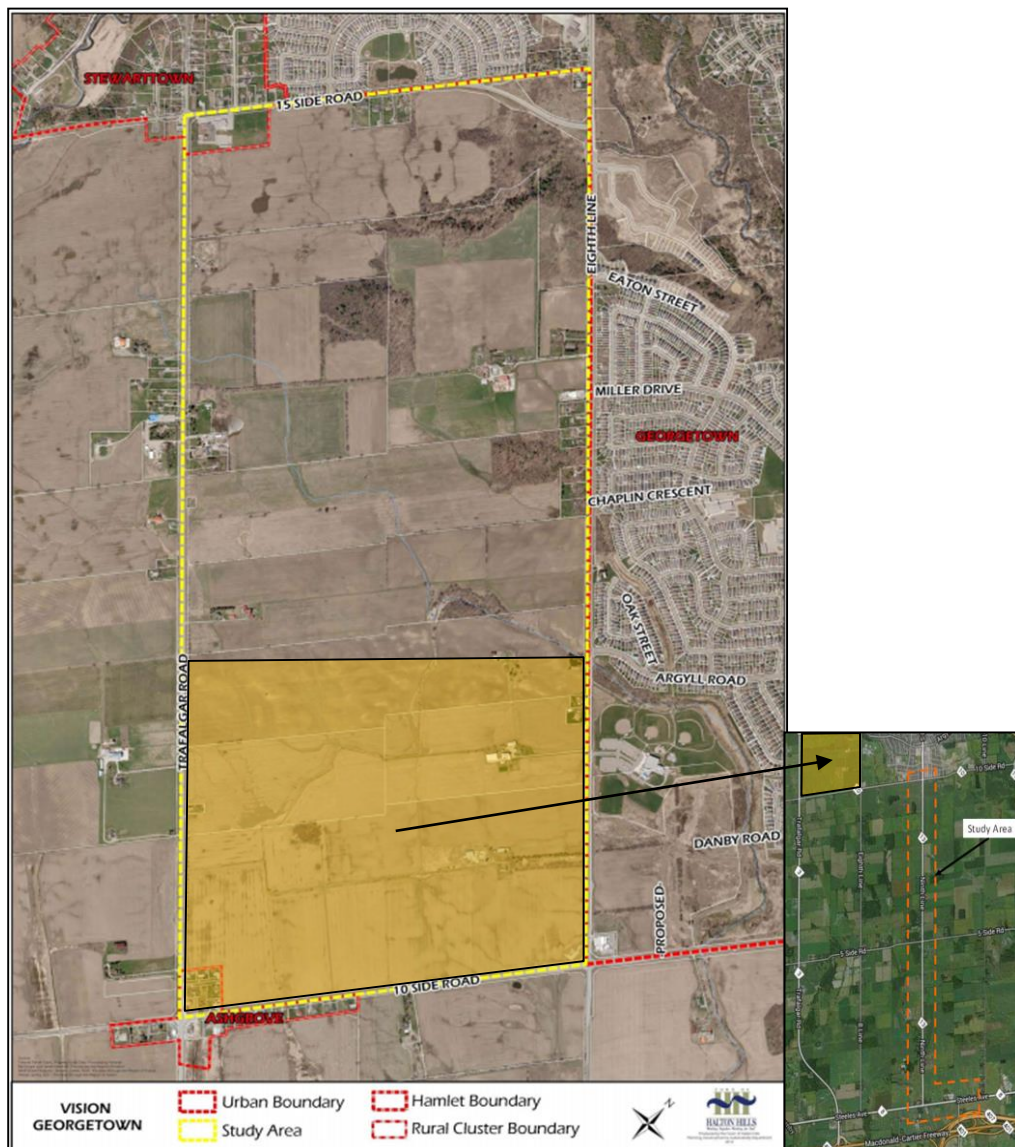


Figure 3-9: Vision Georgetown Study Area Boundaries

3.4. CULTURAL HERITAGE ENVIRONMENT

Detritus Consulting Ltd. completed an archaeological assessment and a cultural heritage assessment for the Ninth Line study area to identify cultural heritage features and make recommendations on how to mitigate any potential negative impacts posed by the preliminary preferred design.

3.4.1. ARCHAEOLOGICAL ASSESSMENT

The study area was subject to Stage 1 background research in June 2014 and July 2015. Background research revealed the study area exhibited large stretches of archaeological potential along with some areas of low or no potential due to disturbance or a lack of proximity to features that create potential. The study area is adjacent to mapped historic farmsteads and built heritage resources, which may contain undisturbed archaeological resources. Site visits were carried out on July 6, 2014 and July 7, 2015. A Stage 2 Archaeological Assessment of areas with archaeological potential is recommended in the future stages of this undertaking (refer to full report in **Appendix C**).

Background research was undertaken in order to:

- Determine the potential for any archaeological resources which may exist on the property;
- Establish the proximity of known archaeological sites by compiling all available data on previous archaeological surveys in the area; and,
- Determine the prior land use of the property including prior construction impacts.

Pre-Contact aboriginal culture in the vicinity of the study area developed along similar lines to those in the rest of southern Ontario and the northeast until we reach the Middle Woodland period and the emergence of the Point Peninsula Complex about 300 B.C.E. Burial mounds such as Serpent Mound are another distinguishing characteristic, many featuring well-made grave goods. Subsistence patterns appear to have focussed on rivers and upland hunting but gradually shifted toward a system more oriented toward fishing. Most importantly, it is during the Middle Woodland period that corn and tobacco agriculture appear.

Around 900 A.D. Point Peninsula artefacts are replaced by Owasco artefacts. How or why this happened is not fully understood but archaeologists believe the Owasco culture may have been the ethnic and cultural antecedent of the Ontario and New York Iroquois.

Research in the National Archaeological Sites Registration Database for the Province of Ontario at the MTCS office in Toronto indicates there are 8 archaeological sites registered within 1km of the study area. These include a number of historic homesteads, mainly clustered around the south end of the study area and one Pre-Contact aboriginal campsite, also near the south end of the study area.

The Ministry of Tourism, Culture and Sport has designated a set of criteria that allow for a determination of archaeological potential for a given property. These criteria include:

- The distance from the study area to any known archaeological sites;
- Elevated topography;
- Pockets of sandy soil;
- Proximity to historic transportation routes;
- Proximity to mapped historic structures; and
- Proximity to sources of water (these may be in the form of primary sources such as lakes or rivers or secondary sources such as old beach ridges or ancient riverbeds).

Certain features of a study area may lower or remove archaeological potential entirely depending on their severity. These include disturbance to the plough zone or surface topsoil layer through grading, excavation, filling, construction or other ground disturbing activities. While it is possible for deeply buried archaeological resources to remain intact under road surfacing and asphalt driveways/parking areas, disturbance of this kind does lower archaeological potential. No specific, graphic determination of archaeological potential was made for small driveways beyond the surrounding context of archaeological potential. But it can be assumed that archaeological potential has been compromised within these small areas.

Archaeological potential can vary greatly from one area to another but for the purposes of this study and in accordance with terms used within the *Standards and Guidelines for Consultant Archaeologists* established by MTCS (Ontario Ministry of Tourism and Culture 2011), archaeological potential was defined as either existing or low/none. In the case of the area under study, low/no potential is sometimes due to disturbance, whether obvious, confirmed, or suspected, based on the physical and topographic traits of the area. Otherwise low/no potential is simply the result of a lack of features that create archaeological potential within sufficient proximity to the study area. Areas exhibiting low or no potential do not require Stage 2 survey under the 2011 Standards and Guidelines.

The Archaeological Potential Map for Halton Region was consulted and all areas, which were deemed to have archaeological potential (except where obvious disturbance in the form of road or building construction has intervened) were identified as having archaeological potential. Additionally, all homesteads and heritage structures identified in the Archaeological Master Plan of Halton Region (AMP) Map have been incorporated and act as features, which create archaeological potential. All areas which correspond to the exact location of mapped former historic structures have been designated as having archaeological potential. Areas with archaeological potential are identified on **Figure 3-10**.

A copy of the Stage 1 Archaeological Assessment Report submitted to MTCS is provided in **Appendix C**. The Stage 1 Archaeological Assessment Report was entered into register on April 14, 2016; the confirmation letter from MTCS has also been provided at the end of **Appendix C**.

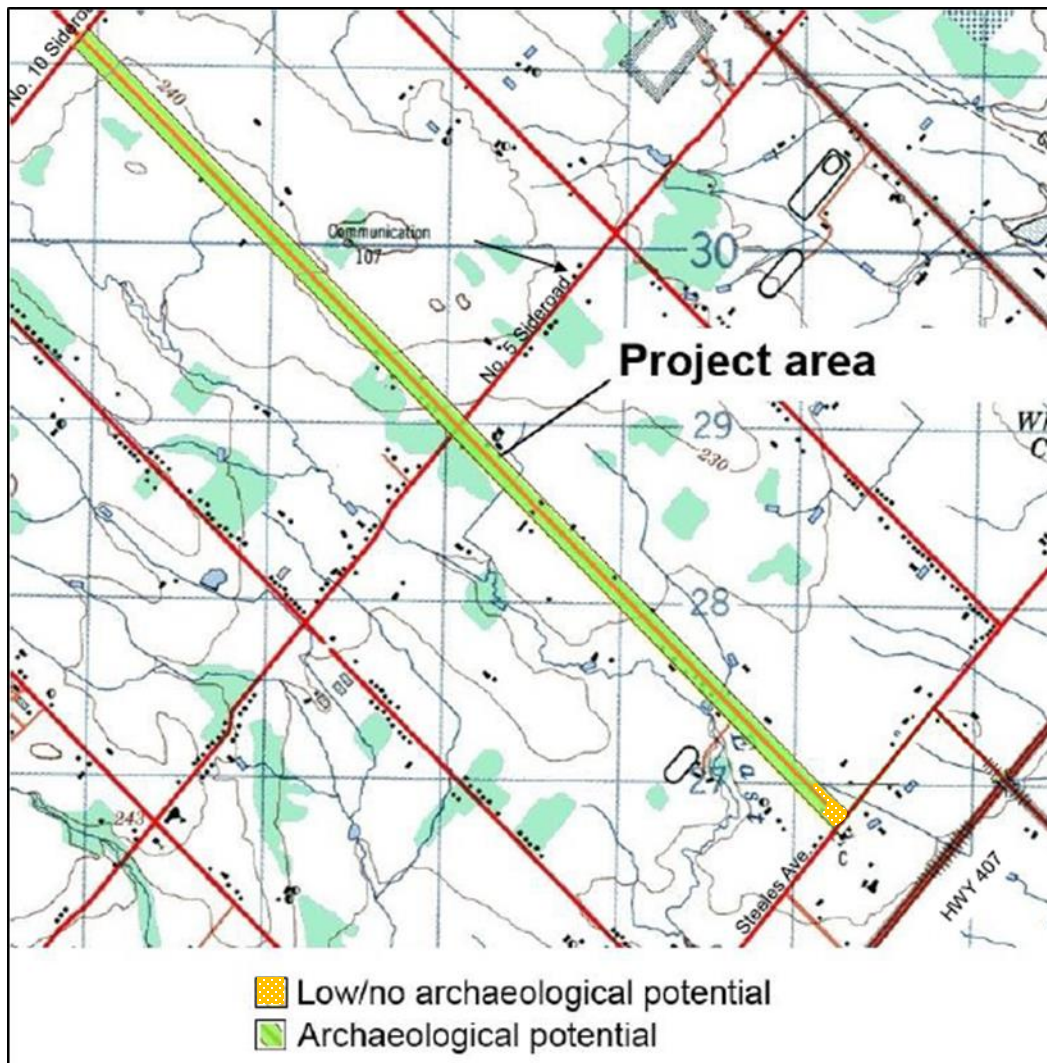


Figure 3-10: Summary of Areas with Archaeological Potential

3.4.2. CULTURAL HERITAGE ASSESSMENT

Two basic cultural heritage resources were identified through the Cultural Heritage Assessment, Cultural Heritage Landscapes and Built Heritage Resources. Definitions from the *Standards and Guidelines for the Conservation of Provincial Heritage Properties* (MTCS, 2010) are provided below:

*A **Cultural Heritage Landscape** is a defined geographical area that human activity has modified and that has cultural heritage value. Such an area involves one or more groupings of individual heritage features, such as structures, spaces, archaeological site, and natural elements, which together form a significant type of heritage form distinct from that of its constituent elements or parts. Heritage conservation districts designated under the Ontario Heritage Act, villages, parks, gardens, battlefields, main streets and neighbourhoods, cemeteries, trails, and industrial complexes of cultural heritage value are some examples.*

A Built Heritage Resource is one or more significant buildings (including fixtures or equipment located in or forming part of a building), structures, earthworks, monuments, installations, or remains associated with architectural, cultural, social, political, economic, or military history and identified as being important to a community.

In some cases, Cultural Heritage Landscapes may contain one or more resources within which have been individually identified by the Town of Halton Hills as a Built Heritage Resource.

Within the study area nine (9) cultural heritage resources were identified and subject to review. These include seven historic homestead sites, a 19th Century Church and associated graveyard, and the Ninth Line rural roadscape (refer to **Figures 3-11, 3-12 and 3-13**).

With the exception of one small scale industrial facility on Steeles Avenue near Highway 407, and two stretches of mid-20th Century homes, this rural agricultural landscape is intact and features a number of buildings built from the 1830s to the late 1800s. No properties within the study area have expressed an intention to designate.

The Cultural Heritage Assessment Report, presented in **Appendix D**, includes a brief history of each site, photo documentation, a summary of key architectural features, an evaluation of heritage interest/value and an analysis of possible impact issues.



Figure 3-11: Cultural Heritage Resources Located in Northernmost Portion of the Study Area



Figure 3-12: Cultural Heritage Resources Located in the Mid-Section of the Study Area



Figure 3-13: Cultural Heritage Resources Located in the Southernmost Section of the Study Area

3.5. STORMWATER MANAGEMENT ASSESSMENT

A stormwater management assessment was conducted to evaluate existing drainage conditions and determine the stormwater management infrastructure required for the proposed preliminary design to ensure that the new road drains properly and nearby private water wells are not negatively impacted by the road improvements. The full Stormwater Management Report is provided in **Appendix E**.

The study area is located within the East Branch catchment of the Sixteen Mile Creek system. Drainage for the Ninth Line road right-of-way is primarily via roadside ditches along both sides of the road. Drainage channels originating up-gradient of the road corridor enter the roadside drainage network and traverse the corridor through a series of culvert crossings under Ninth Line. Of these crossings, there is one major crossing of a small headwater tributary that traverses Ninth Line in the lower portion of the study area. This headwater tributary presents a flooding and erosion hazard as defined by the Conservation Authorities Act.

To investigate up-gradient drainage that traverses the study corridor, digital terrain data and local drainage channel locations were obtained from the Region. These data were supplemented by drainage catchment delineation and stream lines provided by Conservation Halton for Sixteen Mile Creek. Based on this information, a surface model of the study area was completed and the drainage patterns within this area examined (refer to Drainage Plan Figures 1 through 3 in Appendix A of the Stormwater Management Report provided in **Appendix E** of the ESR).

The primary tributary of interest flows perpendicular to Ninth Line with a bend north approximately 200 metres upstream of the road. The channel is relatively small and shallow. A fluvial geomorphic assessment for this channel is provided in Section 4.1 of **Appendix E**. A photograph of the culvert is presented in **Figure 3-14**.



Figure 3-14: Main Crossing Culvert

There is an additional major crossing (Discharge Area No. 5) at the southeast end of the study area, however this crossing is part of the current Steeles Avenue reconstruction and was therefore not assessed.

There are four additional corrugated steel pipe (CSP) culvert crossings that convey drainage from the eastern roadside ditches and rural lands to the west of the road as identified in Appendix A of the Stormwater Management Report and listed in **Table 3-5**. These four culverts outlet into separate channels that continue westward to the East Branch of Sixteen Mile Creek. These culverts range in size from 450 mm to 1,125mm. These culverts are below the 2,000 mm diameter used by the Region as the threshold

to track the culvert condition, therefore there is no historical data for these culverts. Visual observations by the team indicated these culverts were in generally good condition with minor deformations of the pipes and water corrosion present in one pipe (Culvert #3). There are additional driveway culverts in the study area that connect the parallel roadside ditches through existing driveways and other culverts that provide a hydraulic connection between the roadside ditches on the eastern and western sides of Ninth Line.

Table 3-5: Ninth Line Culvert Crossings that Discharge out of Study Area

Discharge Point	Station	Dimension	Catchment Area (ha)
1	1+238	700 mm dia CSP	109.
	1+247	900 mm dia CSP	
2	3+056	450 mm dia CSP	36.
3	3+498	1125 mm dia CSP	37.
4 (main crossing)	5+180	3000 mm wide Concrete Box	196.
5 (part of Steeles Ave re-construction)	6+139	1900 mm wide Concrete Box	53.

The total catchment area up-gradient of the five discharge points is 432.0 hectares. There is an additional 25.8 hectares of drainage areas west of Ninth Line that is collected by the existing Ninth Line roadside ditches.

3.6. HYDROLOGIC & HYDRAULIC ASSESSMENT

The main culvert crossing (Discharge Point 4 at survey station 5+180) is a 3.0 metre wide open bottom box culvert. A preliminary assessment of peak flow rates for the main culvert crossing was completed using Visual HYMO. Inputs and model outputs for this assessment are provided in Appendix D of the Stormwater Management Report (provided in **Appendix E** of the ESR). A summary of the inputs includes:

- The catchment for the discharge point was divided into 4 sub-catchments;
- Based on Town of Halton Hills rainfall data, a 12-hr SCS Type 2 mass curve was developed with a 15 minute time interval;
- Time of Concentration for each catchment was calculated using the Airport Method; and
- Based on the predominant soil type, SCS Curve Number (CN) was set at 88 for all design storms except the Regional Storm where an assumed higher antecedent moisture condition resulted in a CN of 95.

The peak flows for each design storm are shown in **Table 3-6**.

Table 3-6: Peak Flow Rates at Main Crossing

Return Period	Peak Flow (cms)
2-yr	3.8
5-yr	6.7
10-yr	8.7
25-yr	11.3
50-yr	13.3
100-yr	15.2
Regional	21.5

These flow rates are likely conservative (high) based on modelling inputs and assumptions.

These flow rates were then applied to the HEC-RAS model of the drainage system provided by Conservation Halton. A summary of results is provided in **Table 3-7**. This assessment was completed for the current culvert cross section and at three times bankfull width as well. Increasing the height of the culvert opening from 0.7 metres to 1.5 metres was also examined.

In **Table 3-7**, the road surface is threatened during 25-year return period storms with a new 3.0 metre wide by 0.7 metre deep culvert (but longer to traverse new wider road). However, when the culvert opening is increased to account for three times bankfull width, the floodplain elevations for all design storms are well below the proposed road surface elevation at the crossing.

The bottom row of **Table 3-7** also shows the open channel capacity of each culvert option calculated independently. When compared to the peak flow rates in **Table 3-6**, results show that a new culvert with a 10 metre width and 0.7 metre depth can pass the 50-year peak flow without restriction, which meets the required 50-year storm (MTO, Rural Arterial, 0.6m span). Larger culverts (wider and/or deeper) can pass the Regional Storm peak flow under open channel conditions. Conservation Halton has requested that the Region consider an ultimate culvert design that keeps Ninth Line road surface flood free under Regional Storm conditions.

A culvert 15 metres wide by 1.5 metres high addresses all of the above requirements.

Table 3-7: Flood Plain Elevation at Road Crossing

		Proposed 3m x 0.7m Box Culvert	Proposed 10m x 0.7m Box Culvert	Proposed 10m x 1.5m Box Culvert	Proposed 15m x 0.7m Box Culvert	Proposed 15m x 1.5m Box Culvert
Category of Storm Severity	2 Year	213.32	212.77	212.77	212.65	212.65
	5 Year	213.83	212.96	212.96	212.78	212.78
	10 Year	214.37	213.07	213.07	212.86	212.86
	25 Year	214.73*	213.21	213.21	212.96	212.96
	50 Year	214.78*	213.32	213.31	213.03	213.03
	100 Year	214.80*	213.40	213.40	213.09	213.09
	Regional	214.92*	213.75	213.68	213.29	213.29
Culvert	UP Invert	212.56	212.56	212.36	212.56	212.36
	DN Invert	212.05	212.05	211.80	212.05	211.80
	UP Obvert	213.26	213.26	213.86	213.26	213.86
Road Crest Height		214.68	214.68	214.68	214.68	214.68
Culvert Open Channel Capacity (cms)		3.5 < 2-yr storm	13.9 > 50-yr storm	47.6 > Regional Storm	21.4 > 100-yr storm	75.3 > Regional Storm

*Note: * Flood line elevation is above road crest*

3.7. FLUVIAL GEOMORPHOLOGY

A site visit was made on December 10, 2015. Details of the site visit and analysis are provided in Section 4.1.2 of the Stormwater Management Report provided in **Appendix E**.

During this field survey, a Rapid Geomorphic Assessment (RGA) was undertaken as well as the survey of two cross sections upstream of the culvert crossing on Ninth Line. The RGA was undertaken to determine the current geomorphic status of the sections. Bankfull geometry estimates cannot be made without knowing the stability status of the channel in question. Sections were measured to characterize the existing geometry of the stream bed.

The RGA used for this project is a standard assessment adapted from the Ontario Ministry of Environment's Stormwater Management and Planning Manual, Appendix C, Rapid Geomorphic Assessment, 2003 (Ontario Ministry of Environment, 2003), the State of Maine's Rapid Geomorphic Assessment, Appendix J-3, 2007 (State of Maine, 2007), and the NCHRP's Report 25-25 (8), Developing Performance Data Collection Protocol for Stream Restoration, 2006 (National Cooperative Highway Research Program, 2006). Each of the study reaches was evaluated for specific evidence of:

- Aggradation;
- Degradation;
- Widening; and,
- Plan Form Adjustment.

From this evaluation, an index score was derived. The index scores are indicative of general geomorphic stability: a score of less than 0.20 indicates a stable system (in-regime), a score of 0.21 to 0.40 indicates a stressed/transitional system, while a score of greater than 0.40 is indicative of an adjusting (unstable) system.

The RGA survey was based upon a physical inspection of approximately 300 metres of channel (and stream valley) upstream of the culvert crossing on Ninth Line. The RGA observation sheet is presented in Appendix E of the Stormwater Management Report provided in **Appendix E** of the ESR.

It is apparent that the channel geomorphology upstream of the culvert has been impacted by human activities, insofar as the RGA score of 0.26 indicates that the stream is in a state of transition, from stability to instability. The primary driver for this transition to instability appears to be degradation (erosional loss and entrenchment) followed by plan form adjustment (meander loss and re-establishment). Agricultural interference in the form of channelization and ploughing to and through the channel and its valley complex seem to be the primary cause.

Because of the transitional nature of the stream system as it presently exists, it is important to note that bankfull geometry indicators should be used with caution.

The existing channel configuration can be used to estimate the magnitude of the bank-forming flow event and thus the bankfull stream width. The bank forming event is that stage and velocity of water in the channel that exhibits a recurrence between once a year and once every two years (1 to 2-year return flow frequency). In-situ conditions such as channel friction/roughness, channel morphology data such as bankfull width and depth and mean profile slope can be utilized to estimate the bankfull flow (capacity) of the channel as it is currently configured. These data can also be used to estimate the bankfull channel velocity that has given rise to the conditions observed in the channel during the geomorphic site assessment.

Only the reach immediately upstream of the culvert (to 60 metres upstream of the culvert inlet) presented evidence of a clearly defined bankfull depth and width. Beyond this thalweg distance, the stream bed and valley are too disturbed by long term ploughing to adequately discern the bankfull width/depth of the channel.

Two sections were surveyed. The first was within the disturbed channel, approximately 125 metres upstream of the culvert inlet. This channel section was surveyed to determine the severity of channel disturbance from agricultural activities. **Figure 3-15**, details the setting for this cross section survey.



Figure 3-15: Channel Survey Section in Disturbed Area
(Approximately 125m upstream of main culvert inlet)

The measured cross-section for this location is depicted in **Figure 3-16**.

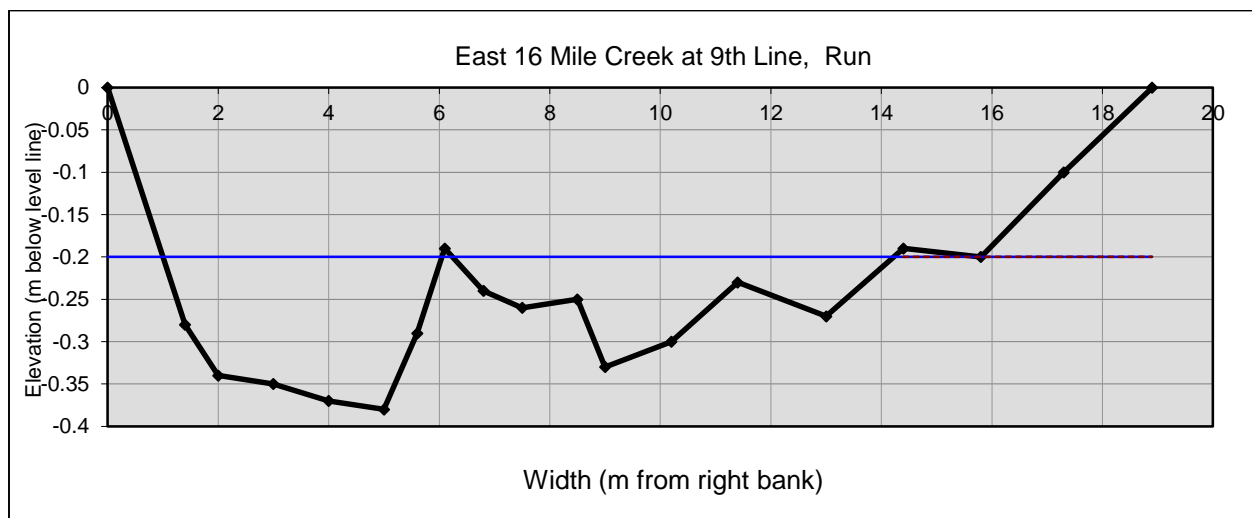


Figure 3-16: Channel Cross-section in Disturbed Area
(Approximately 125 m upstream of culvert inlet)

The second section was located approximately 25 metres upstream of the culvert inlet, within the reach that exhibits a clearly defined (albeit entrenched) channel. **Figure 3-17** details the location of this section.



Figure 3-17 – Channel Survey Section in Defined Channel Area
 (Approximately 25 m upstream of main culvert inlet)

The measured cross-section for this location is depicted in **Figure 3-18**.

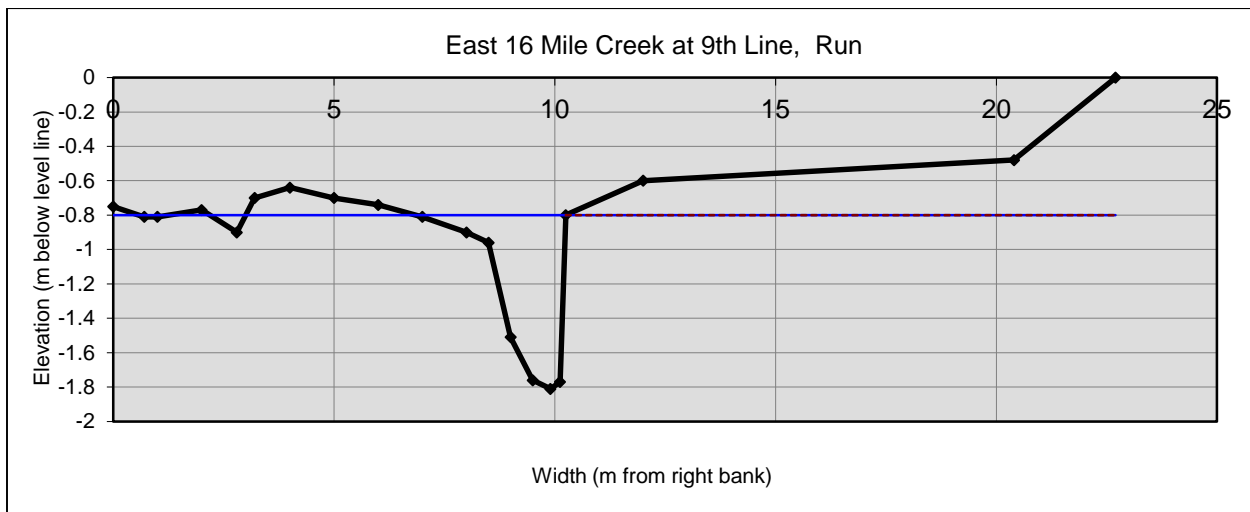


Figure 3-18 – Channel Cross-section in Defined Channel Area
 (Approximately 25 m upstream of culvert inlet)

Given the defined cross section detailed in **Figure 3-18** above, **Table 3-8** details the stream morphology parameters observed in the upstream sub-reach during the geomorphic assessment.

Table 3-8: Geomorphic Parameters for the Bankfull Flow Event (determined in-situ)

Geomorphic Component Measured In-Situ	Value
Bankfull Width (W_{BF})	4.9 m
Bankfull Depth (D_{BF})	1.0 m
Bankfull Wetted Perimeter (P_{BF})	6.1 m
Bankfull Hydraulic Radius (R_{BF})	0.5 m
Mean Thalweg Slope (S)	0.010 m/m = 1.0%
Manning's Friction Coeff. (n), from (Chow, 1959)	0.030 (clean, straight, full stage, no rifts or deep pools)

Manning's n, the friction co-efficient was estimated from the literature (Chow, 1959) since the bed was smooth clay with minimal alluvial material. From these geomorphic data, flow components can be estimated. **Table 3-9** details the bankfull flow parameters calculated using the observations of **Table 3-8**.

Table 3-9: Bankfull Flow Components (Estimated)

Geomorphic Component Measured In-Situ	Value
Bankfull Velocity (V_{BF})	1.3 m/s
Bankfull Discharge (Q_{BF})	1.9 m ³ /s
Froude Number (Fr)	0.83 (sub-critical)
Shear Stress at Bed (T_b) – aka Shield's Parameter	23.85 N/m ²
Threshold Particle Size (incipient motion via Shield's Equation)	25 mm

The observed entrenchment of the stream at the cross section 25 metres upstream of the culvert inlet is thus well explained by the predicted bed shear stress (T_b) of 23.85 N/m².

Any works proposed for the existing culvert should seek to stabilize the channel upstream, to avoid erosion of the stream at the culvert as well as damage to the culvert itself. An inlet contraction pool should be designed using bio-engineering elements that will bring about the required stability.

In support of detailed design for the entire Ninth Line study corridor, the following additional fluvial geomorphic assessments are recommended:

- Meander Belt and Width Change Assessment of existing channel based on historical imagery.
- Rapid Geomorphic Assessment (RGA) of channel downstream of the existing main culvert crossing to convergence with tributary west of Ninth Line, to assess stability of downstream channel. Conservation Halton typically requires that "new or replacement structures will facilitate appropriate bankfull flows, water depth, water velocities and tractive forces." These parameters should be the same through the crossing as in upstream and downstream natural areas.
- Rapid Geomorphic Assessment (RGA) of minor channels associated with the two minor crossing that will be retained in the final design (at Stn. 1+238 and Stn. 3+498).

A bankfull flow competence analysis of existing channel based on a Wolman count is not recommended at this location.

Additionally, a fluvial geomorphologist should provide advice and design guidance on:

- Proposed main culvert width in relation to bankfull width and potential meander belt migration;
- Channel base and low flow channel configuration through proposed new culvert;
- Proposed bank stabilization design upstream and downstream of proposed main culvert;
- Contraction pool design upstream of proposed main culvert;
- Sediment trap design at ditch and channel locations; and,
- Channel stabilization downstream of proposed new culvert crossing at 0+408.

3.8. REGIONAL GEOLOGY & GEOTECHNICAL INVESTIGATION

The primary objectives of the investigation were to determine the existing pavement structure, shoulder, and subgrade soil conditions to be encountered during the road improvements, and assess options to address the pavement conditions and provide recommendations for construction.

Boreholes were drilled on the paved portion of the road and on the gravel shoulder to a depth of approximately 3.5 metres. The locations of the boreholes are shown on Drawings 1 to 6 in the full Geotechnical Investigation Report provided in **Appendix F**. The asphalt thickness ranges from 75 mm to 300 mm and the granular base thickness is variable between 75 mm and 300 mm with the majority of the thickness measurements being in excess of 175 mm.

Analyses for metals and inorganic parameters were carried out on composite subgrade samples from all the boreholes. The samples were tested in relation to MOECC Table 1 Full Depth Background Site Conditions and the MOECC Table 3 soil quality standards and compared to both the Residential/Parkland/Institutional property use and the Industrial/Commercial/Community criteria given in the MOECC document "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", dated April 15, 2011.

Geology map data indicated that Ninth Line is in an area of clay to silt textured soil of the Halton formation overlying Queenston shale. The borehole information is consistent with the background geology data and indicates that the predominant native subgrade soil is silt till overlying shale bedrock. Fieldwork was carried out in May 2015, which consisted of a visual survey and drilling fifteen boreholes on May 28 and 29, 2015.

When compared to the MOECC Table 3 Industrial/Commercial/Community Land Use Standards, the parameters of the soils tested met all soil quality standards. Elevated results for Electrical Conductivity (EC) and Sodium Absorption Ratio (SAR) occurred in boreholes 1, 5, 9, 10, 11, and 12 when compared to the MOECC Table 1-Full Depth Background Site Condition Standards and the MOECC Table 3 Residential/Parkland/Institutional Land Use Standards.

The elevated EC results are considered to be related to the historical use of road salts for winter de-icing operations and do not present an adverse health risk. Some variability in soil quality parameters may occur within a given sample as well as along the length of a road section. During the course of excavation and mixing of materials the EC and/or SAR parameters may not be an issue. Ontario Regulation 153 indicates that elevated residual road salt parameters in soils within the road allowance that result from winter salting that was placed to address safety issues are not regarded as an environmental problem that requires remediation.

Future road improvements are expected to include both rehabilitation and upgrading of existing asphalt pavement and transition areas, and new asphalt pavement construction for lane widening and bicycle lanes. The asphalt on Ninth Line generally has a substantial thickness that typically ranges from 75 mm to 300 mm and likely reflects past resurfacing practices. As well, crack sealing maintenance practices have been kept up to date such that the current road surface is in good condition without immediate need for major repairs and/or resurfacing.

In 2005, a pavement surface condition survey was undertaken by Applied Research Associates Inc. for the section of Ninth Line between 10 Side Road and Steeles Avenue. A copy of the report is provided in **Appendix F**. The condition of the existing pavement was concluded to be in fair to good condition, with local poor areas. The Pavement Condition Rating (PCR) was evaluated to be 58 (out of 100) from 10 Side Road to 5 Side Road, and 68 from 5 Side Road to Steeles Avenue.

The ride quality was fair with few to intermittent bumps or depressions. The predominate distresses throughout the area included longitudinal cracking in the wheel paths, transverse cracking and alligator cracking. Many of the old longitudinal cracks had been sealed through routine maintenance by the Region. Localized areas of patching and rutting were found along the corridor.

The study concluded both sections of Ninth Line were structurally deficient and would require rehabilitation of the existing travel lanes to support future traffic. A pulverize and overlay treatment was conducted by the Region to maintain this corridor in the interim, as required capacity improvements are defined.

3.9. STRUCTURES

The study area includes one major culvert located approximately one kilometre north of Steeles Avenue spanning approximately 3 metres crossing underneath Ninth Line (referred to as the Main Culvert and Discharge Outlet #4).

The culvert was constructed in 1960 and, to the knowledge of the Project Team, has not been rehabilitated. There are no steel-beam guide rails or hazard signs over the structure, and no maximum load is posted at the site. An inspection of the culvert was completed on May 22, 2014 (the inspection report is attached in **Appendix G**). The culvert received an overall condition rating of "fair" (BCI = 65). The asphalt roadway and deck soffit are in good condition, and the abutment walls are generally in fair condition. The culvert shows some signs of deterioration, including:

- Severe concrete disintegration of the east end of the south abutment wall;
- Exposed footings at the east end of the structure, particularly at the southeast corner due to scour and erosion;
- Leakage through cold joints and efflorescent staining on the abutment walls;
- Areas of light honeycombing/segregation throughout the abutment walls and deck soffit; and
- Areas of light to medium scaling on abutment walls and on the fascia of structure outlets.

Photographs of the culvert are provided in **Figures 3-19 to 3-21**.



Figure 3-19: West Elevation of Main Culvert



Figure 3-20: North Abutment Wall of Main Culvert Looking West



Figure 3-21: Major Culvert (Discharge Outlet #4)

There are four additional conjugated steel pipe (CSP) culverts within the study area (refer to the Drainage Plan Figures 1-3 in the Stormwater Management Report in **Appendix E** for the location of each culvert):

- Twin 700mm and 900mm CSPs at Discharge Outlet #1;
- 450mm CSP at Discharge Outlet #2; and
- 1,125mm CSP at Discharge Outlet #3.

These culverts are small in comparison to the main culvert ranging from 450 mm to 1,125 mm. All of these culverts are below the 2,000 mm diameter used by the Region as the threshold to track the culvert condition. Therefore, there is no historical data for these culverts. Visual observations by the team indicated these culverts were in generally good condition with minor deformations of the pipes.

The 1,125 mm diameter culvert at Station 3+498 (Discharge Outlet #3) is shown in **Figure 3-22**. In addition, this culvert exhibited minor deformation of the culvert and waterline corrosion.



Figure 3-22: Photographs of the Culvert South of 5 Side Road (Discharge Outlet #3)

3.10. UTILITIES & SERVICES

Halton Hills Hydro lines run on alternating sides of Ninth Line within the study limits on overhead lines. Since the study area is located outside of the urban area boundary, there are no existing municipal services (i.e. watermain, sanitary sewer) or gas lines within the ROW.

Prior to detailed design, utility locates should be completed to confirm the size, type and alignment of all above ground utilities within the study area.

3.11. STREET ILLUMINATION

Currently there is no street illumination along Ninth Line within the study area boundaries with the exception of intersection illumination in accordance with Regional policy.

3.12. ROADWAY ACCESS

Property access to all existing driveways will be maintained during the detailed design phase of the project. Property access for agricultural equipment will also be improved. During detailed design, the proponent should consult with agricultural property owners to determine if they require rolling curbs in front of property access points.

3.13. AIR QUALITY IMPACTS

The assessment of air quality impacts followed the draft assessment guidance provided by Halton Region (2012). According to Halton Region guidance, transportation projects are classified as having potentially high air quality impacts and require a detailed Tier 3 modelling assessment. At minimum, a Tier 3 assessment includes:

- An emissions inventory of the proposed development and existing sources;
- Air dispersion modelling using an approved approach for the assessment of air quality impacts of contaminants of concern at sensitive receptors;
- Inclusion of background air quality concentrations in the assessment; and,
- A summary of mitigative measures incorporated to the project.

Impacts from the construction of transportation projects do not require assessment.

Air quality concentrations have been predicted at select sensitive receptors for a base case scenario (2016) and two future (2031) operating scenarios – one which assumes that the Project does not proceed, and Ninth Line remains in the current configuration (Future No-Build), and one which assumes that the Project does proceed (Future Build). The difference between these scenarios represents the incremental increase in air contaminant concentrations that is attributable to the Project.

The air quality impact assessment modelled the following contaminants of concern and compared the predicted levels to applicable provincial and/or federal ambient air quality criteria:

- Particulate matter less than 2.5 microns (PM_{2.5});
- Nitrogen dioxides (NO₂ – also including NO_x and NO);
- Sulphur dioxide (SO₂); and
- Carbon monoxide (CO).

The model also evaluated changes in greenhouse gas (GHG) emissions.

Ambient background concentrations used in air quality assessments represent the cumulative contribution of upwind sources such as industrial facilities, other roadways (e.g., Highway 401/407), and transboundary pollution that are not included in the modelling. It is important to add background concentrations to modelled concentrations in order to assess the combined effect of all sources at a specific receptor location. In order to capture emissions other than those directly related to the planned Project, historical background concentrations for each air contaminant of concern were calculated and added to model-predicted concentrations.

To establish background air quality concentrations in the study area, five years of historical data for the period 2009 to 2013 was obtained from two local ambient air quality monitoring stations that were closest to the study area. The closest station to the Project is located approximately 8 kilometres southwest of the study area at the Bishop Reding Catholic Secondary School in Milton. It is operated by Halton Region

and collects hourly measurements of PM_{2.5}, nitrogen oxides (NO, NO₂ and NO_x), SO₂ and CO as well as ozone and meteorological data. The MOECC also measures air contaminants at various locations throughout Ontario, and reports on the state of Ontario's air quality on an annual basis. One MOECC monitoring station located approximately 10 km away in downtown Brampton has also been considered, but only measures PM_{2.5} and NO₂. A single MOECC station that measures all compounds was not used as the data from the two selected stations were closer to the project and are more representative of the background concentrations in the vicinity of the study area.

The air quality impact assessment considered three scenarios:

1. Base Case Conditions (2016) – The current configuration of Ninth Line based on 2016 traffic estimates;
2. Future No-Build (2031) – The current configuration of Ninth Line based on 2031 traffic estimates; and
3. Future Build Preferred Option (2031) – The preferred project design option for Ninth Line based on 2031 traffic estimates.

When assessing the merits of the proposed Ninth Line widening project compared to Future No-Build conditions, it is the incremental change in total model predicted concentrations between the two future cases that is the true measure of the future impact of the Project. The same background concentrations are added to the modelled concentrations for the future scenarios. Therefore, when assessing the incremental change in the combined concentrations, the background concentration cancels out.

As the Tables in Section 5.1 of the Air Quality Impact Assessment Report illustrate (full report located in **Appendix H** of the ESR), for all contaminants and all averaging periods, model predicted concentrations are shown to increase for the Future Build Scenario relative to No-Build conditions at all receptor locations. On average, the percent difference between the Future Build Scenario and Future No-Build Scenario is on the order of 70%. This increase occurs for two reasons: (1) the increase in traffic as a result of widening Ninth Line (see Table 4.3 and Table 4.4 in the Air Quality Impact Assessment Report); and (2) the decrease in separation distance between the receptors and the edge of the roadway. In other words, receptors become closer to a roadway with higher emissions. As a result, the effect is an increase in air contaminant concentrations at the receptor locations. However, all predicted concentrations at representative worst-case receptor locations remain below applicable ambient air quality criteria despite the increase in traffic due to the widening of Ninth Line. Since there are no predicted adverse air quality effects expected due to the proposed widening of Ninth Line, mitigation of air quality effects is not required.

3.14. NOISE IMPACTS

A noise impact assessment was conducted to estimate if noise levels originating from Ninth Line would increase as a result of the alternative designs considered. Another objective of the study was to determine if any noise attenuation measures would be required to mitigate any negative noise impacts. The full Noise Impact Assessment report is provided in **Appendix I**.

Since roadway sound levels vary over time, the noise descriptor used in Ontario to assess noise is the equivalent sound level, Leq. Leq is identified as the continuous sound level, which has the same energy as a time varying sound level over a specified time period. For the purposes of assessing municipal roadway noise, Leq is calculated on the basis of the 16-hour daytime period, 7:00 a.m. to 11:00 p.m. For Outdoor Living Areas (OLAs) under new development, the provincial objective for sound level is 55 dBA for the

daytime period (for calculation purposes this is defined as 3 metres from the back of the house, at a height of 1.5m). Based on the Ministry of Environment and Climate Change (MOECC)/Ministry of Transportation (MTO) Noise Protocol, where a new or expanded roadway is proposed adjacent to a Noise Sensitive Area (NSA), the MOECC requires 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 is required
- 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 receivers. Noise control measures should mitigate to ambient, as administratively, economically, and technically feasible.

The Ontario Road Noise Analysis Method (ORNAMENT), which was developed by the Ministry of the Environment, is used to assess potential noise impacts on existing residential areas where changes are proposed to existing roads. ORNAMENT, based on a model developed by the United States Federal Highway Administration, is designed for land use planning and has been modified for use on a personal computer using the STAMSON 5.0 computer program. The program is used to predict noise levels generated from road sources at the outdoor activity areas (typically backyards) of Noise Sensitive Areas (NSAs). It considers numerous variables including traffic volumes, percentage of trucks, distance from roadway, road grade, posted speed, topography, barriers and vegetation.

The majority of receptors (24) are predicted to experience changes in sound level between 0 and 5 dBA, which does not require an assessment of noise controls per Halton Region and MOECC guidelines. The remaining receptors (12) are predicted to experience reductions in sound levels. This is applicable to receptors on the west side of Ninth Line along a section north of Steeles, for which Ninth Line will be widened toward the east, thereby increasing the separation distance between these receptors and the road. Based on the general predictions for the receptors in the study area, it is estimated that 27 out of the 36 receptors will experience sound levels greater than 60 dBA in the future no-build case, increasing to 29 in the future build scenario (as summarized in **Table 3-8**).

Table 3-10: Number of Receptors in Various Predicted Sound Ranges

Range of Predicted Change in Sound Level (dBA)	Number of Receptors in Predicted Range	
	Future No-Build	Future Build
45 to 50	0	0
50 to 55	4	1
55 to 60	5	6
60 to 65	19	15
65 to 70	8	13
70 to 75	0	1

The locations with predicted sound levels exceeding 60 dBA may apply to Halton Region for retrofit noise barriers; however, this is unlikely to be successful as barriers are typically only considered for reverse frontage lots.

An investigation into noise control is not required per Halton Region and MOECC guidelines since the difference between the Future No-Build and Future Build scenarios are less than 5 dBA. However, it is

recommended that noise control measures be considered during detailed design to avoid excessive sound levels at houses with minimal setbacks.

3.15. GTA WEST CORRIDOR

The Ninth Line Class EA study area is located within the GTA West Corridor Route Planning Study Area, as depicted in **Figure 3-23**. Stage 2 (Alternative Methods) of the GTA West Corridor EA Study commenced in February 2014 and is scheduled to be completed in 2018. Since the EA has not been completed, it is yet to be determined if the Ninth Line Transportation Corridor will be incorporated into GTA West Corridor Plans in the future. Therefore the GTA West corridor was not analyzed as a future condition affecting this corridor as the planning of the GTA West corridor by the Ministry of Transportation (MTO) is on-going and the timing of the implementation of this corridor through the southern section of Halton Hills is anticipated to be beyond the 2031 planning horizon. However, the GTA West Corridor Project Team was invited to participate in the Ninth Line TAC meetings and was kept informed of the Ninth Line Class EA Study progress. A reciprocal participation took place with the Ninth Line Project Team with regard to the GTA West Study.

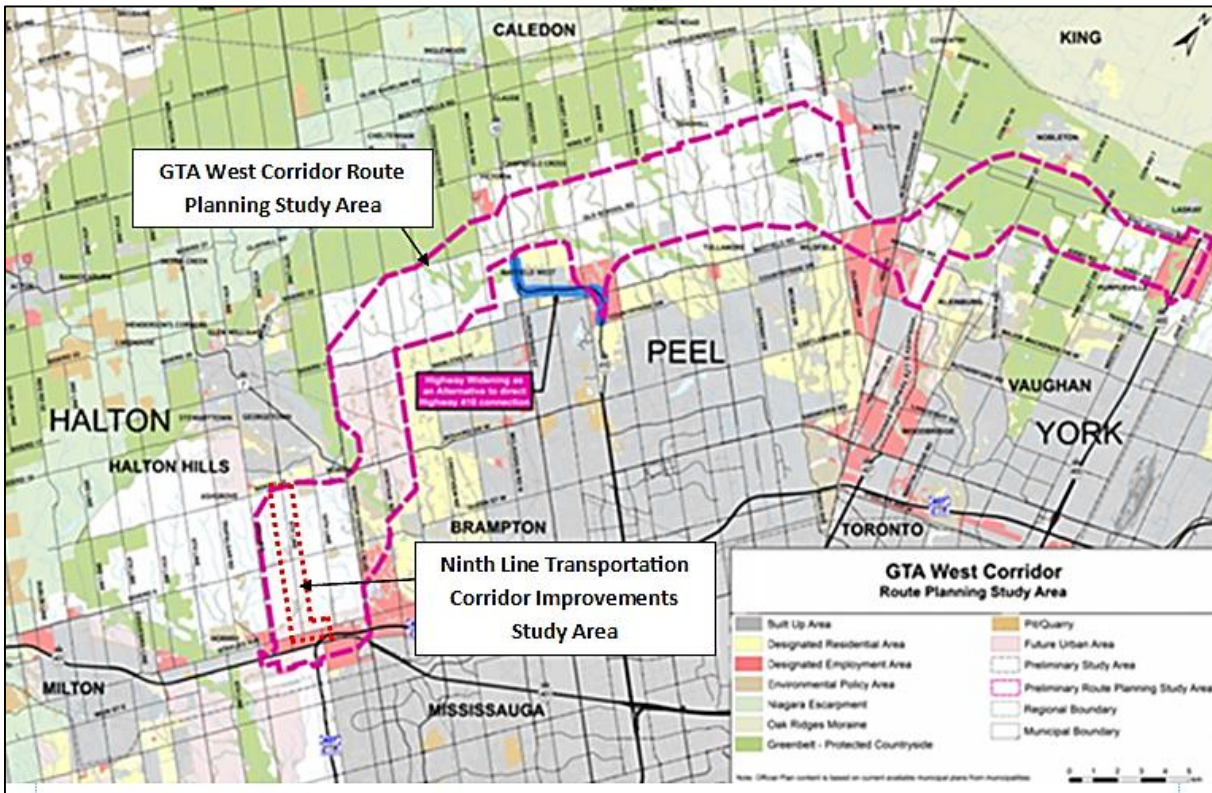


Figure 3-23: Boundaries of the GTA West Corridor Route Planning Study Area
 (Original image from McCormick Rankin Corp., et al., 2012)

4.0 ALTERNATIVE DESIGN CONCEPTS FOR PREFERRED SOLUTION (PHASE 3 OF CLASS EA)

Under Phase 3 of the Class EA process, a range of design alternatives that might be adopted to implement the preferred solution are identified and evaluated based on functionality, impacts to the surrounding environment and feasibility of mitigation measures for any negative environmental impacts. The alternative designs and the preferred design are presented to the public, stakeholders and review agencies to solicit input into the selection of the preferred design.

A comprehensive evaluation of design alternatives was established to select the Technically Preferred Alternative.

4.1. NINTH LINE CROSS-SECTION REQUIREMENTS

The 2011 Halton TMP – *The Road to Change*, identified a need to widen Ninth Line from two lanes to four lanes to accommodate projected growth to 2031. Appendix E of the 2011 TMP identified Ninth Line as an “R2 Rural” Regional Road and typically Regional Roads in this category should have a 42.0 metre wide ROW. As per the TMP, the cross-section for an ‘R2 Rural’ Regional Road typically includes four 3.65 metre travel lanes, a painted median ranging from 0 metres to a maximum of 5 metres, a 1.5 metre paved shoulder/on-road bicycle lane and 1.0 metre gravel shoulder on either side, as well as ditches/swales on either side of variable widths. See **Figures 4-1 and 4-2** for a typical cross-section depicting the ultimate configuration required by 2031 as defined in the TMP.

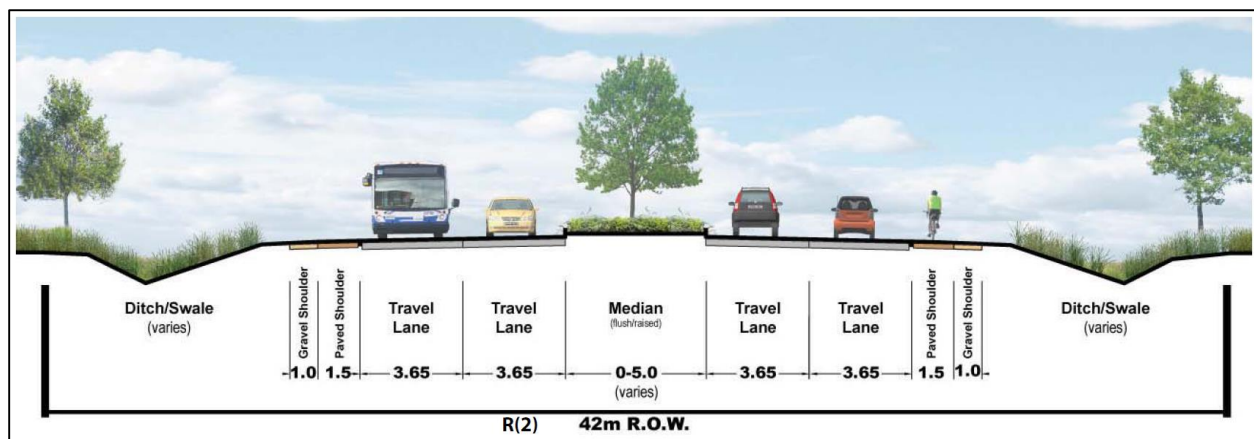


Figure 4-1: Visual of a Typical 'R2 Rural' Regional Road
 (From Appendix E of the 2011 Halton TMP – Page 14)

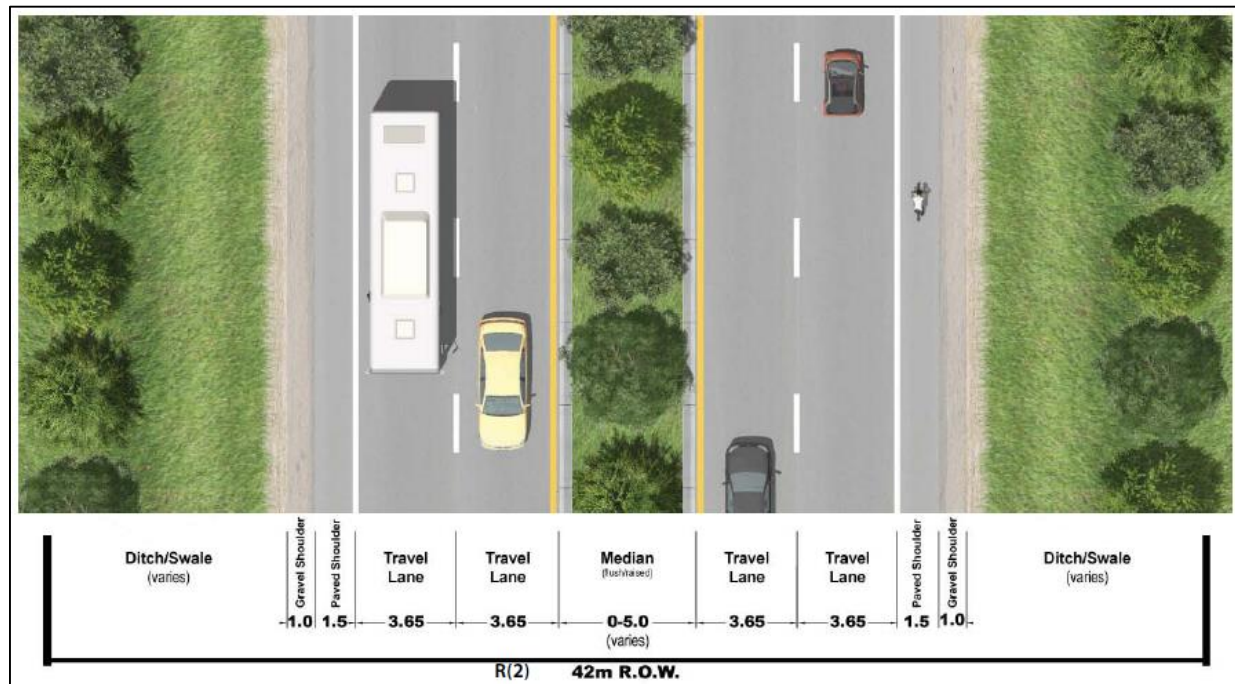


Figure 4-2: Aerial View of a Typical 'R2 Rural' Regional Road
 (From Appendix E of the 2011 Halton TMP – Page 15)

4.2. KEY CONSIDERATIONS & ISSUES

Following the examination of existing conditions within the Ninth Line corridor and consultation with relevant stakeholders, the following items were identified for consideration when evaluating the alternative design options:

- Improvements to the horizontal and vertical alignment of Ninth Line;
- Support for anticipated role and function of an arterial roadway through appropriate cross-section configuration, including additional elements such as accommodation for on-road cycling lanes and multi-use pathway;
- Development of future alternative intersection configuration options including roundabouts;
- Incorporate drainage improvements into the preliminary preferred design;
- Enhance the safety of Ninth Line (e.g. inclusion of a painted median to provide refuge for motorists turning in and out of private driveways, and provide separation between travel lanes);
- Maintain access in interim for the existing access to properties along the corridor;
- Speed limit;
- Street illumination; and
- Tree replacement or relocation.

Key constraints in the study area, considered in the development of design alternatives, included:

- Existing residential homes in close proximity to future Ninth Line ROW;
- Natural environment features on the west side of Ninth Line and 5 Side Road intersection; and
- GTA West Corridor (potential constraint, location to be determined by MTO).

4.2.1. ACTIVE TRANSPORTATION

Active transportation infrastructure options to be considered included provisions for cyclists and pedestrians in the form of 1.5 metre on-road bicycle lanes and a 3.0 metre multi-use path on one side of the road.

4.2.2. DRIVEWAYS & TURNING MOVEMENTS

At present, residents experience difficulty turning left out of their driveways onto Ninth Line due to existing traffic volumes and limited sightlines (in some cases). Solutions that would enable residents to turn into and out of private driveways easily were considered.

4.2.3. DRAINAGE & STORMWATER MANAGEMENT

All alternative designs included stormwater management measures to ensure that stormwater does not overtop the road surface or negatively impact nearby private water wells. The design must also ensure that the wetland to the southwest of the 5 Side Road intersections continues to receive the same amount of water runoff.

4.2.4. SPEED LIMIT

Speed limits are set to promote safety and encourage a uniform travel speed. The posted speed limit should ideally be at or near the 85th percentile speed based on actual measurements of the operating speed to maximize safety and through capacity.

Based on extensive research, raising or lowering the posted speed limit has little overall effect on the operating speed and does not lead to any statistically significant changes in total or severe collisions. Therefore, it is important to set speed limits that achieve the best compromise between the highest level of safety while maximizing mobility and quality of life. This is best achieved through speed limits that closely match the function that each road is designed to serve. The Region's Policy for setting speed limits is based on default speed limits values defined by the hierarchical roadway classification system as well as the context of the surrounding land use. The default speed limits are assigned by roadway classification and the urban or rural context of the surround land use. The three classifications are:

- Major arterials;
- Multi-purpose arterials; and
- Minor arterials.

The Region posts speed limits as presented in **Table 4-1**.

Table 4-1: Posted Speed Limits on Regional Roads

Road Classification	Urban Sections	Rural Sections
Major Arterials*	60 or 70 km/h	80 km/h
Multi-purpose Arterials	50 or 60 km/h	Not Applicable
Minor Arterials	50 or 60 km/h	70 or 80 km/h

**Within the study limits, Ninth Line is classified as a Major Arterial*

For Rural Sections, such as the Ninth Line corridor, the desirable minimum length of a speed zone is two (2) kilometres.

The posted speed limit on Ninth Line may be set below the level in **Table 4-1** if the number and type of access points along the rural section has more than forty (40) accesses per kilometre, then the section should be treated as Urban and a reduction in speed limit may be appropriate. This is not the case along the study area. Hence the posted speed limit considered for Ninth Line is 80 km/hr, which is the current speed limit.

4.2.5. STREET ILLUMINATION

The Region's illumination policy reflects four conditions:

- Regional Roads;
- Municipal Illumination on Regional Roads;
- Provision for Future Illumination; and
- Private or Commercial Entrances.

Within the Ninth Line corridor, and in accordance with Regional Policy, illumination is provided at the intersections of Ninth Line with 10 Side Road, 5 Side Road and Steeles Avenue. Presently, between these intersections, illumination is not required under Regional policy.

The existing illumination will be maintained (or improved) as part of the preferred recommended design.

4.2.6. TREE REPLACEMENT

A common concern in these types of studies is the replacement of any trees that must be removed as a result of the roadway improvements. Halton Region is cognizant the removal of trees adversely affects the urban and rural landscape. As such, the Region has in place a policy that addresses the replacement of trees on regionally owned lands, applicable to tree removal for capital projects by Halton Region, development related projects by private developers, as well as non-development related tree removal.

The key objectives of the Policy are to:

- *Protect significant tree-covered areas as a natural resource (Official Plan Policy 146(6));*
- *Promote the conservation and wise economic use of trees consistent with the ecological and environmental goals, objectives and policies of the Official Plan (Official Plan Policy 146(7));*
- *Recognize and protect trees as a renewable resource essential to the health and welfare of Halton residents, wildlife and rural setting and to this end require all development proposals, to the maximum degree possible, preserve existing trees and plant additional trees in accordance with good forestry management practice (Official Plan Policy 147(5) e)); and,*
- *Retain treescapes along major transportation corridors, replace trees cut down for public works and, wherever possible, develop new treescapes consistent with safe and aesthetically pleasing road or corridor design (Official Plan Policy 147(6) b)).*

The policy attempts to replace the lost canopy with an equivalent number of trees based on the diameter of the tree(s) removed, per the Canopy Replacement Schedule presented in **Table 4-2**.

Table 4-2: Tree Canopy Replacement Schedule

Diameter of Existing Tree Removed	Number of Replacement Trees
Less than 10 cm	1
Between 10 cm and 15 cm	2
Between 16 cm and 20 cm	3
Between 21 cm and 25 cm	4
Over 25 cm	Equivalent of 6 cm caliper trees or greater needed to equal diameter of the tree removed.
Conifer less than or equal to 20 cm diameter	Two 200 cm (in height) conifer trees.
Conifer greater than 20 cm diameter	Four 200 cm (in height) conifer trees.

The policy pertains to removal of live trees only as defined in the Halton Tree By-law No. 121-05. Tree species replacement will be similar to the original tree that was removed, save for invasive species or other species as approved by Halton Region.

The mature roadside trees were individually identified during field visits as the road improvements will require selective removal of trees within the road allowance. The list of trees is presented in **Appendix B** of the ESR. Dead or dying trees were excluded from the survey. It is estimated that there are approximately 191 trees along the western road allowance and 152 trees along the eastern road allowance. The woodlot edge along Ninth Line consists primarily of white cedar, birch, elm, basswood and young ash trees.

The recommended preferred design for the widening of Ninth Line was cognizant of the need to minimize impacts on trees, where feasible.

4.2.7. DESIGN CRITERIA

Design criteria were developed to ensure consistent design standards were used for all alternative designs. The design criteria were developed in accordance with provincial MTO standards as well as Regional design standards in consultation with Project Team members. Design criteria considered items including design speed and posted speed, horizontal and vertical alignments, cross-section, and ROW widths. The design criteria developed for the preliminary alternative designs is presented in **Table 4-3**.

Table 4-3: Summary of Design Criteria Applied to Preliminary Preferred Design

Classification – Urban / Rural Arterial Undivided	
Minimum Right of Way	
• Four Lane Requirement	42 m
Posted Speed	80 km/hr
Design Speed	90 km/hr
Maximum Grade	4.0 %
Minimum Grade	0.50 %
Vertical Curves - minimum	
• Sag	k = 30
• Crest	k = 35
Minimum Lane Widths	
• Through	3.65 m
• Curb lane	3.50 m
• Left turn	3.50 m
• Right turn	3.65 m
Minimum Shoulder Width	1.50 m Paved and 1.0 m Gravel
Intersection Angle	90 Degree
Minimum Median at Intersections	40 m
Minimum Stopping Sight Distance	170 m
Minimum Intersection Radius	15 m
Traffic Signal Requirements	Yes
Stormwater	Yes
Minimum Sight Triangles	
• Arterial to collector	15 m X 15 m
• Arterial to arterial	15 m X 15 m

4.3. ALTERNATIVE WIDENING OPTIONS FOR NINTH LINE

The cross-section requirements for the Ninth Line corridor have been established through the 2011 TMP – The Road to Change. The 42 metre ROW cross-section (as discussed in **Section 4.1**) was used as a baseline for the development of the alternative design options. The alternative designs considered are described in the following sub-sections.

4.3.1. ALTERNATIVE 1 – WIDEN TO THE WEST

This alternative considered holding the existing eastern property line and widening to the west only. The new ROW limits would be a total of 42.0 metres wide and extend 25 metres beyond the existing property lines on the west side of the road.

4.3.2. ALTERNATIVE 2 – WIDEN TO THE EAST

This alternative considered holding the existing western property line and widening to the east only. The new ROW limits would be a total of 42.0 metres wide and extend 25 metres beyond the existing property lines on the east side of the road.

4.3.3. *ALTERNATIVE 3 – WIDEN ABOUT THE CENTERLINE*

This alternative considered a symmetrical widening about the existing centerline of Ninth Line from the existing 35 metre ROW to a 42 metre ROW. The new ROW limits would extend 3.5 metres beyond the existing property lines on either side of the road.

4.3.4. *ALTERNATIVE 4 – COMBINATION OF ALTERNATIVES 1, 2 AND 3*

This alternative considered widening the existing ROW along both the east and west sides of Ninth Line, but varying the alignment of the proposed centerline and ROW to minimize the impacts to the adjacent properties or significant features (natural, archaeological, buildings and structures, etc.). In areas where the proposed cross-section would result in significant impacts to lands on both sides of the existing ROW a modified, reduced cross-section of a minimum 26.6 metre ROW would be considered to maintain the multi-modal elements but reduce other features (e.g. median, boulevards, etc.). These would be customized to specific areas, where warranted.

4.4. EVALUATION OF NINTH LINE ROAD DESIGN ALTERNATIVES

A comprehensive evaluation of the design alternatives was established to select the Technically Preferred Alternative. The same evaluation criteria used to evaluate the alternative planning solutions (Phase 2 of the Class EA process – refer to **Table 2-4**) were applied to the alternative designs to compare the alternatives. The analysis and evaluation of the alternatives with respect to the evaluation criteria is presented in **Table 4-4**.

Table 4-4: Application of Evaluation Criteria to Design Alternatives 1, 2 and 3

Evaluation Criteria Category	Factor	Alternative #1: Widening to the West	Alternative #2: Widening to the East	Alternative #3: Widening about the Centerline
1. Natural Environment	Natural Heritage Features and Unique Landforms	The West Alternative would have the most impact on the woodlot and wetland features to the west of Ninth Line near 5 Side Road since the western ROW boundary would be shifted west more than the other Alternatives.	The widening to the East Alternative would have no impact on the woodlot and wetland features to the west of Ninth Line near 5 Side Road because the western ROW boundary would remain the same.	This Alternative avoids direct impacts to the woodlot and wetland west of Ninth Line near 5 Side Road. The new ROW boundary would be shifted west slightly.
	Vegetation Communities and/or Species at Risk	Each Alternative will result in the removal of some roadside vegetation due to the road widening. The natural environment study (Appendix B) revealed historical records of two Species at Risk (SAR) within the study area: 1) the Milksnake (<i>Lampropeltis triangulum</i>) listed as Special Concern; and, 2) the Bobolink (<i>Dolichonyx oryzivorus</i>) listed as Threatened. Bobolink, Barn Swallow and Eastern Wood Peewee were observed/heard on two separate field visits in June 2014.		
	Wildlife, Wildlife Habitat, Habitat Linkages and Corridors	The West Alternative would have a significant impact on the woodlots and wetland feature to the west of Ninth Line particularly near 5 Side Road.		
	Watercourses, Fisheries and Aquatic Resources	All three Alternatives result in minimal impact to the watercourses.		
	Natural Hazards	All three Alternatives result in minimal impact to natural hazards.		
	Stormwater Management and Erosion Control	Reconstruction of drainage features including culvert crossings and roadside ditches will be required for all three Alternatives. Culvert extensions required for all three Alternatives.		
	Air Quality	All three Alternatives result in similar impact to air quality.		
	Overall Evaluation for this Category:	Most Impact	Moderate Impact	Moderate Impact

Evaluation Criteria Category	Factor	Alternative #1: Widening to the West	Alternative #2: Widening to the East	Alternative #3: Widening about the Centerline
2. Socio-Economic Environment	Existing and Future Land Uses	All alternatives are conducive to the existing and proposed future land uses along Ninth Line. This alternative meets the need for additional capacity and improved network continuity of the TMP.		
	Farms and Business Operations	All three Alternatives accommodate farm vehicles with the inclusion of paved shoulders and rolling curbs where necessary to access agricultural fields.		
	Residential Areas	This alternative would impact the frontage of 37 properties.	This alternative would impact the frontage of 23 properties.	This alternative would impact all properties (60) on both sides of Ninth Line, however the amount of property acquired would be equal on both sides of the road.
	Institutional and Recreational Uses	All three alternatives will accommodate on-road cycling lanes and a multi-use pathway.		
	Potential Property Requirements	Property requirements will be similar for all three alternatives.		
	Property Access	Road access will be maintained during and after construction and the duration of construction would be the same for all Alternatives. All access points along Ninth Line will be maintained by all three Alternatives.		
	Noise	All three Alternatives result in similar impact to noise levels. Noise mitigation per Halton/MTO/MOECC Protocols are not required.		
	Overall Evaluation for this Category:	Moderate Impact	Moderate Impact	Moderate Impact

Evaluation Criteria Category	Factor	Alternative #1: Widening to the West	Alternative #2: Widening to the East	Alternative #3: Widening about the Centerline
3. Cultural Environment	Archaeological Resources and Areas of Archaeological Potential	Archaeological potential exists along the Ninth Line Corridor. A Stage 2 Archaeological Assessment is recommended for the study area and will be carried out during detailed design.		
	Built Heritage Resources and Cultural Landscape	There are only two built heritage resources on the west side of Ninth Line. The homes are setback far enough from the road to not be impacted by the widening.	Four built heritage resources are located on the east side of Ninth Line. Widening to the east would impact the landscape of the farmsteads.	This Alternative would impact the cultural landscapes on both sides of Ninth Line. However, the impact would be shared relatively equally among property owners on both sides of Ninth Line.
	Compatibility with Official Planning Documents	All of the Alternatives are compatible with Official Planning documents.		
	Overall Evaluation for this Category:	Minimum Impact	Moderate Impact	Minimum Impact
4. Transportation	Impact on Current and Projected Traffic Patterns	All three Alternatives provide improvement to roadway geometrics and additional capacity along the Ninth Line corridor.		
	Active Transportation	All three Alternatives accommodate active transportation (walking and cycling) within the road right-of-way with 1.8m on-street cycling lanes and space for a 3.0m multi-use path on the west side of the roadway.		
	Intersection Requirements	Each alternative has the same intersection configuration for the 5 Side Road intersection.		
	Safety	All three Alternatives conform to geometric requirements including horizontal and vertical alignments satisfying an 80km/hr posted speed limit.		
	Overall Evaluation for this Category:	Minimum Impact	Minimum Impact	Minimum Impact

Evaluation Criteria Category	Factor	Alternative #1: Widening to the West	Alternative #2: Widening to the East	Alternative #3: Widening about the Centerline
5. Construction Cost	Appropriation of Land	This alternative would impact the frontage of 37 properties. This Alternative would result in the full displacement of some residents on the west side of Ninth Line.	This alternative would impact the frontage of 23 properties. This Alternative would result in the full displacement of some residents on the east side of Ninth Line (fewer than the 'widen to the west' option).	This alternative would impact all properties (60) on both sides of Ninth Line, however, this Alternative does not require entire properties to be acquired, and therefore this Alternative has the least impact.
	Capital Cost	All three Alternatives have similar order-of-magnitude for construction costs.	All three Alternatives have similar order-of-magnitude for construction costs.	All three Alternatives have similar order-of-magnitude for construction costs, however this Alternative has the least property requirements, therefore it would have a lower total cost.
	Overall Evaluation of Each Alternative for this Category:	Most Impact	Moderate Impact	Minimum Impact

4.5. SELECTION OF PREFERRED NINTH LINE ROAD WIDENING OPTION

Following the evaluation of Alternatives 1, 2 and 3 as described in **Table 4-4**, in consultation with stakeholders and technical agencies, the Project Team selected Alternative 4 (combination of widening about the centerline, to the east and to the west) as the preferred alternative for widening Ninth Line from two lanes to four lanes. It was determined that Alternatives 1, 2 and 3 all posed some negative impacts on the surrounding environment. Alternative 4, in conjunction with the incorporation of modified cross-sections, is the only alternative that offers the flexibility required to mitigate the negative effects that widening poses to the surrounding environment.

Figures 4-3, 4-4 and 4-5 provide a comparison between existing and proposed conditions for a full 42.0 metre rural cross-section, 26.6 metre modified urban cross-section with curb and gutter, and the 5 Side Road intersection respectively³.

³ Note: The graphics presented in Figures 4-3, 4-4 and 4-5 show paved multi-use paths on both sides of the road. After these graphics were created, Halton Region decided that only one multi-use path would be constructed along Ninth Line on the west side of the road.



Figure 4-3: Before and After Visualization of Rural Cross-Section (42.0 m ROW) within the Ninth Line Transportation Corridor



Figure 4-4: Before and After Visualization of Urban Cross-Section (26.6 m ROW) within the Ninth Line Transportation Corridor



Figure 4-5: Before and After Visualization of Intersection at 5 Side Road and Ninth Line

4.6. ALIGNMENT OF PROPOSED NINTH LINE ROAD WIDENING OPTION

By varying the alignment of the proposed centerline, Alternative 4 minimizes impacts to adjacent properties and significant features. In sections that have constraints on both sides of Ninth Line, a modified cross-section is proposed. All modified cross-sections would maintain all multi-modal elements (i.e. travel lanes, median, bicycle lanes and multi-use path).

4.7. STORMWATER MANAGEMENT TECHNIQUES

The types of stormwater management techniques incorporated into the preliminary preferred design was dependent on the cross-section of the road in any given area (rural, semi-urban, or urban) and preference was given to gravity fed and infiltration options wherever feasible. The Project Team consulted with Conservation Halton to arrive at the preferred stormwater management solution.

4.7.1. *SURFACE ON-ROAD DRAINAGE*

Stormwater on the road surface will drain towards the ditches in the rural cross-section areas of the corridor and towards the curb and gutter system within the urban cross-section areas. The road will be graded in such a way as to prevent ponding of stormwater on the road surface, while at the same time protecting the water quality of private wells. During consultation with Conservation Halton staff, the Project Team evaluated vegetated trapezoidal ditches for the design to allow for maximum infiltration of stormwater and to manage the velocity of stormwater traveling through the ditches alongside Ninth Line to address sediment concerns.

4.7.2. *STORM-SEWER DRAINAGE*

In the sections of the Ninth Line corridor where an urban cross-section is proposed with a curb and gutter stormwater management system, storm-sewers were considered. In areas where the grade of the road does not allow for gravity-fed surface water drainage, storm-sewers will be installed below the road to allow for proper drainage to the culverts and ditches/swales in the rural cross-section areas of the corridor.

4.7.3. *SECONDARY FLOW ROUTE AT 5 SIDE ROAD INTERSECTION*

The results of the stormwater management assessment indicate that a secondary flow route is required for major flows (greater than the five-year storm) from the crossing culvert at 3+056 (Discharge Outlet #2) to the culvert at 3+498 (Discharge Outlet #3). An urban cross-section is required in this stretch of road to accommodate the presence of private homes on both sides of Ninth Line and minimize impacts on the woodlot and wetlands in the northwest quadrant. It is proposed to replace the existing 450mm diameter CSP culvert at 3+056 with a 450 mm diameter concrete culvert to handle proposed minor flows on the north side of 5 Side Road (crossing Ninth Line) from the east to the west. A secondary culvert is proposed to cross 5 Side Road to divert major flows from Discharge Outlet #2 to Discharge Outlet #3. The flow route from both these existing discharge points skirt a wetland south of the intersection of 5 Side Road and Ninth Line and form a confluence south of the wetland as shown in **Figure 4-6**.

As part of detailed design, these existing channels and ditches down to the existing confluence will be further investigated to ensure changing flow regimes (during major flow events) will not have an adverse impact or that channel modifications, as needed to handle increased flows, are designed into the proposed works.

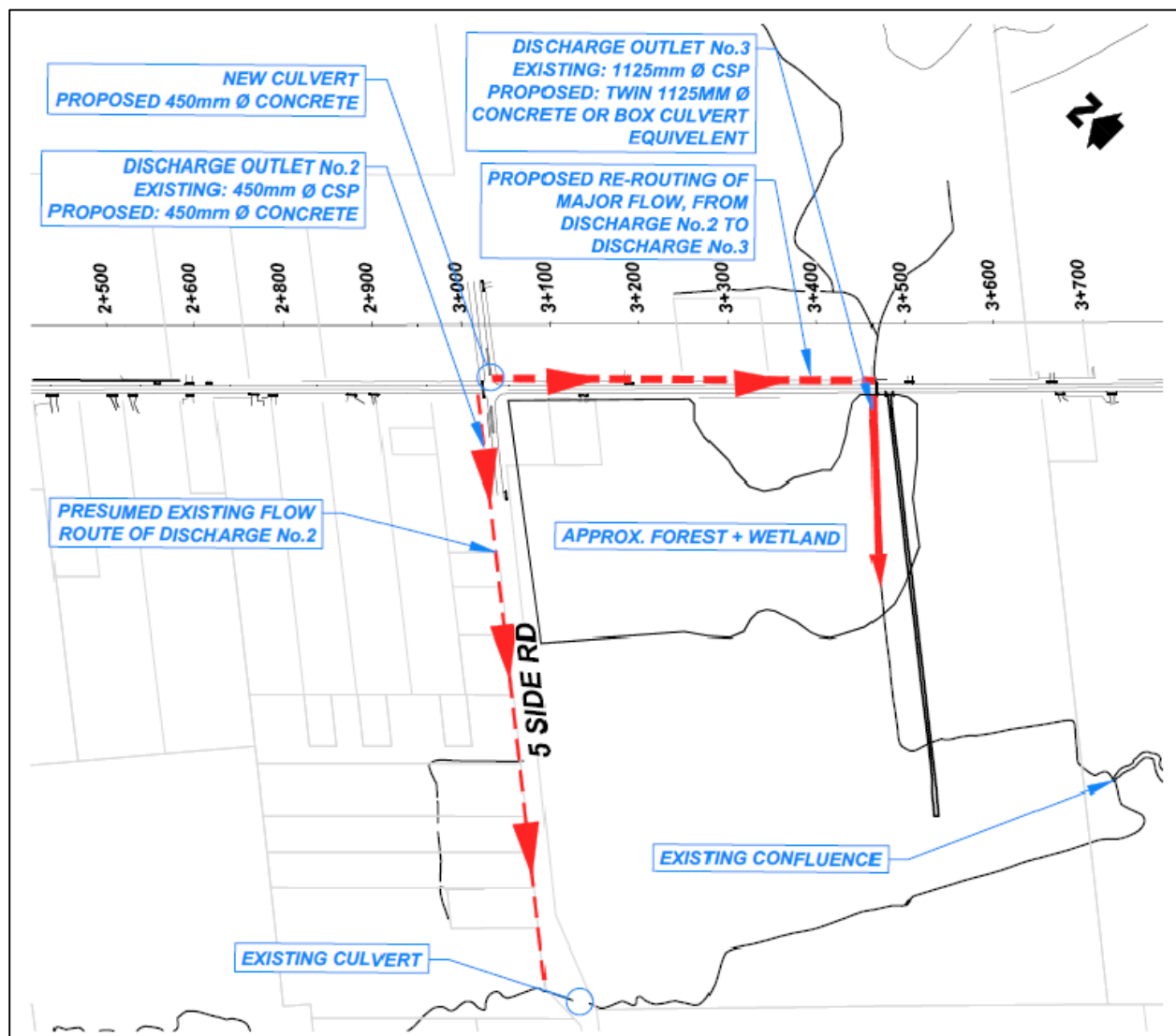


Figure 4-6: Downstream Flow Routes from Discharge Outlets #2 and #3

5.0 CONSULTATION

Public and agency consultation was a key feature of the Ninth Line Class EA Study. The Project Team aimed to generate meaningful dialogue between the study team, the public and review agencies, through an effective public consultation program, allowing an exchange of ideas and the broadening of the information base, leading to better decision making. One of the principal goals of the consultation therefore was to strive for resolution of conflicting viewpoints to reduce or avoid controversy and minimize potential for a Part II Order request(s). **Table 5-1** summarizes consultation activities undertaken as part of the consultation program.

Table 5-1: Summary of Consultation Program Activities and Target Stakeholders

Date	Activity	Target Stakeholders
Phase 1 – Identification of the Problem/Opportunity (2014)		
June 19, 2014	Notice of Study Commencement	Members of the Public, Adjacent Property Owners, Relevant Regulatory Agencies, Utilities
June 26, 2014	Ninth Line Class EA Study Notification Letter (Residents)	Adjacent Property Owners
June 26, 2014	Ninth Line Class EA Study Notification Letter (Technical Agencies)	Relevant Regulatory Agencies, Utilities
Phase 2 – Alternative Solutions (2014)		
June 13, 2014	Meeting with Conservation Halton	Relevant Conservation Halton Staff
October 16, 2014	Invitation to Technical Agency Meeting No. 1	Relevant Regulatory Agencies, Utilities
October 31, 2014 (mail) November 3, 2014 (email)	Invitation to Public Information Centre No. 1	Adjacent Property Owners
November 6, 2014	Notice of Public Information Centre No. 1 on Halton Region website	Members of the Public
November 5, 2014	Ninth Line Class EA Study and Public Information Centre Notification Letter	Potentially Affected First Nations
November 13, 2014	Technical Agency Meeting No. 1	Relevant Regulatory Agencies, Utilities
November 18, 2014	Article in the <i>Georgetown Independent</i> about Public Information Centre No. 1	Members of the Public

Date	Activity	Target Stakeholders
November 20, 2014	Public Information Centre No. 1	Adjacent Property Owners, Members of the Public, Municipal and Regional Councillors, Potentially Affected First Nations
Phase 3 – Alternative Design (2014/2015)		
April 8, 2015	Meeting with Conservation Halton	Relevant Conservation Halton Staff
April 27, 2015	Invitation to Technical Agency Committee Meeting No. 2	Relevant Regulatory Agencies, Utilities
May 12, 2015	Technical Agency Meeting No. 1	Relevant Regulatory Agencies, Utilities
May 14, 2015	Invitation to Public Information Centre No. 2 and Notice on Halton Region website	Adjacent Property Owners
May 15, 2015	Article in the <i>Georgetown Independent</i> about Public Information Centre No. 2	Members of the Public
May 21, 2015	Conference Call with Infrastructure Ontario	Relevant Infrastructure Ontario Staff
May 26, 2015	Public Information Centre No. 2	Adjacent Property Owners, Members of the Public, Municipal and Regional Councillors, Potentially Affected First Nations
July 10, 2015	Call with Infrastructure Ontario	Relevant Infrastructure Ontario Staff
August 13, 2015	Conference Call with Ministry of Tourism, Culture and Sport	Relevant MTCS Staff
September 29, 2015	Meeting with Conservation Halton	Relevant Conservation Halton Staff
February 18, 2016	Meeting with Conservation Halton	Relevant Conservation Halton Staff
April 19, 2016	Conference Call with Conservation Halton	Relevant Conservation Halton Staff
April 21, 2016	Meeting with Conservation Halton	Relevant Conservation Halton Staff
Phase 4 – Environmental Study Report (2015/2016)		
May 12, 2016	Notice of Study Completion	MOECC, Adjacent Property Owners, Interested Parties, Members of the Public, Municipal and Regional Councillors, First Nations, Regulatory Agencies, Utilities

Appendix J includes detailed documentation of the consultation process including minutes of meetings, relevant correspondence and public consultation/PIC documents.

5.1. NOTICE OF STUDY COMMENCEMENT

A Notice of Study Commencement was published in the *Georgetown Independent* and *Acton Tanner*, beginning Thursday, June 19, 2014. The Notice of Study Commencement was also placed on the Region's website on Thursday, June 19, 2014. A copy of the Notice of Study Commencement is provided in **Appendix J.1**.

Copies of the Notice of Study Commencement were also mailed to property owners within 250 metres of the study area, technical agencies (federal, provincial and municipal), as well as utilities providers on Monday, June 30, 2014. The Region also notified Halton Region Councillors, Halton Hills Councillors and senior Regional staff about the Notice of Study Commencement.

A Ninth Line Class EA Study Notification Letter was mailed to all property owners with land adjacent to Ninth Line within the study area boundary (based on available municipal records) on June 26, 2014. A copy of the official Notice of Study Commencement was enclosed with each notification letter. This letter provided a description of the study area boundaries, background information about the Region's TMP and the need for road improvements, and the purpose of the Class EA. The notification letter also provided contact information for both Alvaro Almuina (UEM Project Manager) and Alicia Jakaitis (Halton Region Project Manager) in case the recipients had any questions. A copy of the Ninth Line Class EA Study Notification Letter is provided in **Appendix J.1**.

5.2. TECHNICAL AGENCY COMMITTEE (TAC)

Contact lists of potentially interested or affected external participants comprising of technical agencies, governmental review agencies and utilities were compiled during the project initiation phase of the Ninth Line Class EA Study. **Table 5-2** provides a summary of the agencies and utilities that were contacted during the consultation program. This list was updated throughout the Ninth Line Class EA Study to ensure that the contact information remained current.

A Ninth Line Class EA Study Notification Letter was sent to all entities listed in **Appendix J.2**. This letter was delivered on June 26, 2014 and included a copy of the official Notification of Study Commencement as well as a feedback form. The purpose of the Ninth Line Class EA Study feedback form was to confirm who the key contact person(s) at each organization would be, gather their contact information, indicate whether or not the agency would like to be kept informed on the Ninth Line Class EA Study, and provide each recipient with an opportunity to share their areas of interest/preliminary comments with the Project Team. Agencies and utilities were notified of the Ninth Line Class EA Study commencement and were provided with feedback forms via email and/or mail on Monday, June 30, 2014.

All comments received from TAC participants are provided in **Appendix J.2**.

Table 5-2: Agencies and Utilities Contacted During the Ninth Line Class EA Study

Federal & Provincial Ministries/Agencies	Regional & Municipal Agencies/Committees	Utilities/Other
<ul style="list-style-type: none"> • Aboriginal Affairs and Northern Development Canada • Canadian Environmental Assessment Agency • CN Rail • Conservation Halton • Credit Valley Conservation • Environment Canada • Fisheries and Oceans Canada • Goderich-Exeter Railway • Infrastructure Ontario • Metrolinx • Ministry of Aboriginal Affairs • Ministry of Agriculture, Food & Rural Affairs • Ministry of Municipal Affairs & Housing • Ministry of Natural Resources and Forestry • Ministry of the Environment and Climate Change • Ministry of Tourism, Culture and Sport • Ministry of Transportation • Niagara Escarpment Commission • OMAFRA • Ontario Stone, Sand & Gravel Association • Ontario Trucking Association 	<ul style="list-style-type: none"> • Credit Valley Conservation • Halton Catholic District School Board • Halton District School Board • Halton Hills Chamber of Commerce • Halton Region • Halton Region - Emergency Medical Services • Halton Region - Forestry • Halton Region - Health Department • Halton Region - Legislative & Planning Services • Halton Region Police Service • Halton Region - Water Services, Public Works • Halton Student Transportation Service • Town of Halton Hills - Fire Department • Town of Halton Hills - Infrastructure Services • Town of Halton Hills - Planning Development & Sustainability • Town of Halton Hills - Recreation & Parks • Niagara Escarpment Commission 	<ul style="list-style-type: none"> • Bell Canada • COGECO Cable Canada Inc. • Enbridge Gas Distribution Inc., Planning Asset Management • Halton Hills Community Energy Corporation • Halton Hills Hydro Inc. • Hydro One Networks Inc. • Ontario One Call • Ontario Stone, Sand and Gravel Association • Ontario Trucking Association • SouthWestern Energy Inc. • Trans Canada Pipelines • TransCanada Pipeline - Halton Hills Generating Station • Union Gas Ltd.

5.3. PUBLIC INFORMATION CENTRES (PIC)

5.3.1. PUBLIC INFORMATION CENTRE No. 1

A Notice of PIC No. 1 was published on the Halton Region website on November 6, 2014. The notice was also delivered to all of the property owners on the residential mailing list for the project by surface mail on November 3, 2014. In cases where an email address was available, the notice was also emailed to each property owner on November 3, 2014. The official Notice of PIC No. 1 is provided in **Appendix J.3**.

In addition to formal notice, the *Georgetown Independent* also published an article on November 18, 2014 providing information about the Class EA and the time and location of PIC No. 1.

The first PIC for this Class EA was held on November 20, 2014 from 6:30 p.m. to 8:30 p.m. in the Georgetown District High School Cafeteria (located at 70 Guelph Street, Halton Hills, Ontario). The purpose of the PIC was to provide stakeholders, agencies and interested members of the public with an opportunity to meet the Project Team, review the study scope, and discuss issues related to the project including the preliminary alternative design concepts, environmental considerations, evaluation criteria, and next steps. The PIC was organized as an informal drop-in format with informational boards and aerial imagery of the study area on display. Copies of the display boards are provided in **Appendix J.3**.

An attendance register was maintained at the PIC and participants were requested to sign the attendance sheet. Another PIC for a separate EA was being held at the cafeteria simultaneously and one attendance register was shared between the two EA studies. Attendees were asked to indicate which PICs they were interested in and they were asked to give consent to receive future correspondence related to each EA study that they were interested in. Thirty-four (34) people that signed the joint PIC attendance register indicated that they were interested in the Ninth Line Class EA and of those thirty-four people, twenty-nine (29) attendees gave their consent to receive future correspondence regarding the Ninth Line Class EA Study. The project mailing list was updated accordingly.

Participants were encouraged to review the display materials, ask questions, and complete and return comment forms to the Project Team. Everyone had the option of either completing a comment sheet at the PIC or take a comment sheet with them to fill out at a later date and return to either UEM (c/o Alvaro Almuina) or Halton Region (c/o Alicia Jakaitis) by December 5, 2014. A total of eight (8) comment forms, three (3) email messages, and one (1) letter were returned to the Project Team following PIC No. 1. Copies of all written comments received are provided in **Appendix J.3**. All of the submitted written comments were reviewed and responded to by the Project Team in all cases where contact information was provided. A table summarizing the issues and concerns identified in written submissions and their consideration in this EA is presented in **Appendix J.3**⁴.

In addition to the written responses received, a number of discussions were held throughout the PIC between the Project Team and the PIC attendees. All verbal comments were noted and will be considered in the next phase of the Ninth Line Class EA Study. A general summary of the verbal comments/issues/concerns brought to the attention of the Project Team at the PIC is provided below:

- Reduce the speed limit to 60 km/hr;
- "Connect" north and south Ninth Line at Steeles Avenue (similar to the configuration of Trafalgar Road);
- Consider a roundabout at the intersection of Ninth Line and 5 Side Road;
- Construction timing (property owners along Ninth Line are eager for construction to begin); and
- Individual impacts on property.

⁴ Note: All names and addresses were removed for privacy reasons.

Media kits containing information about the Ninth Line Class EA Study as well as responses to frequently asked questions about the Ninth Line Class EA Study were prepared by Halton Region and were available at the PIC for any members of the media in attendance. The contents of the media kit are provided in **Appendix J.3**.

5.3.2. PUBLIC INFORMATION CENTRE NO. 2

The Notice of Public Information Centre No. 2 was published on the Halton Region website on May 14, 2015. The notice was also delivered to all of the property owners on the residential mailing list for the project by surface mail on May 19, 2015. Two of the notices were not able to be delivered and were returned to UEM by Canada Post. The explanations provided as to why the envelopes were delivered was that one of the recipients was either unknown or moved and the other envelope was refused by the addressee. In cases where an email address was available, the notice was also emailed to each property owner on May 19, 2015. The official Notice of Public Information Centre No. 2 is provided in **Appendix J.3**. In addition to formal notice, the *Georgetown Independent* also published an article on May 15, 2015 providing information about the time and location of PIC No. 2.

The second Public Information Centre (PIC) was held on May 26, 2015 from 6:30 p.m. to 8:30 p.m. in the Georgetown District High School Cafeteria (located at 70 Guelph Street, Halton Hills, Ontario). The purpose of the PIC was to provide stakeholders, agencies and interested members of the public with an opportunity to meet the Project Team, review the Ninth Line Class EA Study scope and the preferred alternative design, and discuss issues related to the project and next steps. The PIC was organized as an informal drop-in format with informational boards and aerial imagery of the study area on display. Copies of the display boards and the preferred design are provided in **Appendix J.3**.

Attendees were asked to sign the sign-in sheet. Twenty-seven (27) people signed the attendance sheet.

Participants were asked to provide any comments to either UEM (c/o Alvaro Almuina) or Halton Region (c/o Alicia Jakaitis) by June 26, 2015. A total of three (3) comment forms were submitted in the comment box at the PIC. Copies of all written comments received are provided in **Appendix J.3**. All of the submitted written comments were reviewed and responded to by the Project Team in all cases where contact information was provided. A table summarizing the issues and concerns identified in written submissions and their consideration in this EA is provided in **Appendix J.3**⁵. No comments were received after the PIC.

As a result of input received at PIC No. 2, the south section of Ninth Line above Steeles Avenue was redesigned to include a semi-urban cross-section, with a ditch/boulevard on the east side and a curb and gutter system on the west side with the residential properties, to mitigate impacts on adjacent landowners.

5.4. ADDITIONAL CONSULTATION WITH STAKEHOLDERS & TECHNICAL AGENCIES

5.4.1. MEETINGS WITH INDIVIDUAL PROPERTY OWNERS

Seven property owners significantly impacted by the proposed widening along Ninth Line were invited to meet with the Project Team to discuss the preferred design alternative prior to the second PIC. The Project Team met with four of those property owners on April 29, 2015 at the Gellert Community Centre in Georgetown. The Project Team also met with one more property owner prior to the second TAC meeting

⁵ Note: All personal information was removed for privacy reasons.

at the Gellert Community Centre on May 12, 2015. The invitation letter and minutes of these meetings are included in **Appendix J.4**.

5.4.2. CONSERVATION HALTON

Staff from Conservation Halton were in attendance at both TAC meetings for the Ninth Line Class EA Study. In addition to those meetings, Conservation Halton provided input to the Project Team on several occasions. The first meeting with Conservation Halton staff took place on June 13, 2014 to discuss the project scope and any issues or concerns that Conservation Halton had regarding the study area.

The Project Team had a second meeting with Conservation Halton staff on April 8, 2015 to discuss the preferred preliminary design for the Ninth Line corridor and the EA requirements checklist provided to the Project Team. Conservation Halton staff provided clarification on more detailed field work required and arrangements were made for Halton Region staff to accompany Conservation Halton staff during a site visit to stake a wetland southwest of the 5 Side Road intersection.

One of the commitments made by the Project Team during this meeting was to include a section in the ESR that clearly presents all of the Region's Ninth Line Class EA study commitments to aid Conservation Halton (and other regulatory agencies) in their review of the ESR. An overview of Halton Region's commitments is provided in **Table 7-3**.

Halton Region staff accompanied Conservation Halton staff on a site visit in June 2015. The objective of this site visit was to delineate the boundaries of a wetland southwest of the intersection at Ninth Line and 5 Side Road. GPS coordinates of the boundaries of the wetland were recorded and were subsequently added to study area maps.

The Ninth Line Project Team met with Conservation Halton staff again on September 29, 2015 and February 18, 2016. The main topics discussed at these meetings were the regionally significant wetland located southwest of the Ninth Line and 5 Side Road intersection, stormwater management and the incorporation of trapezoidal 'flat-bottom' ditches into the design, and the sizing of the new culvert or bridge to replace the main culvert crossing (Culvert Discharge Outlet No. 4 located near Station 5+180).

Following the completion of the Draft ESR Review Period, the Project Team had two more meetings with Conservation Halton staff on April 19 and 21, 2016 to discuss the natural environment assessment, the proposed drainage strategy and an alternative design concept for the 5 Side Road intersection. As a result of these meetings, the preliminary preferred design (Sheets 11 and 22 in **Appendix K.1**) was modified in the vicinity of the 5 Side Road intersection to ensure the water balance in the wetland remains the same before and after construction.

Minutes from all meetings and the Project Team's responses to the Conservation Halton comments are provided in **Appendix J.5**.

Conservation Halton staff reviewed and provided comments on the Draft ESR. A copy of the comments and the Project Team's response is provided in **Appendix J.10**.

5.4.3. MINISTRY OF TOURISM, CULTURE AND SPORT

The Ministry of Tourism, Culture and Sport (MTCS) conducted a review of the TAC No. 1 meeting materials and requested a copy of the draft Built Heritage Report to review. MTCS provided comments on the report on May 28, 2015. The Project Team participated in a teleconference call with MTCS staff to discuss the results of the Built Heritage Report on August 13, 2015. As a result of this discussion, the cultural heritage

consultant revised their draft report to include cultural heritage landscapes and submitted a Cultural Heritage Assessment Report (**Appendix D**). Copies with all correspondence with MTCS staff regarding the Ninth Line Class EA Study are provided in **Appendix J.6**.

MTCS staff reviewed the Draft ESR and provided comments to the Project Team on April 7, 2016. Copies of the correspondence is provided in **Appendix J.10**.

5.4.4. INFRASTRUCTURE ONTARIO

The Project Team notified Infrastructure Ontario (IO) on March 12, 2015 that one of IO's properties will be impacted by the proposed widening along the Ninth Line corridor. A teleconference call was arranged between members of the Project Team and IO staff to discuss the impacts to the IO property. It was concluded the impacts of the proposed road improvements would be minimal and that access to the property would need to be maintained during construction. A second call was arranged with IO staff to discuss the streamlining of IO Class EA requirements with this Class EA. Meeting minutes and a memo summarizing these conversations as well as copies of all correspondence between the Project Team and IO are provided in **Appendix J.7**.

As the disposal and severance of IO-managed land triggers the application of the MEDEI Class EA process, this ESR has been completed in accordance with both the Schedule 'C' Municipal Class EA requirements and IO's Category 'B' Class EA requirements. An overview of the MEDEI Class EA process undertaken as part of the Ninth Line Class EA Study is provided in **Section 8.0** of the ESR.

As requested by IO staff, the Draft ESR was provided to IO for their review prior to publishing the Notice of Study Completion and the commencement of the mandatory 30-day public review period.

Two Infrastructure Ontario staff members were provided with an electronic copy of the ESR (the Project Team was informed that IO does not accept hard copies of ESRs). The Project Team did not receive any comments from IO on the Draft ESR.

5.4.5. UTILITIES COMPANIES

Summaries of all correspondence with utility providers are provided in the sub-sections below. Copies of all email correspondence are provided in **Appendix J.8**.

5.4.5.1. HALTON HILLS HYDRO

A representative of Halton Hills Hydro provided UEM with marked up plan drawings identifying the approximate location of all hydro poles, customer-owned poles, traffic signal poles and underground plant in March 2015. These mark-up drawings represent the approximate location of Halton Hills Hydro owned infrastructure and will be verified in the field during detailed design. Prior to commencement of construction, the Region will contact Ontario One Call to request all applicable underground locates.

5.4.5.2. HYDRO ONE

Representatives from Hydro One attended both TAC meetings. In an email received from a Hydro One representative in May 2015, the Project Team was informed that if the proposed work impacts Hydro One infrastructure then the proponent is required to maintain existing line clearances and access to Hydro One facilities at all times. The structural integrity of all facility foundations must not be compromised as well. It is acknowledged that if proposed works affect Hydro One facilities or rights-of-way, the proponent will be required to submit detailed plans to the Hydro One Real Estate Management department and that

all costs associated with the modification or relocation of Hydro One facilities will be incurred by Halton Region. However, the prepared design for Ninth Line does not affect Hydro One infrastructure.

5.4.5.3. UNION GAS

Representatives from Union Gas indicated that the company has no plans to service this area at this time. However, in anticipation of future development within the corridor, Union Gas has requested that a standard gas running line one metre from the future property line be reserved for future distribution gas mains on both sides of the road. The company has requested that they be notified once property acquisition commences. If Union Gas expands its services to Ninth Line, a distribution station may be required near the intersection of Ninth Line and Steeles or near Highway 407.

During detailed design, Union Gas will be contacted with regards to their participation. However, at this stage there is no impact on their infrastructure.

5.4.6. FIRST NATIONS

Contact lists of potentially interested First Nations Communities in Southern Ontario were compiled during the project initiation phase of the Ninth Line Class EA Study. **Table 5-3** provides a list of the First Nations communities that were contacted during the consultation program. All correspondence with First Nations was done by Halton Region staff throughout the project.

Table 5-3: First Nations Mailing List

First Nations and Metis Communities		
• The Mohawks of the Bay of Quinte First Nation	• Six Nations of the Grand River	• Six Nations Haudenosaunee Confederacy Council
• Oneida Nation of the Thames	• Mohawk Council of Akwesasne	• Mississaugas of the New Credit First Nation
• Mississaugas of Scugog Island First Nation	• Hiawatha First Nation	• Curve Lake First Nation
	• Wahta Mohawk Territory	• Alderville First Nation

A Ninth Line Class EA Study Notification Letter was mailed to all First Nations communities listed in **Table 5-3** on November 5, 2014. A copy of the official Notice of PIC No. 1 was enclosed with each notification letter. This letter provided a description of the study area boundaries, an overview of consultation requirements, and an invitation to participate in PIC No. 1 or provide comments to Halton Region. The notification letter also provided a link to the project page on the Halton Region website. Another notification letter was delivered on May 19, 2015 prior to PIC No. 2. All notification letters delivered to First Nations are provided in **Appendix J.9**.

Ninth Line Class EA Study notification letters were mailed to the Ministry of Aboriginal Affairs (MAA) and Aboriginal Affairs and Northern Development Canada (AANDC). MAA and AANDC representatives were invited to participate in the TAC.

The Project Team received one response from a First Nations community. The Mississaugas of the New Credit First Nation (MNCFN) sent a response letter via email to Halton Region, on July 6, 2015. The letter indicated that MNCFN does not have a high level of concern regarding the proposed improvement to Ninth Line. However, they did request to receive copies of all environmental and archaeological reports related to the project and that a Field Liaison Representative (FLR) employed by MNCFN be present whenever any environmental or archaeological assessments are undertaken. Halton Region responded in

an email dated July 10, 2015 that MNCFN would receive a copy of the Stage 1 Archaeological Assessment Report with the Notice of Study Completion. A copy of the MNCFN letter and email response by Halton Region are provided in **Appendix J.9**.

5.4.7. TOWN OF HALTON HILLS

Representatives of the Town of Halton Hills attended both TAC meetings. Town staff were provided a copy of the Draft ESR for review and comment prior to filing. Following the Draft ESR review period, Halton Region staff and Town of Halton Hills staff discussed the provision of active transportation infrastructure further. As a result, it was decided that the Region, in consultation with the Town of Halton Hills, will confirm the type and location of active transportation off-road facilities (i.e. the multi-use path and sidewalks), during the detail design process. In addition to providing a multi-use path on the west side of Ninth Line, consideration will be given to providing a 2.0 metre sidewalk on the east-side of Ninth Line, where property is available.

5.5. NOTICE OF STUDY COMPLETION

The Notice of Study Completion for this Class EA was issued on May 12, 2016 in the local newspaper and on the Halton Region website; this date marks the beginning of the mandatory 30-day public review period for the Ninth Line Class EA Study. During this time, members of the public and other stakeholders are invited to review the ESR and provide any comments to the Project Team. In addition, a copy of the Notice of Study Completion was sent to all affected property owners (via surface mail), regulatory agencies and other stakeholders (via email) to notify them that the ESR is available for review. A copy of the Notice of Study Completion is provided in **Appendix J.11**.

Following the successful completion of the mandatory 30-day public review period (ends Monday, June 13, 2016), with any and all comments received addressed and no Part II Order Requests, this project will have met the requirements of the EA Act. The mitigation measures and commitments identified in **Table 7-3** of this ESR shall be carried out during the detailed design and construction phases of the project. During the detailed design phase, meetings will be held with approval agencies and individual property owners as necessary.

6.0 DESCRIPTION OF THE PREFERRED DESIGN

This section of the ESR provides an overview of the key features of the preliminary preferred design for the Ninth Line corridor improvements. Specific advantages provided by the preferred alternative design include:

- Provides sufficient traffic capacity for the TMP planning horizon (to 2031) and will improve traffic flow through the corridor;
- Improves access to private driveways by providing refuge for motorists to turn in and out of driveways safely;
- Accommodates modes of active transportation by providing on-road designated bicycle lanes and multi-use paths (for walking, cycling, roller blading, etc.); and
- Improves safety by providing better sightlines and more distance between travel lanes and road users.

Additional details of the preferred design are provided in the preliminary plan and profile drawings provided in **Appendix K.1**.

6.1. CROSS-SECTIONS

The recommended preferred design option, as discussed in **Sections 4.3.4 and 4.5**, was presented to the stakeholders and the public through the second round of consultations, as discussed in **Section 5.0** of the ESR. As a result of these discussions, the preferred design consists of three cross-sections (rural, semi-urban, and urban) located throughout the Ninth Line Corridor that will tie into the existing intersections at 10 Side Road and Steeles Avenue.

6.1.1. RURAL CROSS-SECTION

The typical rural cross-section (per Rural Cross-Section R2 of the Regional ROW Design Guidelines – presented in **Section 4.1**) is a maximum of 42.0 metres wide and includes four through lanes (two in either direction), a 5.0 metre painted median/two-way left-turn lane, 1.5 metre bicycle lanes/paved shoulder on either side of the road, 1.0 metre gravel shoulder, as well as space reserved for 3.0 metre multi-use paths on either side of the road. The boulevards between the shoulders and the multi-use path vary in width depending on the locations of constraining features adjacent to the proposed ROW and existing grading.

As a result of consultation, the “standard” rural cross-section was modified to accommodate one multi-use pathway recommended by the Region’s ATMP, provide minimal impact on grading beyond the 42 metre ROW and provide a safe separation between the vehicular lanes and the multi-use pathway, while observing the impact. There are various combinations to achieve the above and for the purpose of the ESR, the “ultimate” rural cross-section used in the preferred design reflects the following changes:

- A 3.0 metre painted median;
- The multi-use path on the inside of the ditch line on the west side of Ninth Line; and
- A 1.0 metre buffer between the multi-use path and the top of the ditch bank.

Figure 6-1 presents the rural cross-section carried forward in the design. **Appendix K.2** presents alternative cross-sections (rural, urban and semi-urban) considered to address all of the input and requirements for the preferred design.

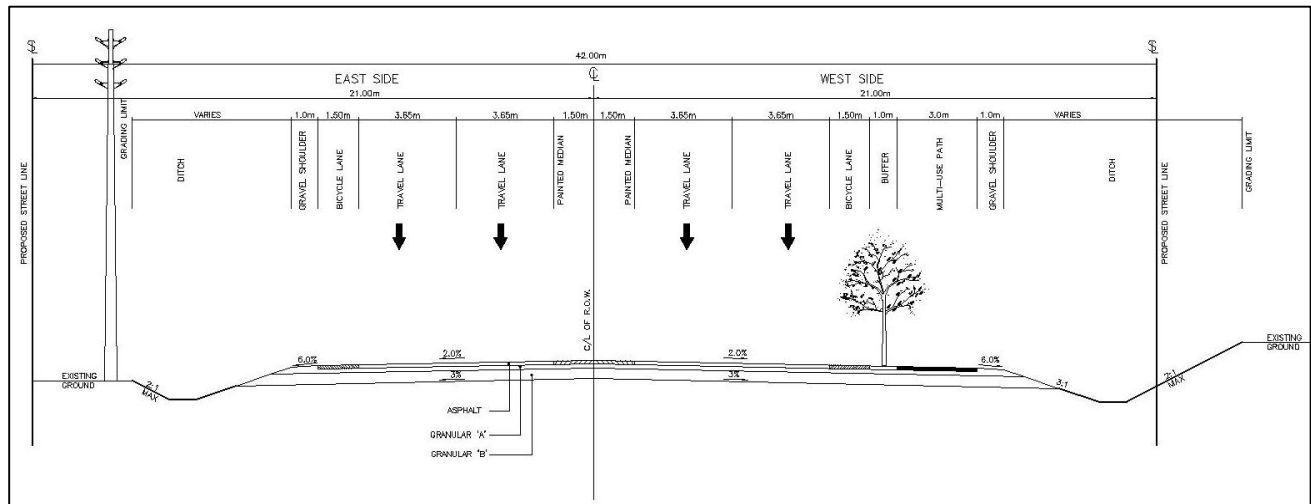


Figure 6-1: Revised Rural Cross-Section (42.0 metre ROW)

The resulting observations and conclusion from this exercise is that if Halton Region is to consider a separate multi-use path on rural cross-sections (R1 and R2 per Halton's ROW Design Guidelines), consideration must be given to updating these guidelines or creating a new "R" guideline that incorporates the new standard and would also identify the additional ROW that would be required. Based on the analyses undertaken in this study, a ROW of 48 metres would be the minimum width required to accommodate these needs.

6.1.2. URBAN CROSS-SECTION

The typical urban cross-section (**Figure 6-2**) is a minimum of 26.6 metres wide and includes the same facilities as the rural cross-section, with the exception of the boulevards and gravel shoulders, which were replaced with a curb and gutter stormwater management system.

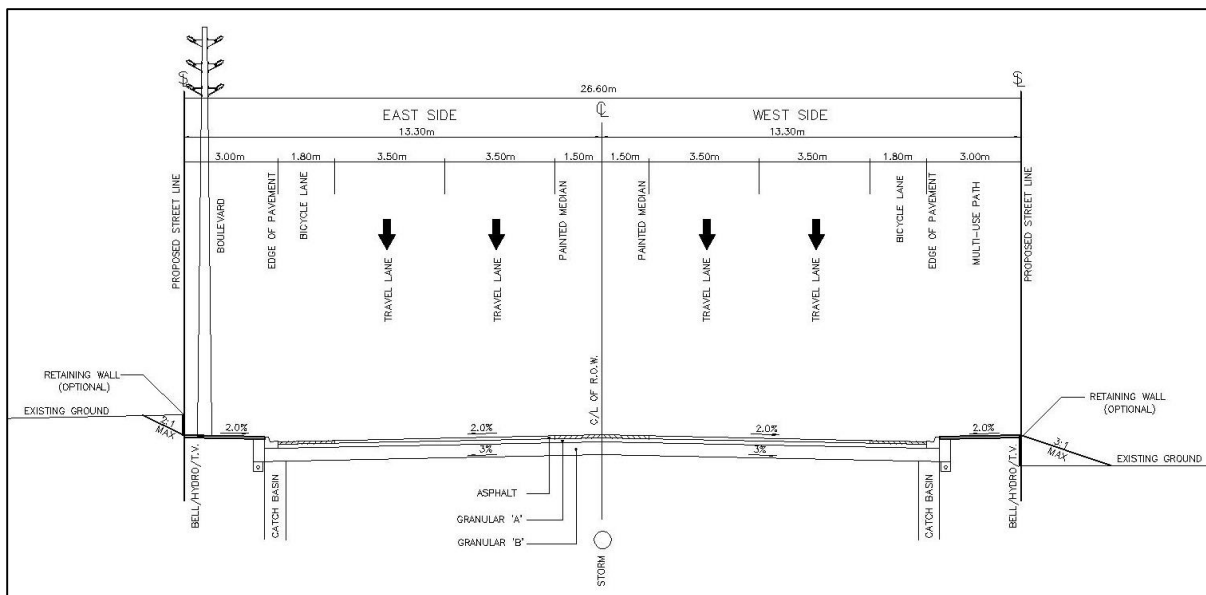


Figure 6-2: Representation of the Urban Cross-Section (26.6 metre ROW)

6.1.3. SEMI-URBAN CROSS-SECTION

A semi-urban cross-section (**Figure 6-3**) was developed for the southern portion of Ninth Line, which is characterized as having residences close to the existing property line on the west side and agricultural fields on the east side. For the semi-urban cross-section, the west section of Ninth Line will resemble the urban cross-section and the east section of Ninth Line will resemble the rural cross-section.

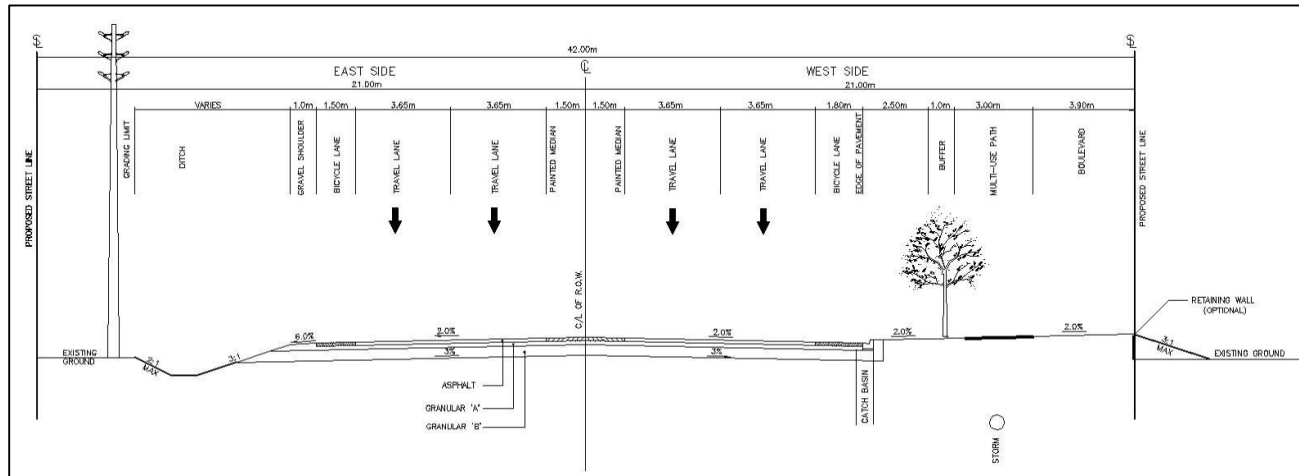


Figure 6-3: Representation of the Semi-Urban Cross-Section (42.0 metre ROW)

6.1.4. LOCATIONS WITH MODIFIED CROSS-SECTIONS

In portions of Ninth Line that are constrained by significant features on one or both sides of the road, the distances between the various features of the proposed roadway were altered to mitigate the impacts on the significant features (where feasible). The constrained areas in which the cross-section was reduced to minimize impacts are described below in **Table 6-1** (listed in order of appearance from north to south):

6.2. HORIZONTAL ALIGNMENT

When determining the horizontal alignment of the preferred design, a number of factors were taken into consideration, including:

- Following the existing ROW as much as possible;
- Minimize impacts to properties that would be significantly impacted by widening the ROW (refer to **Table 6-1** for a list of examples);
- Align with the existing and new intersection configurations (at 10 Side Road and Steeles Avenue respectively) at the study area limits; and
- Meet the design criteria and applicable design standards.

Based on these design goals, the proposed horizontal alignment shifts slightly from the existing centerline, as shown on the preliminary design plans provided in **Appendix K.1**. At the locations where the alignment shifts to the east or west, simple curves were used to achieve the required deflections.

During detailed design, refinements to the horizontal alignment may be required.

Table 6-1: Locations of Modified Cross-Sections within the Ninth Line Study Area

Station	Address Range	Description of Modification
2+400 to 3+050	9202 Ninth Line to 9052 Ninth Line	This section of the preferred design for Ninth Line was modified to have an urban cross-section. This was required to minimize impacts on the properties adjacent to the corridor as some properties have buildings (garage, home) close to the current right-of-way. The cross-section is carried through to the 5 Side Road intersection which is also proposed to be modified with full curb.
3+050 to 3+300	9174 Ninth Line	This section of the preferred design for Ninth Line was modified to have an urban cross-section. This was required to minimize impacts on the property on the west side (9174 Ninth Line) and to minimize impacts on the natural areas located on the west side of the corridor in the vicinity of the 5 Side Road intersection.
3+650 to 3+750	8790 Ninth Line & 8811 Ninth Line	This section of the preferred design for Ninth Line was modified to have an urban cross-section. This was required to minimize impacts on the two properties opposite each other, which form a "pinch" point.
4+700 to 5+350	8464 Ninth Line to 8310 Ninth Line	This section of the preferred design for Ninth Line was modified to have a semi-urban cross-section. This was required to minimize impacts on the properties on the west side as a number of concerns were expressed by residents with regards to contamination of the wells, which were located close to the roadway.

6.3. VERTICAL ALIGNMENT

The vertical alignment of the preferred design was designed to achieve the following goals:

- Improve sightlines;
- Minimize the amount of grading on either side of the ROW;
- Ensure overtopping requirements were met, while protecting the water quality of private water wells;
- Align with the existing vertical alignments of the intersections at the study limits (10 Side Road and Steeles Avenue); and
- Meet the design criteria and design standards.

With the exception of the large hill in the northern section of the study area (near Station 2+300), the vertical alignment of the preferred design generally follows the existing road profile. Grades varied from 0.5% to 3.5%.

The preferred vertical design (i.e. profile) is shown in the preliminary plan and profile drawings provided in **Appendix K.1**. During detailed design, refinements to the vertical alignment may be required.

6.4. INTERSECTIONS

There is one signalized intersection located within the study area (at Ninth Line and 5 Side Road) that requires improvements to accommodate future travel demands. The other signalized intersections in the

study area (at Steeles Avenue and 10 Side Road) have been upgraded as part of separate Class EAs. Several alternative designs were considered for the intersection of Ninth Line with 5 Side Road, including a roundabout configuration.

6.4.1. *ROUNDAABOUT OPTION*

The implementation of a roundabout at the intersection of Ninth Line with 5 Side Road was considered as part of this study and was presented to stakeholders at PIC No. 1.

A roundabout is a circular intersection at which traffic flows around a center island in a counter-clockwise direction. Vehicles yield to oncoming traffic before entering the intersection and drive around the central island until arriving at the desired exit lane.

Roundabouts have the following benefits:

- **Safety:** Safety performance can improve as a result of the reduced number of conflict points at the intersection;
- **Speed:** Vehicles must slow down to travel through the roundabout, which can reduce the number and severity of collisions;
- **Fewer Stops:** Vehicles stop less at roundabouts, compared to stopping at intersections;
- **Reduced Idling and Air Pollution:** Reduced vehicle stopping will result in less idling and air pollution;
- **Increased Capacity:** A high volume of left-turn movements may be better served by a roundabout than by a signalized intersection;
- **Reduced Maintenance Costs:** There are no traffic signals to maintain; and
- **Landscape Opportunity:** The central area provides an opportunity for landscaping and improved urban design.

Roundabouts are more suitable at intersections with:

- A high number of head-on, right angle and left turn across path collisions;
- High collision severity due to excessive speed;
- Heavy delay on minor street; and
- High left-turning volumes, especially with single lane approaches.

At this location, the study team had to account for current and future traffic conditions. Within the current characteristics of the intersection, the conditions did not meet the “more suitable” characteristics of a roundabout. Looking to the future conditions at 2031, 5 Side Road is proposed to have an interchange with the future GTA West Transportation Corridor (as currently being studied by MTO) therefore, there will be more traffic in the east-west direction beyond the capacity of a roundabout.

Therefore, given the current and future conditions at this intersection do not favour the implementation of a roundabout, this option was not pursued as a reasonable alternative for Ninth Line and 5 Side Road.

6.4.2. *PROPOSED 5 SIDE ROAD INTERSECTION CONFIGURATION*

It was determined that a signalized intersection would better accommodate future traffic demands compared to the roundabout for several reasons including:

- Proximity of the proposed GTA West Corridor (exact location to be determined by MTO); and
- Dominance of north-south traffic flows compared to east-west traffic movements.

In order to accommodate current and future left turn movements, designated left turn lanes were included at the 5 Side Road intersection, with storage lengths of 15 metres north-south on Ninth Line and 15 metres east-west on 5 Side Road. Refer to **Figure 6-4** for an overview of the existing intersection layout and **Figure 6-5** for the proposed signalized intersection configuration.

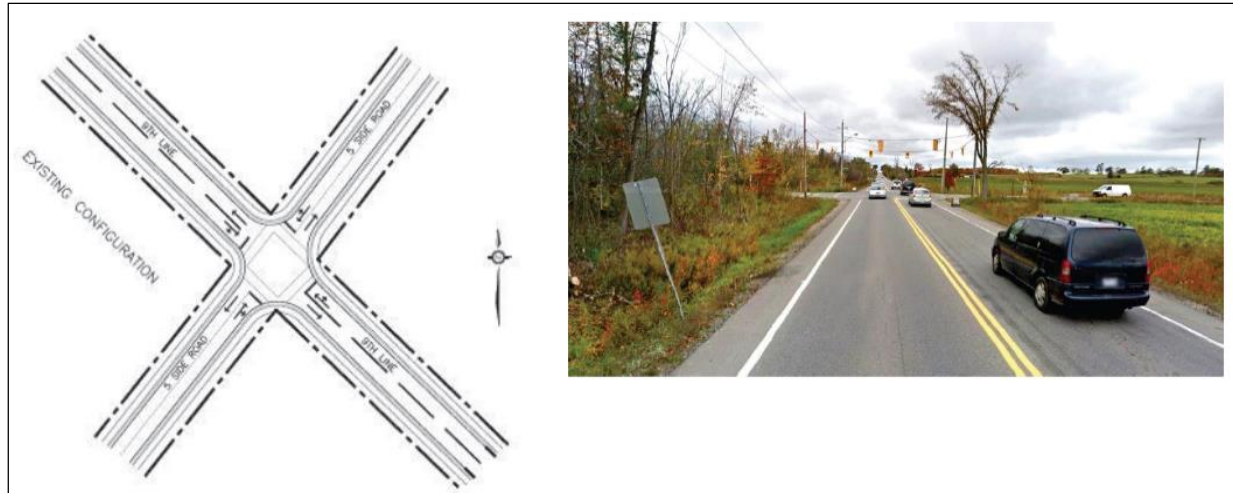


Figure 6-4: Existing Intersection Configuration

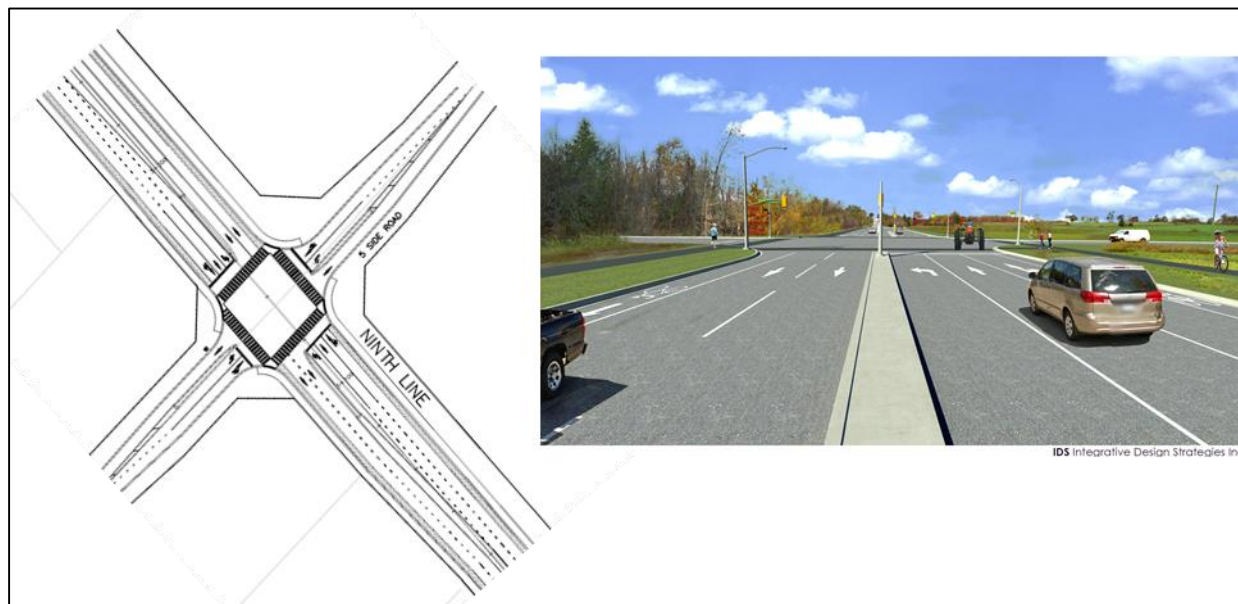


Figure 6-5: Proposed Configuration of the Ninth Line and 5 Side Road Intersection

6.4.3. INTERIM 5 SIDE ROAD INTERSECTION IMPROVEMENTS

It is anticipated that the reconstruction of Ninth Line will commence in the year 2020. However, after reviewing the results of the traffic analysis for the existing conditions it is recommended that the operation of the Ninth Line and 5 Side Road intersection receive interim improvements before the scheduled road reconstruction. Two interim intersection improvement scenarios, including the provision

of northbound and southbound left-turn lanes, were drafted by the Project Team, *widen to the west* (**Figure 6-6**) and *widen to the east* (**Figure 6-7**).

It was determined that widening to the east is the preferred solution for the interim intersection improvements as this alternative has less impact on the surrounding natural and built environments. At the 5 Side Road intersection there are hydro poles and street lights located on the west side of Ninth Line that would have to be relocated in the widen to the west scenario. Therefore, the “widen to the east” option would have a lower cost. In addition, the “widen to the east” option defers impacts on the woodlot located on the west side of Ninth Line.

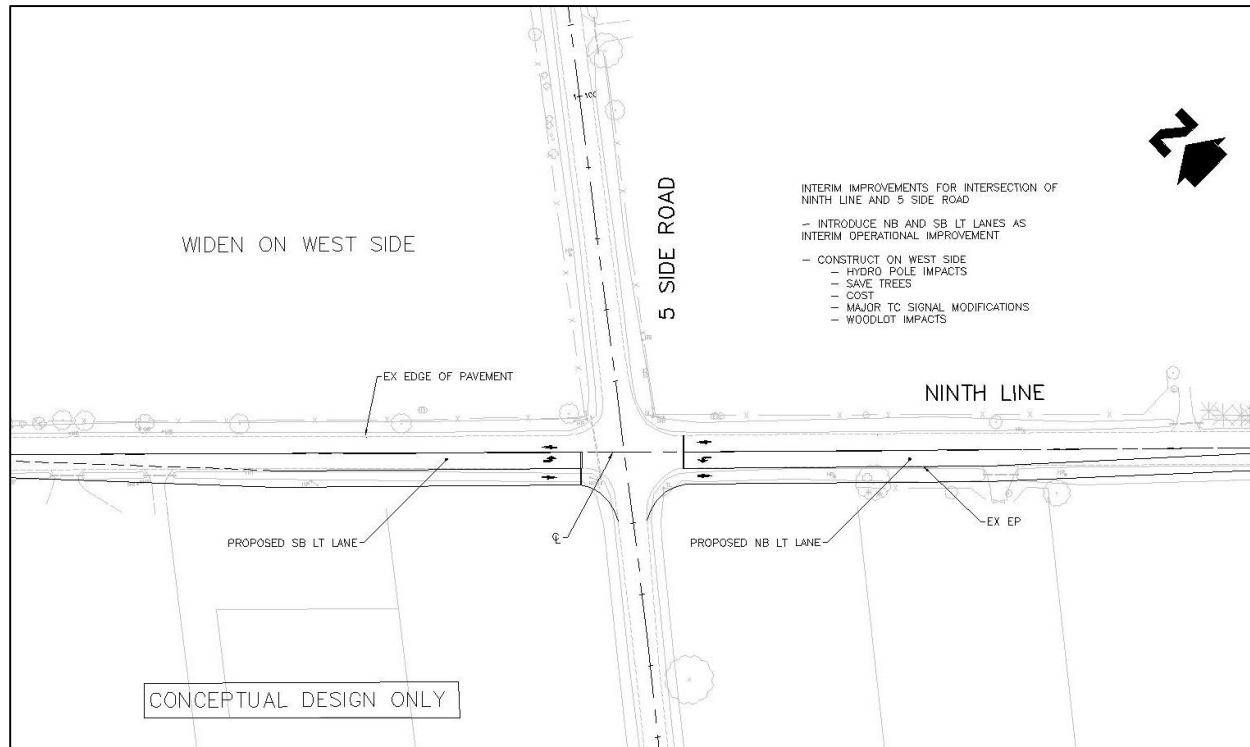


Figure 6-6: Interim 5 Side Road Intersection Configuration Alternative (Widen to the West)

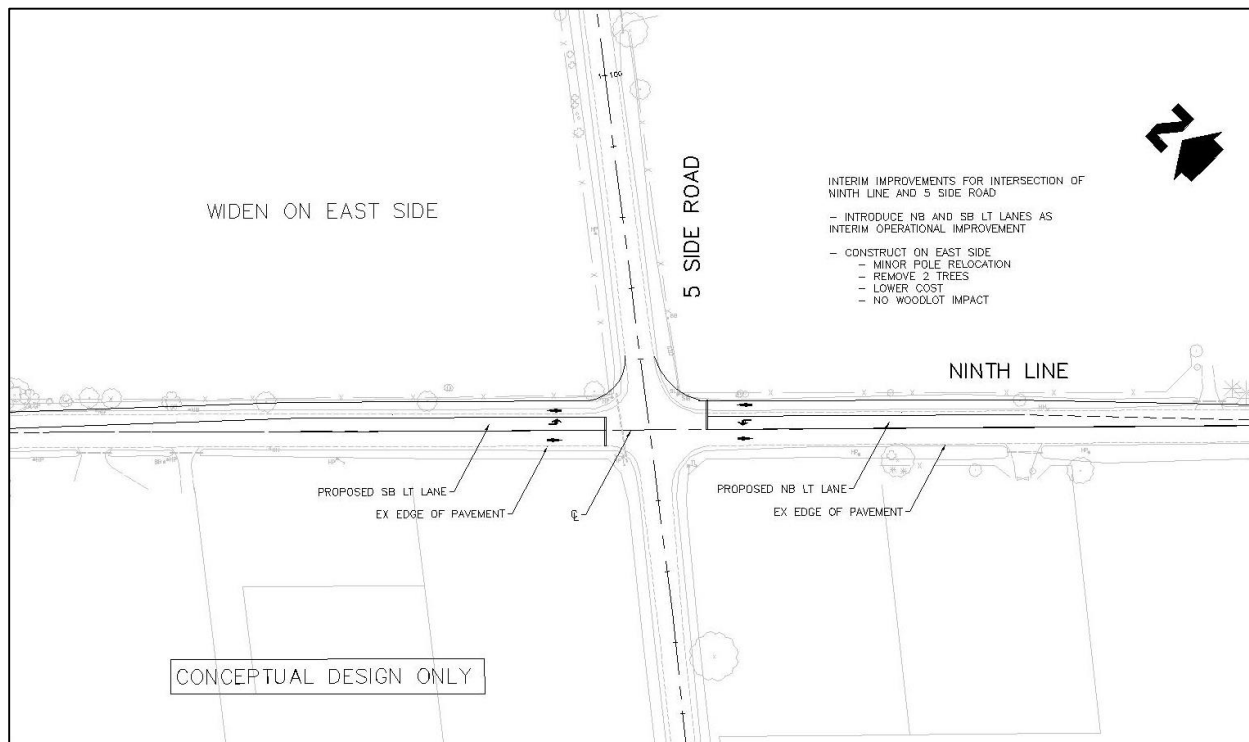


Figure 6-7: Interim 5 Side Road Intersection Configuration Alternative (Widen to the East)

6.4.4. REALIGNMENT OF NINTH LINE NORTH AND SOUTH OF STEELES AVENUE

The option of realigning the north and south portions of Ninth Line at Steeles Avenue was explored (refer to **Figure 6-8**). Due to the development freeze placed on the Premier Gateway Employment Area through ROPA 43 and OPA 21 as a result of the GTA West Corridor Route Planning and Environmental Assessment Study in progress (described in more detail in **Section 3.3.3.1**), the elimination of the jog in the road north and south of Steeles Avenue is not recommended at this time. The Region and the Town of Halton Hills may decide to assess this option in the future when more is known about the route that the GTA West corridor will take and the development freeze is lifted.

At the appropriate time, alternatives to remove the offset can be examined on their own or in the context of development applications as this area is designated for future commercial development.

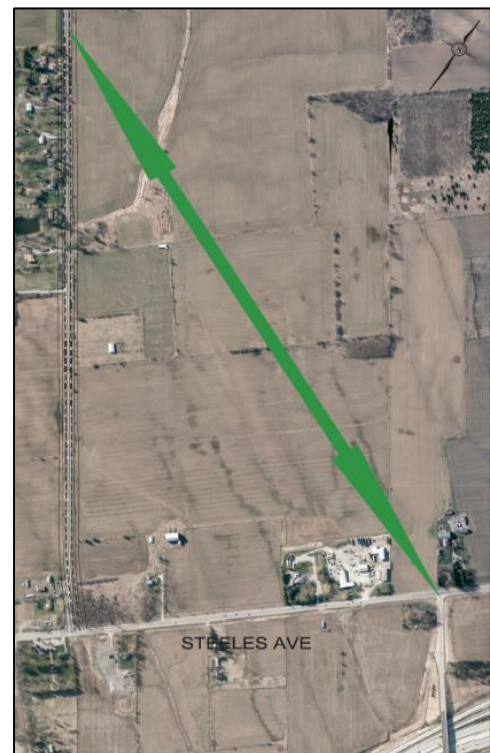


Figure 6-8: Ninth Line Realignment Option

6.5. ACTIVE TRANSPORTATION – CYCLIST & PEDESTRIAN ACCOMMODATIONS

The preferred alternative design includes provisions for cyclists and pedestrians in the form of 1.5 metre on-road bicycle lanes (for cyclists only) and a 3.0 metre multi-use path on the west side of the road (for pedestrians, cyclists, rollerbladers, etc.).

6.6. STORMWATER DRAINAGE – DISCHARGE OUTLETS AND CULVERTS

6.6.1. MAIN CULVERT CROSSING

For the purpose of this Class EA, the main culvert crossing (Discharge Outlet #4) was designed with the following in mind:

- **Size** – To meet Conservation Halton requirements, the proposed goal will be to achieve a “three times bankfull width” culvert opening of approximately 15m wide by 0.7m high. During detailed design, a full fluvial geomorphic assessment will be completed to look at the feasibility of using a smaller culvert opening along with “natural channel design” bank stabilization techniques upstream of the culvert to stabilize the upstream channel to reduce the risk of meander belt migration. The culvert should also be large enough to meet MTO criteria for passing at least a 50-year flow. Conservation Halton has requested that the Region consider an ultimate culvert design that keeps Ninth Line road surface flood free under Regional Storm conditions.
- **Length** – Conservation Halton has requested that all efforts be made during detailed design to minimize the length of the culvert.
- **Type** – Open footed concrete culvert with natural channel bottom and a stabilized low flow channel through the culvert passage. Given the significant width for three times bankfull, alternative open footing techniques (e.g., a bridge) may need to be considered.
- **Inlet contraction pool** – Incorporate bioengineered elements to stabilize the crossing site (i.e., stop the entrenching). Bioengineering techniques that should be considered include hardening the banks with crib-walls and/or layered vegetation (i.e. matts).
- **Alignment** – will be as close as possible to perpendicular to the road, but will account for existing up-gradient and down-gradient meander which may require a modified alignment. Downstream bank stabilization using natural channel design techniques should be considered, in addition to similar upstream treatment, if needed to ensure stability of the downstream channel banks based on the assessment of the fluvial geomorphologist.
- **Low flow channel** – within the open bottom, a low flow channel will be established to convey baseflow.
- **Wet swales or sediment traps** – to address sediment issues and channel erosion where roadside conveyance and the channel converge. Wet swales or sediment traps in the ditches before discharge locations into the main channel are recommended. The MOECC *Stormwater Management Planning and Design Manual* (2003) states that:

“Wet swales combine elements of dry swale systems and wetland systems. Wet swales are typically wider than dry swales (e.g., 4 m - 6 m) and the check dams are used to create shallow impoundments in which wetland vegetation is planted or allowed to colonize. Because of their width, wet swales are not generally implemented along the front of residential properties, but rather are included where overland flow routes use linear open space areas.”

6.6.2. MINOR CULVERT CROSSINGS

Due to road widening, all minor culvert crossings will have to be replaced with longer culverts. The replacement culverts will also be designed to conform to the MTO *Drainage Management Manual* (1997), and *Highway Drainage Design Standards* (2008) and the MTO *Gravity Pipe Design Guidelines: Circular Culverts and Storm Sewers* (Revised, April 2014). Based on the MTO Drainage Manual, for crossings of a rural arterial road with a span less than 6 metres, the culverts should at a minimum be designed to convey peak flow from a 25-year storm.

The current preliminary corridor configuration indicates that a new discharge point may be required at Station 0+408 (Discharge Point 0) to address a new low point in the proposed roadside ditch system. This would reduce the runoff at Discharge Point 1 (Station 1+240) but introduce new flows into an existing channel southwest of the road at this 0+408. If this new discharge point is retained through final design stage, then additional information will need to be collected on the receiving channel, impact on drainage divides evaluated, and stormwater management and culvert design implications assessed.

Preliminary road design also indicates that a secondary flow route is required for major flows (greater than the five-year storm) from crossing culvert at 3+056 (Discharge 2) to the culvert at 3+498 (Discharge 3). An urban cross-section is required in this stretch of road to accommodate the presence of private homes on both sides of Ninth Line and minimize impacts on the woodlot and wetlands in the northwest quadrant. Due to elevation constraints, it is proposed to replace the existing 450mm diameter CSP culvert at 3+056 with a 450 mm diameter concrete culvert to handle proposed minor flows. A secondary culvert will cross 5 Side Road to divert some major flows to from Discharge 2 to Discharge 3. The flow route from both these existing discharge points skirt a wetland south of the intersection of 5 Side Road and Ninth Line and form a confluence south of the wetland as shown in **Figure 6-9**. As part of detailed design, these existing channels and ditches down to the existing confluence will be investigated to ensure changing flow regimes (during major flow events) will not have an adverse impact, or that channel modifications as needed to handle increased flows are designed into the proposed works.

As part of detailed design, these existing channels down to the existing confluence will be investigated to ensure changing flow regimes will not have an adverse impact, or that channel modifications as needed to handle increased flows are incorporated into the proposed works. Additionally, the potential impact of the modified flow route on wetland water balance will be assessed and addressed during detailed design.

Table 6-2 provides a summary of preliminary recommendations for culvert replacements that account for reduced culvert slopes due to longer spans, and meet the MTO conveyance criteria. This preliminary assessment was based on the Rational Method from the preliminary fluvial geomorphic assessment completed in December 2015.

The results in **Table 6-2** are based on a conservative open channel calculation of peak flow capacity of the proposed culverts. During detailed design, a more detailed assessment should be completed to see if smaller culverts under surcharged conditions can convey the peak flows and meet MTO requirements in detail. At locations where large or twin culverts are needed, Conservation Halton has requested consideration be given to a box culvert to provide more effective flow and channel characteristics for the watercourse feature.

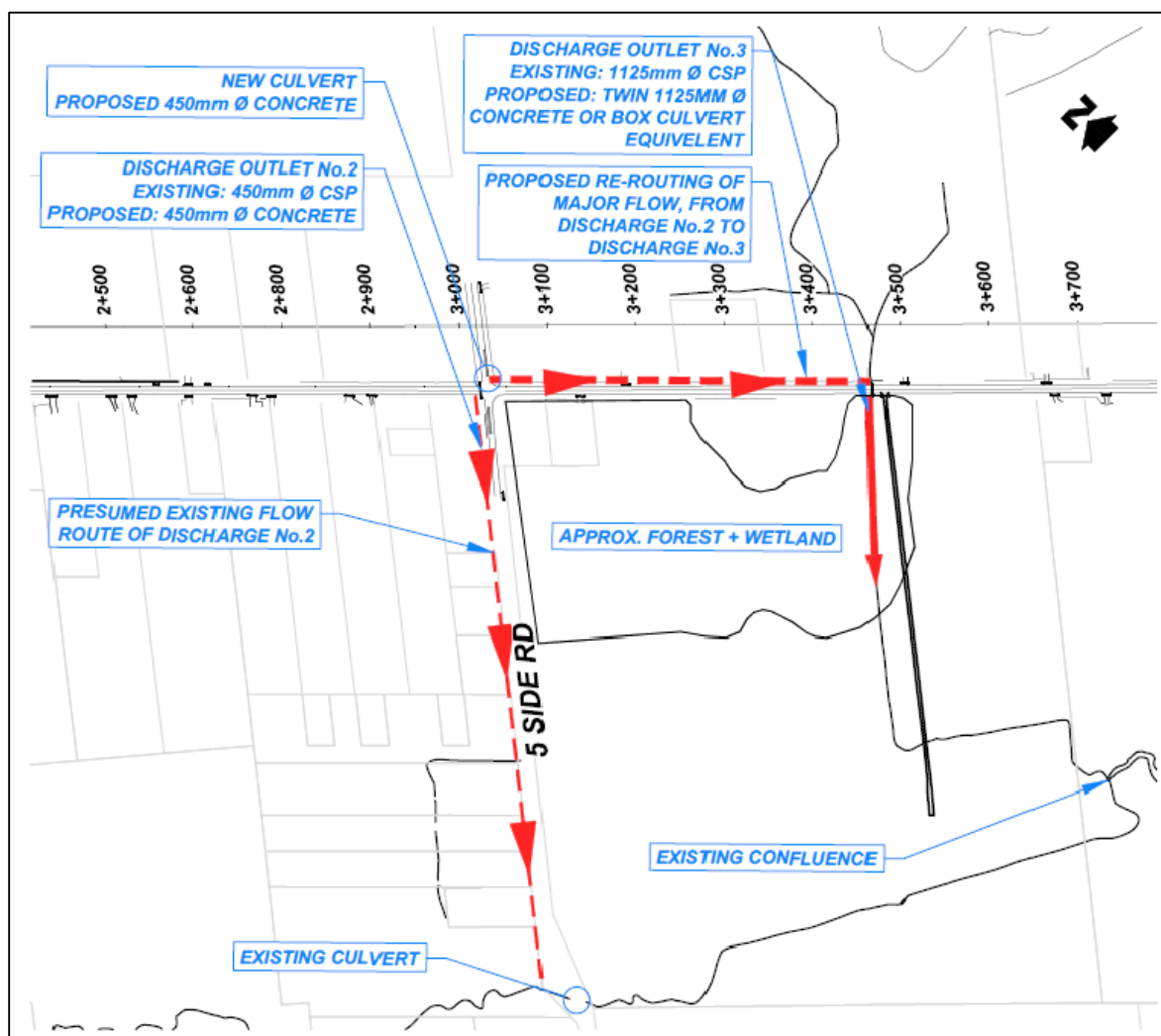


Figure 6-9 – Proposed Drainage Strategy in the Vicinity of 5 Side Road (Discharge Outlets #2 and #3)

Table 6-2: Ninth Line Minor Culvert Crossings that Discharge Out of the Study Area

Discharge Point (Minor Culvert Crossings Only)	Station	Existing Dimension	Proposed Dimension
0	0+408	none	900mm dia concrete
1	1+238	700 mm dia CSP	Twin 1050 mm dia concrete – or box culvert with equivalent capacity
	1+247	900 mm dia CSP	
2	3+056	450 mm dia CSP	450 mm dia concrete
3	3+498	1125 mm dia CSP	Twin 1125 mm dia concrete – or box culvert with equivalent capacity

There are at least two intermediate culvert crossings that are not located at existing discharge/outlet points. These crossings convey flow from the east side ditch to the west side ditch. These connections potentially help to balance out flows between the east and west side ditches as there is a significant disparity between catchment areas for lands east of the roadside (432 hectares) and west of the roadside (26 hectares), particularly at the northern end of the system tributary to Drainage Area No. 1 in Figure 1 in Appendix A of the Stormwater Management Report.

During detailed design, consideration will be given to more sites for this type of intermediate crossings as part of overall collection system design. The locations of existing crossings at the northern end of the study area should be maintained with new culverts installed to maintain existing conveyance capacity.

6.6.3. ROADSIDE DITCHES

From a drainage perspective, there are three types of road cross sections and related roadside conveyance proposed for the rebuilt road as shown in Appendix G of the Stormwater Management Report. These include:

- **Rural Section** – roadside trapezoidal shaped ditches with a 1m flat bottom and a 3:1 side slope closest to the road and a 2:1 side slope toward the surrounding land.
- **Semi-Urban Section** – ditches on the one side of the road, with a storm sewer aligned along the other road boundary.
- **Urban Section** – curb and catchbasins that discharge into a storm sewer aligned with the road centerline.

The current preliminary design includes trapezoidal-shaped ditches with a typical slope of 0.5% and some steeper sections as necessary.

The worst case scenario for roadside ditches is the northern end of the study area where significant farmland enters the roadside ditch. About two-thirds of the proposed 89.7ha catchment area is tributary to specific ditch sections. Using two-thirds of the 25-year peak flow, results in a peak flow of 2.6 m³/s in the ditch. In the proposed trapezoidal-shaped ditch, assuming a Manning's n of 0.040 and a slope of 0.5%, the depth of flow would be 0.8m with a velocity of 1.0 m/s. This suggests that a maximum ditch depth of 1m will generally be sufficient, with shallower depths suitable in other locations.

6.7. STORMWATER MANAGEMENT

As per MOECC Stormwater Management Planning and Design Manual and the 16 Mile Creek Watershed Plan:

- **Quality** requirements are Enhanced/Level 1 treatment (long-term average removal of 80% of suspended solids),
- **Quantity** requirements are post to pre development controls to the extent possible
- **Erosion control and detention storage** requirements are implemented to the extent possible

Stormwater quality and quantity control is proposed through the maintenance and enhancement of the existing rural ditches where possible. A trapezoidal vegetated ditch is preferred over a V-shape ditch to increase water infiltration rates to offset the increased impermeable surface area posed by the road widening. A vegetated ditch with a shallow slope also improves stormwater runoff quality.

Shallow sloped, trapezoidal, vegetated ditches will be used along the road corridor in all "Rural" sections and will be the primary method of quality, quantity and erosion control. Typical slope of the proposed ditch is 0.5%, with a 3:1 side slope adjacent to the road and 2:1 side slope on the opposite side. A base width of 1.0 m is proposed.

Table 6-3 provides a preliminary estimate of existing and post-development peak flows based on Rational Method for the 100-year storm. Discharge Point 4 estimates are significantly lower than those computed using Visual HYMO presented earlier in this report. This is likely due to the preliminary and un-calibrated nature of the modelling. And due to the tendency of Rational Method to underestimate low frequency storms (like the 100-year storm) as the runoff coefficient is actually a function of rainfall intensity and will increase with rainfall volume and intensity of a storm. These preliminary estimates are only provided here to illustrate the relative impact of proposed roadworks and drainage configuration on peak flows at each discharge point.

Table 6-3: Ninth Line Pre and Post Peak Flows for 100 Year Storm

Discharge Point (DP)	Peak Flow (cms)		Notes
	Existing	Post Development	
0	0.0	1.4	New proposed discharge point. Takes some of Existing DP #1 flows
1	5.9	4.9	Some of this flow is diverted to DP# 0
2	2.7	0.0	Assumes most of major flow (> 5-year storm) is re-directed to DP #3
3	2.5	5.1	Most of increase due to major flow (> 5-year storm) diverted from DP #2 to DP #3
4	7.7	7.8	A 1% increase in flow due to proposed road works

The primary changes in peak flow rates are due to changes in catchment areas for Discharge Points 0 through 4. Discharge Point 0 is a new point and downstream channel will need to be designed to adequately convey the flow. Similarly, the peak major flow at Discharge Point 3 will increase as it will now take major flows from the culvert at Discharge Point 2. The confluence for these two outlets is approximately 200m south of the Discharge Point 3. This channel is straight and likely engineered and should be assessed to ensure it can handle the increased peak major flows until the confluence.

The increase in peak flow at Discharge Point 4 is a 1% increase in peak flow and is due only to expanded road works. The proposed trapezoidal channel should reduce this peak flow.

To help further improve water quality and quantity control, a treatment train approach that considers the following stormwater management options will be evaluated during final design in addition to the roadside trapezoidal ditches:

- **Wet swale or sediment traps** in all ditches prior to discharge into any of the main or minor discharge points. For the minor crossings, it may be possible to consolidate the sediment control within the channel instead of the roadside ditches. These devices also provide detention storage for high frequency rainfall events.

- Add strategic **check dams** to the trapezoidal ditches to provide additional detention storage for water quality control.
- All "Semi Rural" or "Urban" cross sections discharge into "Rural" trapezoidal ditches with the exception of the "Semi Rural" section that discharges into the downstream end of the major crossing at Discharge Point 4 (5+180). All other rural sections will therefore be controlled (quantity and quality) by the downstream trapezoidal ditching. To help control water quality from the "Semi Rural" at the major discharge at 5+180, two techniques are proposed:
 - Add a **sediment trap** or **wet swale** near the inlet of the proposed storm sewer to provide additional quality control on the flows entering the ditch, and
 - Use **oil grit separators** at the catchbasins immediately upstream of the storm sewer discharged to the main watercourse near 5+180.
- Consider using Low Impact Development (LID) techniques. Conservation Halton recommends that discussions between the designing Landscape Architect and Engineer take place at the onset of the detailed design process to refine LID options (e.g., tree pits, bio-retention areas within proposed landscape area within the project limits). Other techniques could include:
 - Porous granular buffer – between the paved shoulder and the multi-use path in the typical proposed rural cross section highlighted in **Figure 5-1**. This buffer width should be maximized and subsurface fill selected to promote infiltration. This will reduce peak flows for frequent rainfall events and provide an additional measure of water quality control.
 - Porous asphalt bicycle lane (**Figure 5-2**) – in the "Semi Rural" section that discharges to the main crossing at 5+180. It may be possible to extend the porous asphalt bike lanes through the rural section as well depending on relative cost. Permeable asphalt is not recommended where sand is used for winter road treatment.

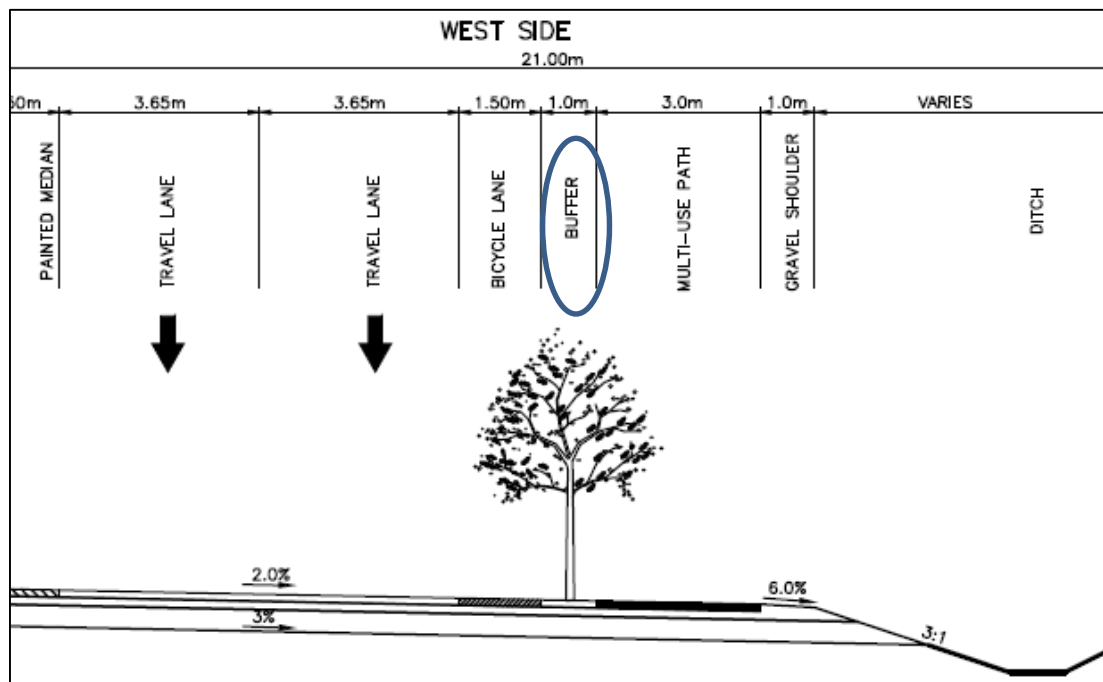


Figure 6-10 – Porous Buffer between Paved Shoulder and Multi-use Path in "Rural" Cross Section

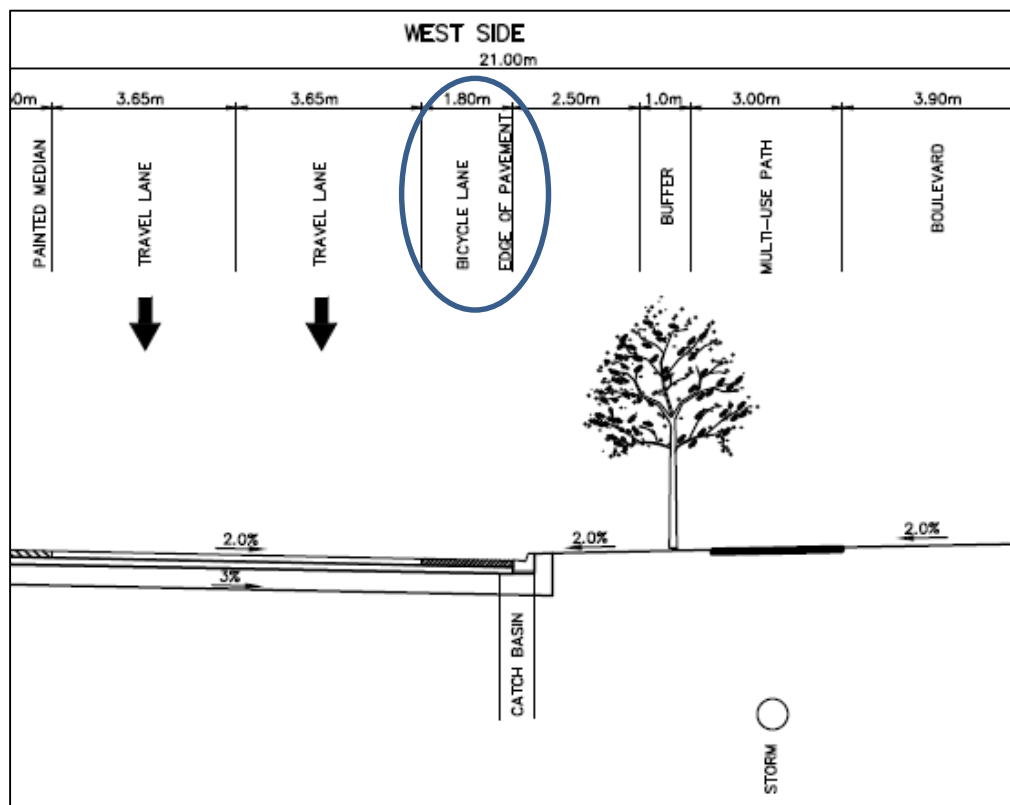


Figure 6-11 – Porous Asphalt Bicycle Lane in “Semi-Urban” Cross Section near 5+180



Figure 6-12 – Example of Porous Asphalt Bicycle Lane
 (From Credit Valley Conservation, Grey to Green Road Retrofits, 2014)

6.7.1. MAIN CONCLUSIONS OF THE STORMWATER MANAGEMENT ASSESSMENT

Based on this review of drainage and stormwater management:

- There is limited development anticipated in the study area to the year 2031. Therefore, changes to the hydrological characteristics of the study area will be primarily due to road widening.
- The road widening will increase the impervious Ninth Line road surface area from 2.2% of the study area to 4.5% of the 457ha study drainage area. The proposed road work is expected to have a negligible effect (around 1%) on peak flow rates following road widening compared to existing conditions.
- There is currently one major channel crossing of Ninth Line through a 3 metre wide open bottom box culvert. This culvert will be replaced with a wider open bottom box culvert. Details of this proposed new culvert will be developed during final design based on a fluvial geomorphic assessment and natural channel design principles. An initial calculation based on a proposed span that is three times the bankfull width of the upstream creek indicates that this span could be up to 15 metres wide. During detailed design, additional fluvial geomorphic investigations will be undertaken and opportunities will be examined to reduce this span by enhancing channel stability through construction of a contraction pool and bioengineered bank hardening (e.g., crib walls and layered vegetation). Additional recommendations for this culvert include:
 - **Size** – The culvert should be large enough to meet MTO criteria for passing at least a 50-year flow. Conservation Halton has requested that the Region consider an ultimate culvert design that keeps Ninth Line road surface flood free under Regional Storm conditions.
 - **Length** – Conservation Halton has requested that all efforts be made during detailed design to minimize the length of the culvert.
 - **Type** – Open footed concrete culvert with natural channel bottom. Given the significant width required to accommodate the three times bankfull requirement, alternative open footing techniques (e.g., a bridge) may need to be considered unless bank stabilization can provide relief from this width requirement.
 - **Inlet contraction pool** – and bioengineered elements to stabilize the crossing site (i.e., stop the entrenching). Bioengineering techniques that should be considered include hardening the banks with crib-walls and or layered vegetation (matts).
 - **Alignment** – will be as close as possible to perpendicular to the road, but will account for existing up-gradient and down-gradient meander which may require a modified alignment. Downstream bank stabilization using natural channel design techniques will be considered, in addition to similar upstream treatment, if needed to ensure stability of the downstream channel banks based on the assessment of the fluvial geomorphologist.
 - **Low flow channel** – within the open bottom of the crossing, a low flow channel will be established to convey baseflow.
 - **Wet swales or sediment traps** – to address sediment issues and channel erosion where roadside conveyance and the channel converge. Wet swales or sediment traps in the ditches before discharge locations into the main channel are recommended.
 - **Capacity** – to meet MTO criteria for passing a 50-year flow. Conservation Halton has requested that the Region consider an ultimate culvert design that keeps Ninth Line road surface flood free under Regional Storm conditions.

- There are three other existing minor discharge locations where runoff from the road right of way and up-gradient lands discharge to the west. One new crossing will also be constructed. Down gradient channels from these crossings should be assessed to ensure channel stability. Preliminary sizes of culverts for these minor crossings were assessed to ensure they will be able to convey peak flow from a 25-year storm as per MTO requirements. At locations where large or twin culverts are needed, Conservation Halton has requested consideration be given to a box culvert to provide more effective flow and channel characteristics for the watercourse feature.
- The existing ditch system will be replaced with a new drainage system that will include shallow sloped, vegetated trapezoidal ditches, and underground pipes in locations where insufficient right of way exists for ditches. This trapezoidal ditches are intended to provide quality and quantity control for stormwater runoff. Additional stormwater management features include strategically placed oil-grit separators, sediment traps and/or wet swales, check dams, and implementation of Low Impact Development Techniques (e.g., porous buffer strip and strategic use of pervious pavement for the bike lanes in the semi-urban cross section, tree pits, bio-retention areas). Conservation Halton recommends that discussions between the designing Landscape Architect and Engineer take place at the onset of the detailed design process to refine LID options.
- Inlet and outlet channel stabilization works at the Main Culvert (5+180) will need to occur outside of the 42m right-of-way.

Modelling and sizing of drainage infrastructure in this report is preliminary in nature to assess general feasibility of proposed stormwater plans. For final design, additional detailed assessment recommended is including:

- Develop a Visual HYMO (or equivalent) model of the entire study area and up gradient tributary areas to provide flow rates for existing and proposed conditions at all existing and proposed crossings.
- Continue to develop the HEC-RAS model for the site including the crossings at Station 1+238 and Station 3+498.
- Detailed design of all culverts, ditches and storm sewers to meet all Town of Halton Hills and MTO design requirements.

6.7.2. MAIN CONCLUSIONS OF THE FLUVIAL GEOMORPHIC ASSESSMENT

In support of detailed design for the entire Ninth Line study corridor, the following additional fluvial geomorphic assessments are recommended:

- Meander Belt and Width Change Assessment of existing channel based on historical imagery;
- Rapid Geomorphic Assessment (RGA) of channel downstream of the existing main culvert crossing to convergence with tributary west of Ninth Line, to assess stability of downstream channel; and,
- Rapid Geomorphic Assessment (RGA) of minor channels associated with the two minor crossing that will be retained in the final design (at Stn. 1+238 and Stn. 3+498).

Additionally, a fluvial geomorphologist should provide advice and design guidance on:

- Proposed main culvert width in relation to bankfull width and potential meander melt migration;
- Channel base and low flow channel configuration through proposed new culvert;
- Proposed bank stabilization design upstream and downstream of proposed main culvert;
- Contraction pool design upstream of proposed main culvert;

- Sediment trap design at ditch and channel locations; and,
- Channel stabilization downstream of proposed new culvert crossing at 0+408.

6.8. GEOTECHNICAL ENVIRONMENT

A recommended pavement structure design was developed based on The Asphalt Institute methodology for a 20-year design life and the following data:

Percent commercial truck/bus traffic	8.0 %
Estimated AADT (both ways)	5,500
Design traffic split	50/50
Average yearly growth rate in design period	2.5 %
Average subgrade support resilient modulus	35 MPa

The binder course asphalt should meet current Region of Halton specifications for Heavy Duty Binder Course (HDBC) or HL8 HS. HDBC hot mix asphalt identified in OPSS 1150 (**Table 6-6**) is a binder course intended for use in locations where rutting and deformation is likely to occur due to frequent heavy traffic loading. The surface course asphalt should meet OPSS specifications for HL3 HS material and have a minimum compacted thickness of 50 mm.

Asphalt cement should conform to OPSS 1101 specifications for Performance Graded asphalt cement binder. All hot mix asphalt should incorporate PG 58-28 grade asphalt cement binder as a minimum requirement. Given that the road is used for commercial truck traffic it is recommended that the grade of asphalt cement be upgraded to PG 64-28 (one level higher than required for the Ontario climate zone) for both the top asphalt and the binder course asphalt.

Table 6-4: Pavement Structure Design Recommendations

Pavement Layer	Recommended Pavement Design
Asphalt	50 mm HL 3 HS 100 mm HDBC (two 50 mm lifts)
Granular Base	150 mm OPSS Granular A
Granular Subbase	350 mm OPSS Granular B, Type II
Total Thickness (GBE)	650 mm (800)

Note: Best paving practice is to specify the compacted lift thickness to be at least 3 times the nominal maximum aggregate size (NMAS) of the mix. For HL 3 HS the NMAS is typically 13.2 mm such that the compacted lift thickness should be at least 39.6 mm to minimize segregation, broken aggregate and other placement problems.

The granular base course materials should meet OPSS Granular A specifications. Quarried 20 mm limestone, crushed to Granular "A" gradation specifications, is recommended. The granular subbase material should meet OPSS Granular "B" Type II specifications. OPSS Type II subbase material is assumed in the design and consists of 100 percent crushed aggregate from a quarried rock source. Quarried 50 mm crusher-run limestone, processed to Granular "B" gradation specifications, is recommended.

Granular base course and subbase course fill material should be compacted to 100 percent Standard Proctor Density. Hot mix asphalt should be compacted to the criteria set out in the Region's paving specifications, which requires a minimum of 91 to 92 percent of the Marshall Maximum Relative Density (MRD) depending on mix type.

The existing bituminous material and granular can be considered for on-site reclamation and reuse in the new pavement using in-place pulverization methods however because of the substantial asphalt layer thicknesses it may not be practical and cost-effective since the depth of the pulverization should be at least two and half times the asphalt thickness to avoid high proportions of asphalt coated particles in the reclaimed granular.

The gradation quality of the recovered pulverized material is expected to be quite variable and the gradation of the reclaimed material is expected to not consistently meet OPSS Granular B Type I gradation limits. For this reason, the reclaimed granular should be restricted to the lower half of the sub-base layer in the new pavement. If the intention is to pulverize and reclaim the granular and bituminous material for reuse it is advisable to investigate the in-situ materials more thoroughly by means of test pits.

The subgrade soil conditions are expected to be variable along the road section consequently from time to time it may be necessary to complete subgrade repairs by excavating poor quality soils and placing structural fill. Subgrade repair areas should be compacted to a target density of 97 % of the Standard Proctor Maximum Dry Density.

It is recommended that prior to the placement of pavement granular fill, the exposed subgrade soil should be observed and proof-rolled using a loaded tandem axle truck to traverse the exposed subgrade and provide for full coverage. The proof-rolling should be monitored by a geotechnical representative of this office to delineate any soft areas, which may require repair. Repairs should be undertaken to avoid creating "bathtub" conditions in the subgrade within the pavement structure.

There is no evidence that the existing pavement structure of Ninth Line has been structurally deficient to date and therefore it is expected that future rehabilitation can focus on road surface improvements. Road realignment, grade changes, and/or geometric changes may dictate that other types of more extensive rehabilitation methodologies be examined. The potential rehabilitation options are as follows:

- | | |
|----------|---|
| Option 1 | Partial depth cold milling with new hot mix asphalt resurfacing. |
| Option 2 | In-place full depth pulverization and recycling of the bituminous layer and granular (OPSS 330) plus new asphalt resurfacing. |

Option 1, partial depth milling with hot mix asphalt resurfacing, is the most straightforward rehabilitation option and should fit the needs for Ninth Line over the next 10 to 20 years. This option has a relatively low impact on traffic flow, and enables an acceptable grade height and road crossfall to be maintained.

Options 2 uses road re-profiling and reclaiming equipment to recycle existing pavement materials and minimize off-site removals.

For preliminary design purposes to address pavement rehabilitation over the next 10 to 20 years the following option is recommended as follows:

1. Partial depth cold milling with new hot mix asphalt paving;
2. Complete Cold Milling to a depth of at least ± 60 mm; milling depth may have to be adjusted and increased to meet surface grade access requirements at existing properties;
3. Carry out base repairs based on visual distress conditions in milled pavement;
4. Proceed with 60 mm of HL 8 HS (HDBC) binder course paving;
5. Complete surface paving with 50 mm of HL 3 HS hot mix asphalt; and
6. Utilize PG 64-28 asphalt cement in both the binder course and surface course mixes.

Ninth Line generally does not exhibit areas of distortion and severe cracking that require full depth base repairs. In the event that areas of distress occur or become evident after milling these areas should be repaired prior to pavement resurfacing. Full base repairs should be carried out and should include excavation to a depth of 500 mm, or deeper if organic soils are encountered, and the placement and compaction of Granular A to 100 % SPMDD.

Wherever possible “bathtub” subgrade conditions should be avoided and the subgrade should be “daylighted” out to the ditch line. This may require additional shoulder excavation to achieve the optimum drainage conditions.

6.9. GRADING

A combination of retaining walls and side slopes were used to minimize property impacts and construction costs.

As part of the grading activities, temporary property easements will be required. **Appendix K.3** presents the grading requirements of the preferred design, outside of the 42 metre ROW. These areas outside the new ROW will require temporary grading encroachment agreements with the affected property owners.

6.10. STREET ILLUMINATION

In accordance with Regional policy, street illumination is not required along Ninth Line, except at intersections. There was some interest by residents to have roadway illumination in the modified cross-section areas. The possibility of installing streetlights along Ninth Line will be revisited during detailed design.

If it is determined that roadway illumination will be provided, poles and luminaires would be installed in accordance with Halton Region standards; illumination design, light standard spacing and opportunities for sharing poles with Halton Hills Hydro would be explored during detailed design (if required).

6.11. DRIVEWAY ACCESS/LANDSCAPING

In accordance with Halton Region policies and best practices, the Region will ensure that driveways be reconstructed in such a way as to tie in seamlessly with the existing driveways, whether the driveways are paved, unpaved or have interlocking brick.

6.12. UTILITIES & SERVICES

The proposed improvements for the road widening and drainage works will require the relocation of utility poles. Hydro plant is located on aerial lines connected to existing hydro poles located on both sides of Ninth Line. The proposed roadwork does not require that overhead wires be buried. Utility relocation work will be coordinated with the utility providers (i.e. Halton Hills Hydro) to minimize disruptions to services where possible.

The location of utilities through the urban sections (26.6 metre ROW) can be accommodated in two ways:

- i. Underground on the east side; or
- ii. Overhead on poles, as is currently the case.

This decision is subject to future dialogue and at this stage all reasonable options are presented and can be accommodated in the preferred design option.

As the study area is outside of the Urban Area Boundary, municipal services (watermains and sanitary sewers) will not be installed along Ninth Line.

6.13. CONSTRUCTION STAGING

The decision to reconstruct Ninth Line in phases will be determined during the detailed design phase of the project, and shall consider maintaining property access as well as soil surpluses/deficits. Due to a recent decision by Regional Council, it is estimated that construction will not begin until the year 2020.

However, there is a need to improve traffic flow at the Ninth Line and 5 Side Road intersection. Therefore, interim intersection improvements have been proposed and are described in detail in **Section 6.4.3**. The interim intersection improvements will be implemented prior to the full road reconstruction in 2020.

6.14. PROPERTY REQUIREMENTS

Property requirements (i.e. new proposed property line) based on the preliminary preferred design plan for the proposed Ninth Line corridor improvements are shown on Drawings 1 to 21 provided in **Appendix K.3**. The existing ROW width of Ninth Line ranges from 30-35 metres and the ROW for the proposed four-lane cross-section is 42 metres, which is consistent with the Halton Region TMP. Properties with direct frontage onto Ninth Line will be impacted and property requirements will be based on the 42 metre ROW and intersection geometric requirements. The approximate amount of property required is specified in **Appendix K.3**.

6.15. PRELIMINARY COST ESTIMATES

The estimated project cost for implementing the Ninth Line improvements as detailed in the preferred design is estimated to be approximately \$36.6 million, including property (excluding HST). The preliminary cost estimate is detailed in **Table 6-7**.

Table 6-5: Preliminary Cost Estimates for Ninth Line Road Reconstruction and Property Acquisition

#	Item Description	Quantity	Unit	Estimated Unit Price	Total
1	Clearing and Grubbing	20	ha	\$ 10,000.00	\$ 200,000.00
2	Strip and Stockpile Topsoil (Assumed 300mm Depth)	60,000	m ³	\$ 6.00	\$ 360,000.00
3	Remove Existing Asphalt	60,000	m ²	\$ 3.50	\$ 210,000.00
4	Earth Excavation	75,000	m ³	\$ 6.00	\$ 450,000.00
5	Granular B (600mm Depth)	250,000	tonnes	\$ 19.14	\$ 4,785,000.00
6	Granular A (150mm Depth)	60,000	tonnes	\$ 17.56	\$ 1,053,600.00
7	Base Course Asphalt (100mm Depth)	42,000	tonnes	\$ 99.01	\$ 4,158,420.00
8	Surface Course Asphalt (50mm Depth)	22,000	tonnes	\$ 102.01	\$ 2,244,220.00
9	300mm dia. STM	200	m	\$ 175.00	\$ 35,000.00
10	375mm - 600mm dia. STM	1,167	m	\$ 325.00	\$ 379,275.00
11	675mm - 900mm dia. STM	675	m	\$ 475.00	\$ 320,625.00
12	STM MH	18	each	\$ 4,700.00	\$ 84,600.00
13	STM CB	51	each	\$ 2,500.00	\$ 127,500.00
14	Construct Swale	10,000	m	\$ 60.00	\$ 600,000.00
15	5500mm x 15000mm x 700mm Concrete Culvert	825	m ²	\$ 3,400.00	\$ 2,805,000.00
16	375mm - 600mm dia. CSP Culvert	520	m	\$ 175.00	\$ 91,000.00
17	675mm - 1200mm dia. CSP Culvert	35	m	\$ 350.00	\$ 12,250.00
18	Multi Use Path	18,600	m ²	\$ 50.00	\$ 930,000.00
19	Line Painting	7.2	km	\$ 11,000.00	\$ 79,200.00
20	Traffic Signalization (Per Intersection) (Temporary & Permanent)	2	each	\$ 350,000.00	\$ 700,000.00
21	Hydro (Per Pole)	124	each	\$ 6,000.00	\$ 744,000.00
22	SWM	7.2	each	\$ 50,000.00	\$ 360,000.00
23	Roadway Safety	7.2	km	\$ 80,000.00	\$ 826,000.00
24	Landscaping				
	— Property/Private Repair	12	each	\$ 35,000.00	\$ 420,000.00
	— Tree Replacement	248	each	\$ 525.00	\$ 130,200.00
Subtotal (Construction)					\$ 22,105,890.00
	Property (est. by Consultant)				
	Rural / Agricultural	23.67	ac	\$ 150,000.00	\$ 3,551,100.00
	Rural Residential	4.63	ac	\$ 250,000.00	\$ 1,157,250.00
Subtotal (Property)					\$ 4,708,350.00
	Utility Relocation (est. by Consultant)	7.2	km	\$ 40,000.00	\$ 288,000.00
	Contingency (20%)				\$ 5,420,448.00
	Engineering (Detailed Design & CA) (15%)				\$ 4,065,336.00
TOTAL (excluding HST)					\$ 36,588,024.00

7.0 POTENTIAL IMPACTS, MITIGATION MEASURES & MONITORING

This section of the ESR describes the potential effects on the environment (both positive and negative) as a result of the undertaking and the mitigating 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 detailed design and implemented at construction is also described.

7.1. NATURAL ENVIRONMENT

7.1.1. AQUATIC HABITAT AND FISHERIES

Based on the historical data provided in the existing reports and the field assessments completed for this study, the tributary of Sixteen Mile Creek is well defined and exhibits stable bank morphology and substrate characteristics. There is no current or historical information regarding the potential to support a fish community in this channel, and if so, the residence time would be limited to the spring months when there is water and connectivity. The water chemistry during the spring months falls within the range conducive to support an aquatic community. The narrow riparian buffers and proximity to road and roadside drainage inputs do expose the channel to both sediment and potential nutrient input.

A more comprehensive aquatic habitat assessment at the detailed design stage of the project, once the culvert and road details have been determined, may provide more complete baseline data for the post-construction monitoring, as well as, provide an indication of the channel features that need to be re-instated and/or enhanced. As well, fish habitat mapping as per the MTO Environmental Guide for Fish and Fish Habitat (2009) should be completed at the detailed design stage in order to determine the suitable natural channel design features that should be incorporated into the culvert and channel areas impacted by the chosen design. This information will assist in completing the risk assessment framework in terms of potential impacts which will be required for the Fisheries Authorization. Implementing an open bottom culvert design will eliminate the need to assess groundwater through the culvert area or the need for a benthic assessment provided that similar substrate is re-instated in the bottom of the channel.

7.1.2. TERRESTRIAL ECOSYSTEMS

The terrestrial natural heritage features within the study area are limited to two small woodlot/wetland features west of the 5 Side Road intersection. All other small woodlot features within the length of the study area are located beyond 150 metres from Ninth Line and were not assessed as part of this study.

It is estimated that there are approximately 191 trees along the western road allowance and 152 trees along the eastern road allowance. Only dead or dying trees were excluded from the survey. There were no federally or provincially threatened or endangered vegetation species identified within the right of way.

The wetland area is located west of the right of way and it is not expected that there would be any direct impacts; however, the surface drainage patterns should be verified to ensure that any drainage contribution from Ninth Line is addressed and that appropriate edge management techniques are implemented.

Tree replacement to be conducted in accordance with the Region's Tree Replacement By-Law. Mitigation measures have been incorporated in the preferred design option.

7.1.3. WILDLIFE AND WILDLIFE HABITAT

With the possible exception of the Bobolink, no Species at Risk are expected to be negatively impacted within 120 metres of the proposed lane widening along Ninth Line. Eastern wood peewee uses the interior portions of the wood lot which are not expected to be altered by the road widening. Barn swallow habitat is associated with building structures which are also not impacted by the proposed works. Both species are aerial insectivores and there are adequate feeding areas in the surrounding fields. Neither species nests or feeds near the road. As such, the road widening will not impact the species behaviour or their associated habitat. The location of the observed Bobolink was at a distance well beyond the zone of impact associated with the road widening. There is no expected change in the extent of the various habitat types or quality as a result of any upgrades to Ninth Line.

All tree removal and construction activities near hayfields should be undertaken outside of the breeding bird season (early May to mid-July).

7.1.4. DESIGNATED NATURAL AREAS

The woodlot features adjacent to 5 Side Road are the primary natural heritage features potentially impacted by the proposed road widening. An assessment of the woodlot area potentially lost, as area and as a percent of the total woodlot area, is presented in **Table 7-1** and **Figure 7-1** based on the preferred road alignment. Efforts to reduce the impacts on the woodlot edge and wetland edge south of 5 Side Road through a reduced widening in this area is recommended in order to maintain the integrity of the natural feature.

Based on the preferred alignment, the impacts will be limited to edge habitat along Ninth Line and 5 Side Road. It is not anticipated that the loss of edge habitat will adversely impact the flora and fauna in the woodlot features.

Table 7-1: Potential Woodlot Losses

Woodlot	Area (ha)	Area Impacted (ha)	Total Area (ha)	Percent Lost (%)
West	11.39	0.127	20.04	0.63
Centre	3.50	0.114	20.04	0.57
East	5.15	0.028	20.04	0.14

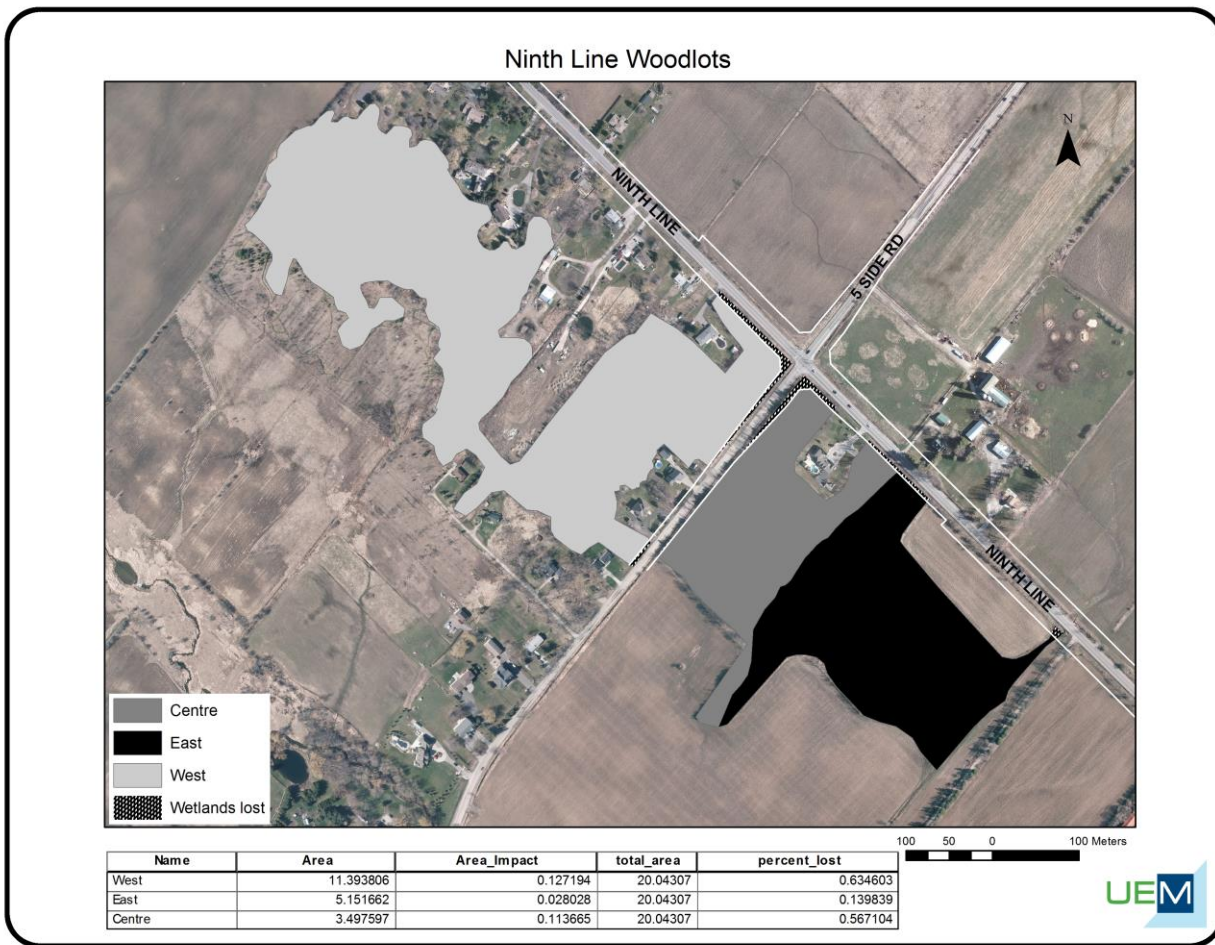


Figure 7-1: Woodlot Features and Proposed Area of Loss

7.1.5. AIR QUALITY

During construction, local air quality can be impacted due to the operation of construction equipment and the generation of dust. Idling of construction equipment should be kept to a minimum and dust control measures in effect should include one or a combination of the following:

- Spraying water (sparingly to avoid pooling on the road surface);
- Street sweeping;
- Applying dust suppressants approved by the MOECC (i.e. non-chloride dust suppressants); and,
- Stockpiles of fine grained materials and/or soil shall be covered with tarps during dry or windy periods.

Dust prevention and control measures will be pursued in accordance with Environment Canada: *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities* (March 2005).

7.1.6. NOISE

The results of the noise study indicate that an investigation into noise control is not required as per Halton Region and MOECC guidelines since the difference between the Future No-Build and Future Build scenarios are less than 5 dBA. However, it is recommended that noise control measures be considered during detailed design to avoid excessive sound levels at houses with minimal setbacks.

Construction noise will be temporary and the level of noise generated will depend on the type of work being undertaken, the type of equipment being used, number of pieces of equipment, duration of the activities, and distance to sensitive noise receptors. Construction activities should be restricted to the day-time whenever possible. In addition, the contractor will be required to adhere to local noise by-laws. Vibrations from the operation of heavy equipment will be kept to a minimum if possible.

To mitigate noise impacts during construction, the following mitigation measures are recommended:

- The contractor obey the local noise by-law in effect. Any exemptions shall be applied for through the municipality and should be included in the construction contract documents;
- General noise control measures should be incorporated into construction contract documents for the contractor to refer to while on-site;
- The condition of the equipment shall be maintained to prevent any unnecessary noise, including but not limited to muffling systems, ensuring components are properly secured, and the lubrication of moving parts;
- Idling of equipment shall be restricted and only be permitted when necessary to perform the work;
- There should be an appropriate amount of distance between the location of the contractor's temporary yard and sensitive noise receptors; and
- Any noise complaints shall be investigated and communicated to the contractor. Additional alternative noise control measures may be required following the investigation of a noise complaint.

7.1.7. CONTAMINATION OF SOILS AND WATERCOURSES

The following monitoring measures are recommended with regard to soils and watercourses:

- Spills and leaks during construction activities shall be avoided by ensuring that fuel storage areas, refueling and maintenance of construction equipment are managed properly and do not occur near the ditches conveying surface water;
- All equipment fuelling and maintenance be carried out at least 30 metres from any watercourse to prevent the entry of deleterious substances (e.g. fuel, lubricant, oil) into the watercourse;
- Contractor to develop and implement an Erosion and Sediment Control Plan prior to commencing construction; and
- Contractor to install and maintain silt fencing to mitigate the potential impact of sediment loading in the ditches.

7.1.8. SUMMARY OF RECOMMENDATIONS FOR THE NATURAL ENVIRONMENT

Based on the field assessments completed, review of existing reports and consultation with review agencies, it was determined that the road widening can proceed with minimal impact to the existing natural heritage features. While there is no SAR or associated habitat within the study area that will be

impacted by the road widening, the loss of edge habitat and associated disturbance to the woodlot edge will require stabilization through effective planting and construction due diligence. As well, construction at the main culvert and channel should minimize disturbance to the channel and riparian areas.

As the primary natural heritage features are limited to the woodlot areas north and south of 5 Side Road and the small tributary in the southern portion of the study area, the recommendations for future steps in the Class EA process are focused on those areas, as follows:

- Options for the intersection at 5 Side Road, including the turning lanes, should strive to reduce the amount of edge habitat lost along the eastern edges of the woodlot features;
- Narrowing the road cross-section south of 5 Side Road will further reduce the potential impacts to the edges of the identified wetland areas;
- Re-establishing the woodlot edged through planting of robust native trees and shrubs in the disturbed edge area will help reduce any associated impacts further into the woodlot (e.g. wind/water impacts or erosion);
- All trees/shrubs that are removed or damaged to the point that their long-term survival is questionable, should be replaced with, where appropriate, native tree species as per the Conservation Halton and Halton Region tree replacement policies. The actual number of trees lost and relative sizes should be assessed once the final design is determined;
- Construction near the channel should be completed under low flow conditions if possible. The area should be dewatered and any fish within the main culvert or channel removed and placed downstream prior to the construction works;
- Reinstating native riparian vegetation along the channel banks in the disturbed areas will help stabilize the banks at the culvert ends;
- Efforts should be made to control roadside sediment input at the main culvert to alleviate the current sediment input issues;
- Construction activities which result in the loss of herbaceous ground cover and plants be immediately re-seeded (post-construction) in order to reduce erosion; and
- Silt fencing should be installed prior to construction in order to reduce the amount of sediment entering nearby waterways and the fencing should remain in place until an adequate amount of herbaceous ground cover has been restored.

The findings of the Natural Sciences Report (**Appendix B**) provide a preliminary assessment of the existing natural heritage feature and functions within the study area in order to assist in evaluating the best alignment for the road widening. In order to ensure that the impacts to the natural features are minimized and the ecological functions of the woodlot edge and watercourse are preserved or enhanced post-construction, there are some additional field assessments that should be completed at the detailed design phase of the project which include the following:

- A comprehensive habitat assessment and fisheries assessment as per the MTO Environmental Guide for Fish and Fish Habitat will provide the details required to ensure that any channel alterations provide equivalent or improved habitat conditions as part of the natural channel design for the watercourse and culvert specifications (open-bottom);
- An assessment of the sediment input from the existing ditches feeding the watercourse to ensure that the newly established ditch and stormwater system is not adversely impact the watercourse;

- An verifications assessment of the street trees (species, dbh, health and condition for each tree) impacted by the preferred design will be required in order to establish a tree compensation plan according to the Halton Region Tree canopy Replacement Policy on Regionally Owned Lands;
- Additional avian surveys may be required by MNRF or Conservation Halton for identified SAR.

7.2. SOCIO-ECONOMIC ENVIRONMENT

7.2.1. *PROPERTY ACCESS*

Limits of excavation and fill will be finalized during detailed design. Where grading within adjacent property will be required, the Region will need to obtain permission from property owners (i.e. obtain temporary easements) to grade road boulevard works to design limits and restore affected private property to its prior condition.

During construction, the following measures should be employed to ensure that impacts to property access points are minimized:

- Access to properties will be maintained at all times unless notified;
- In addition to notices in the local newspaper, affected property owners will be individually notified in advance as to construction schedule and duration; and
- The contractor shall not enter or occupy with crews, equipment or materials, any lands other than property owned by the Regional Municipality of Halton or easements shown on detailed design drawings, unless formal consent has been received from all affected parties.

7.3. CULTURAL HERITAGE ENVIRONMENT

7.3.1. *ARCHAEOLOGICAL RESOURCES*

Background research revealed the study area exhibited large stretches of archaeological potential along with some areas of low or no potential due to disturbance or a lack of proximity to features that create potential. The study area is adjacent to mapped historic farmsteads and built heritage resources which may contain undisturbed archaeological resources. Stage 2 archaeological assessment of areas with archaeological potential is recommended prior to commencing the detailed design phase.

If any archaeological or historical/cultural resources are discovered during construction work, the works in the area of the discovery is to halt. The MTCS's Archaeology Department is to be notified and arrangements made for an assessment of the discovery. Work in the vicinity of the discovery cannot resume until permission is given by MTCS. In the event that human remains are encountered during project work, work will immediately halt and the police, the coroner's office and the Registrar of Cemeteries will be notified.

7.3.2. *CULTURAL HERITAGE RESOURCES*

Schedule 'C' Class EA undertakings generally involve the construction of new or expansion of existing facilities or infrastructure, often requiring impacts to heritage resources including built heritage and cultural landscapes. Part B of the Ontario Municipal Engineers Association (MEA) Municipal Class Environmental Assessment document (October 2000, as amended in 2007 and 2011) states that heritage resources should be avoided if possible and if not, that adverse impacts should be minimized.

A summary of the recommendations to mitigate any impacts to cultural heritage resources (described in **Appendix D**) posed by the preferred design is presented in **Table 7-2**.

Table 7-2: Summary of Recommendations to Preserve Identified Cultural Heritage Resources

Property	Features at Risk of Impact	Recommendation
BHR/CHL 1 James Anthony Farm	Mature trees screening farmstead, changes to property frontage and entrance drive.	Avoid/minimize impacts where possible to trees along front of farmstead, maintain grades and character of entrance lane.
BHR/CHL 2 Adam Dick Farm	Mature trees screening farmstead, changes to property frontage and entrance drive.	Avoid/minimize impacts where possible to trees along front of farmstead, maintain grades and character of entrance lane.
BHR/CHL 3 Theodore Brain Farm	None.	Current undertaking will tie into existing construction at Steeles Avenue/Ninth Line intersection, with no new impacts. No recommendation required.
BHR/CHL 4 Robert May Farm	None.	Current undertaking will tie into existing construction at Steeles Avenue/Ninth Line intersection, with no new impacts. No recommendation required.
BHR 5 John Brown House	None.	No recommendation required.
BHR/CHL 6 St. Stephen's Church and Cemetery	None.	Current undertaking will tie into existing construction at Steeles Avenue/Ninth Line intersection, with no new impacts. No recommendation required.
BHR/CHL 7 William Cook House	None.	No recommendation required.
BHR 8 John Hunter House	None.	No recommendation required.
CHL 9 Ninth Line	Two lane rural roadscape.	No recommendation required.

7.4. TRANSPORTATION ENVIRONMENT

The proposed road widening and improvements, were designed to address the projected traffic capacity deficiencies and support the recommendations of the 2004 and 2011 Halton TMPs.

Ninth Line residents and commuters will experience delays during construction. In order to minimize delays and mitigate impacts on surrounding property owners, the following actions should be taken during the construction phase of the project:

- Development of a Construction Traffic Management Plan to be executed by the contractor;

- Construction ahead signs and detour routes be clearly identified to notify motorists of the construction and redirect them to reduce the use of Ninth Line during construction;
- Construction be staged to maintain traffic flow through one lane at all times. The construction crew include sign holders to alternate the flow of north and south bound traffic flows through the single open lane;
- Property owners be given advanced notice of lane closures and restricted access to their properties; and,
- Emergency services be notified by the contractor of the construction activities and schedule to avoid delays in the event of an emergency.

7.5. UTILITY RELOCATION

Utility relocation and new opportunities should be discussed with Halton Hills Hydro, Union Gas and Ontario Hydro upon the commencement of detailed design.

7.6. SUMMARY OF COMMITMENTS, PERMITS & MONITORING FOR NEXT STEPS OF THE PROJECT

Section 7.0 of the ESR details all of the potential impacts and recommended mitigation and monitoring measures for the next phases of the project. **Table 7-3** provides a summary of all of the recommended mitigation and monitoring requirements as a stand-alone easy reference for the next steps and required actions.

Table 7-3: Summary of Study Commitments

Category	Commitment		Champion	Timeline
1. Natural Environment	1A	Engage a Halton Region Arborist to: <ul style="list-style-type: none"> Evaluate the health of trees impacted by the road improvements Develop a Tree Saving Plan that identifies all trees that will be impacted and complies with the Halton Region Tree Canopy Replacement Policy. A tree inventory table detailing species, DBH, health and condition of each individual tree should be included on construction drawings Develop an Edge Management Plan for the woodlots/wetland on the west side of Ninth Line 	Certified Arborist	Detailed Design and Construction
	1B	Conduct a detailed Stormwater Management Assessment to: <ul style="list-style-type: none"> Confirm and refine options presented in the ESR Verify surface drainage patterns to ensure that the water balance of the wetland is not impacted by the proposed design Re-examine drainage boundaries Refine the hydrologic and hydraulic model 	Detailed Design Consultant in consultation with Conservation Halton and MOECC	Detailed Design
	1C	Retain a qualified Fluvial Geomorphologist to: <ul style="list-style-type: none"> Evaluate the sediment loading of the ditches and review the alignment of the culverts Review and confirm the estimated bankfull channel width and channel design for three times bankfull sizing for culverts Provide guidance on the treatment of the creek through culvert structure, substrate sizing, mixing details, etc. 	Detailed Design Consultant & Fluvial Geomorphologist	Detailed Design
	1D	Refine LID options.	Detailed Design Consultant Engineer and Landscape Architect	Detailed Design

Category	Commitment		Champion	Timeline
	1E	Obtain permits from Conservation Halton for the crossing of all Regulated watercourses.	Detailed Design Consultant in consultation with Conservation Halton	Detailed Design
	1F	Implement all recommendations contained in the Natural Sciences Report prepared by LCA Environmental Consultants, April 2016 (provided in Appendix B of the ESR).	Detailed Design Consultant in consultation with Conservation Halton	Detailed Design
	1G	All tree removal and construction activities near hayfields should be undertaken outside of the breeding bird season (early May to mid-July).	Contractor	Construction
	1H	Consult with MOECC early in the detailed design process to ensure the Stormwater Management and treatment approach meets all applicable criteria. Consultation should also be undertaken with the MOECC Central Region Permit to Take Water (PTTW) Coordinator to confirm any approval requirements for water takings during construction or operation. If a PTTW is required for construction dewatering, a monitoring program for discharge water quality and quantity, as well as a mitigation program, will need to be developed.	Detailed Design Consultant in consultation with MOECC	Detailed Design (Early Stages)
2. Socio-Economic	2A	Complete detailed property acquisition plans and host negotiations with affected Ninth Line property owners.	Detailed Design Consultant, Halton Region and Halton Region Realty Services Department	Detailed Design
	2B	Commitments made to property owners during the meetings with individual property owners, as documents in the ESR, shall be carried out.	Various	Specific to each commitment made
	2C	Develop a landscaping plan when the negotiations with property owners are complete and the requests from the property owners are understood.	Detailed Design Consultant in consultation with Halton Region	Prior to Construction
	2D	Conduct a survey of Ninth Line residents to determine if the majority of residents (66% or more) are in favour of installing street illumination.	Halton Region	Prior to or during Detailed Design

Category	Commitment		Champion	Timeline
3. Cultural Heritage Environment	3A	Complete a Stage 2 Archaeological Assessment for all lands deemed to have archaeological potential in the Stage 1 Archaeological Assessment Report.	Detailed Design Consultant & Archaeological Assessment Consultant	Prior to Detailed Design
	3B	Invite a Field Liaison Representative (FLR) from the Mississaugas of the New Credit First Nation (MNCFN) to oversee any archaeological fieldwork (as requested in a letter from Fawn D. Sault, Consultation Manager for MNCFN dated July 6, 2015).	Detailed Design Consultant & Archaeological Assessment Consultant	During any Archaeological Assessment Fieldwork
	3C	Implement mitigation measures described in Table 7-2 regarding the cultural heritage resources that may be negatively impacted by the preferred preliminary design.	Detailed Design Consultant	Detailed Design
4. Transportation/ Technical	4A	Undertake Detailed Design.	Halton Region & Detailed Design Consultant	Two years prior to construction
	4B	Finalize grading requirements and locations of retaining walls (if necessary).	Detailed Design Consultant in consultation with Halton Region	Detailed Design
	4C	Re-examine the need for a 15m wide bridge to fulfil the 3 times bankfull requirement. Determine if a 12m pre-cast culvert would suffice. Other considerations shall include: <ul style="list-style-type: none"> • Wildlife passage • Methods of minimizing the length of the bridge or culvert • Construction staging and phasing for Culvert #4 	Detailed Design Consultant in consultation with Halton Region and Conservation Halton	Detailed Design
	4D	Develop a Construction Traffic Management Plan and a Construction Staging and Phasing Plan for the construction of Culvert #4.	Contractor in consultation with Halton Region and Conservation Halton	Prior to Construction

Category	Commitment		Champion	Timeline
	4E	Mitigation measures identified in this ESR should be written into the contract tender documents. Insert standard clauses (e.g. wildlife exclusion protocol for snapping turtles) into the tender documents (sample wording to be provided by Conservation Halton).	Detailed Design Consultant in consultation with Halton Region and Conservation Halton.	Prior to Tender
	4F	Send detailed design plans to all utility providers.	Detailed Design Consultant	Detailed Design
	4G	Reassessment of the geometrics at the intersection of Steeles Avenue at Ninth Line will be undertaken during detailed design to ensure that the current intersection design will accommodate the transportation demands.	Detailed Design Consultant	Detailed Design
	4H	The Region, in consultation with the Town of Halton Hills, will confirm the type and location of Active Transportation Off-Road facilities, through the detail design process. There is a commitment that a multi-use path will be constructed on the west side of Ninth Line. In addition, consideration will be given to providing a 2.0m sidewalk on the east-side of Ninth Line, where property is available.	Halton Region and Town of Halton Hills in consultation with the Detailed Design Consultant	Detailed Design
	4I	The following information will be included in the construction tender document: Design, implementation and monitoring of Erosion and Sediment Control (ESC) measures must be completed by a qualified professional designated as a Certified Inspector of Sediment and Erosion Control (CISEC), Certified Professional in Erosion and Sediment Control (CPESC) or suitable equivalent.	Halton Region, Contract Administrator & Contractor	From Tendering to Post-Construction

Category	Commitment		Champion	Timeline
	4J	During construction, ESC plans must be dynamic to adapt to site conditions and it is important that the supervisor and/or inspectors have a basic competence in understanding the various ESC BMPs and the confidence to modify the plan as required. Conservation Halton staff strongly encourage that the Region consider adding this requirement as an item in the projects tender document after the EA has been filed and approved. Perhaps this could be made a recommendation or commitment in the EA document.	Halton Region, Contract Administrator & Contractor	Construction
	4K	During construction, the contract administrator should ensure that fulltime monitoring/inspection of the project works is undertaken to ensure that all environmental commitments identified in this ESR are adhered to by the construction crew.	Halton Region, Contract Administrator & Contractor	Construction
	4L	Following completion of construction, a final inspection should be undertaken to ensure the effectiveness of the identified mitigation measures.	Halton Region, Contract Administrator & Contractor	Post-Construction
5. MEDEI Public Works Class EA	5A	Conduct a Phase 1 ESA in accordance with the CSA Z768-01 standard prior to initiating the property acquisition process for 9399 Ninth Line during the detailed design phase of the project.	Halton Region	Prior to Detailed Design
	5B	Liaise with IO and provide all necessary documentation (as described in Section 8.0) to ensure compliance with the MEDEI Class EA requirements prior to detailed design and property acquisition.	Halton Region	Prior to Detailed Design

8.0 MEDEI CLASS EA REQUIREMENTS

Two properties owned by the Ministry of Economic Development, Employment and Infrastructure (MEDEI) and managed by Infrastructure Ontario (IO) were identified within the study area. However, only one of those properties (9399 Ninth Line) will be impacted by the proposed undertaking. The location of this property in relation to the Ninth Line study area is presented in **Figure 8-1**. The proposed widening of Ninth Line will impact this property as the frontage of this lot will need to be acquired prior to construction (approximate impact to this property is shown in **Figure 8-2**).

Due to the project's impact to property owned by the provincial government, the Ministry of Infrastructure Public Work Class EA 2012 Office Consolidation (PW Class EA) for any and all realty undertakings on lands managed by Infrastructure Ontario (IO) was triggered. The PW Class EA applies to a wide range of realty activities including leasing or letting, disposition, granting of easements, demolition and property maintenance/repairs.

The MEDEI will be required to dispose of and sever lands that it owns as a result of the proposed road improvements to Ninth Line. The purchase of MEDEI owned Lands within the study area triggers the requirement for a Category 'B' EA under the PW Class EA (Steps B1 to B7 described below).



Figure 8-1: Location of Properties Managed by IO

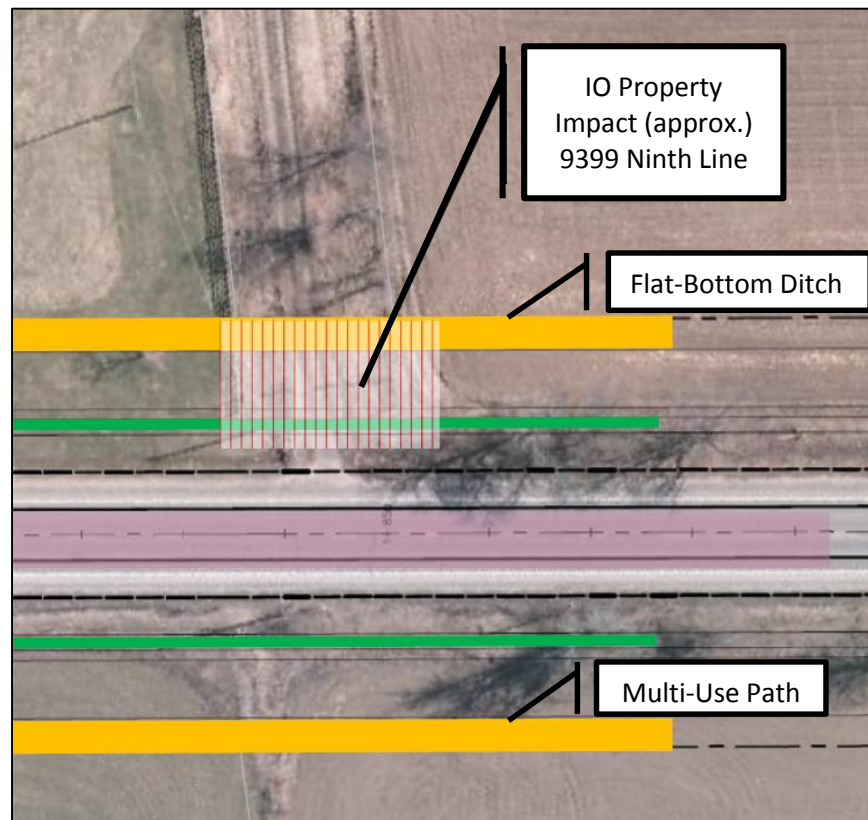


Figure 8-2: Approximate Extent of Impacts to IO Property (9399 Ninth Line)

Step B1: Describe the Undertaking

A property managed by Infrastructure Ontario (IO) was identified within the study area. The proposed widening of the Ninth Line Transportation Corridor from two lanes to four lanes impacts this property and **will require the Ministry of Economic Development, Employment and Infrastructure (MEDEI) to dispose of and sever land that it owns at 9399 Ninth Line (legal description: CON 10 PT LOT 7 RP 20R6315; PART 1) in the Town of Halton Hills.** This realty undertaking triggers the *Ministry of Infrastructure Public Work Class Environmental Assessment 2012 Office Consolidation* (hereby referred to as the 'PW Class EA'). In consultation with IO staff, it was determined that this undertaking is classified as a Category 'B' PW Class EA undertaking and that the PW Class EA requirements could be fulfilled in this ESR.

As required under the PW Class EA process, the proponent is required to complete seven steps under the PW Class EA process for Category 'B' projects. In fulfilling the Municipal Class EA requirement, the requirements of the "Seven Point Analysis" for the PW Class EA have been addressed. The results of the Seven Point Analysis are summarized in the following sub-sections. Where applicable, sections of this ESR covering the category items have been referenced.

1. Existing Land Use

Existing and proposed land use within the study area is discussed in **Section 3.3** of the ESR. With respect to the land use of the IO managed property specifically, this property is designated as:

- *Agricultural (A)* under the Town of Halton Hills Zoning By-Law;

- *Agricultural Area* under the Town of Halton Hills Official Plan;
- *Identified Mineral Resource Area* under Map 1F of the Region's Official Plan; and
- *Prime Agricultural Lands in NHS Enhancements/Buffers* and a *Key Feature* under Map 1G of the Region's Official Plan.

According to IO, the property is used for communication purposes.

2. Environmental Condition of the Property

A Phase 1 Environmental Site Assessment (ESA) was not completed as part of the Ninth Line Class EA Study. In accordance with the requirements of the PW Class EA, a Phase 1 ESA will need to be completed prior to the acquisition of the frontage of the property (as depicted in Figures enclosed with response letters addressed to IO, provided in **Appendix L**). Halton Region is committing to conducting a Phase 1 ESA in accordance with the CSA Z768-01 standard prior to initiating the property acquisition process during the detailed design phase of the project (refer to Item 5A of **Table 7-3** of the ESR). The Region understands that a Phase I ESA is required before the disposal and severance of the land can occur.

3. Environmentally Significant Areas (ESAs)

Environmentally Significant Areas within the Ninth Line Class EA Study area are described in **Section 3.2.4**, and the potential impacts and proposed mitigation measures are provided in **Sections 7.1**. More details are available in the Natural Sciences Report located in **Appendix B**.

The Project Team has consulted with Conservation Halton, MNRF and the Town of Halton Hills regarding the property located at 9399 Ninth Line. These agencies were informed of the details of the proposed realty undertaking and were asked to provide comments related to their respective disciplines. Conservation Halton responded with a letter dated August 24, 2015 that indicated that the organization does not have any concerns with respect to the proposed undertaking. The Project Team received an email response from MNRF on September 21, 2015 indicating that MNRF has no concerns with the disposition of lands as it would in no way impact the policies or programs of this Ministry. The Town of Halton Hills provided a letter dated September 21, 2015 indicating that the Town has reviewed the property in question and has no concerns regarding the disposal or severance of the lands.

Copies of all correspondence with Conservation Halton, MNRF and the Town of Halton Hills regarding the streamlined PW Class EA process are provided in **Appendix L**.

4. Distinctive Environmental Features

Distinctive Environmental Features identified within the overall study area, as well as potential impacts and proposed mitigation measures, have been identified and addressed as part of the Ninth Line Class EA Study. Details are provided in **Sections 3.2 and 7.1** and **Appendix B**.

5. Servicing Capacity of the Surrounding Infrastructure

The servicing capacity of the surrounding infrastructure (e.g. roads, drainage, etc.) within the study area and IO managed land (9399 Ninth Line), have been identified and addressed as part of the Ninth Line Class EA Study. Details are provided in **Section 6.0** of the ESR.

6. Cultural Heritage Resources

Cultural Heritage Resources identified within the overall study area, as well as impacts and proposed mitigation measures, have been identified and addressed as part of the Ninth Line Class EA Study. Details

are provided in **Sections 3.4 and 7.3** of the ESR. Details are provided in the Stage 1 Archaeological Assessment Report and Cultural Heritage Impact Assessment Report located in **Appendices C and D** respectively.

The Stage 1 Archaeological Assessment recommended that a Stage 2 Archaeological Assessment be undertaken. The Stage 2 Archaeological Assessment will be carried out during detailed design, prior to construction.

7. Social and Economic Effects

The social and economic conditions within the overall study area and IO managed land, as well as potential impacts and proposed mitigation measures, have been identified and addressed as part of the Ninth Line Class EA Study. Details are provided in **Sections 3.3 and 7.2** of the ESR.

Step B2: Description of Environmental Effects, Mitigation and Monitoring

Each of the seven points outlined earlier in **Section 8.0** is documented in the Consultation and Documentation Report, which is provided in **Appendix L** of the ESR.

Step B3: Consult with Directly Affected Agencies and the Public

The Project Team has consulted with Conservation Halton, MNRF and the Town of Halton Hills regarding the property located at 9399 Ninth Line. A letter was sent to all three agencies on August 18, 2015 notifying them of the proposed realty undertaking and requesting a formal response to provide input on the property. The original letter and formal responses are provided in **Appendix L**.

Step B4: Reporting

The Consultation and Documentation Report is provided in **Appendix L** of the ESR.

When Halton Region submits the application to IO to acquire the frontage of 9399 Ninth Line, the Region will include an electronic copy of this ESR, the Consultation and Documentation Report, the Stage 1 and 2 Archaeological Assessment Reports, and the Phase 1 ESA Report with the completed application form.

Step B5: Confirmation of Category B

After completing the 'Seven Point Analysis' it was confirmed that the project is a Category 'B' undertaking.

Step B6: Notice of Completion and 30 Calendar Day Review

Upon completion of the Category B Consultation and Documentation Report and receiving a sign-off declaration from IO, the Consultation and Documentation Report for this undertaking will be posted on the MEDEI website along with a notice of the completion of the Ninth Line Class EA Study. This is an opportunity for public input on the approval of the EA and the approval for the undertaking to proceed.

Step B7: Part II Order Requests

During the mandatory 30-day public review period, requests for a Category elevation or Part II Order request may be submitted. After this period, if no request for a Part II Order has been received, the undertaking can proceed.

9.0 REFERENCES

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- Town of Halton Hills & Meridian Planning (2014). *Vision Georgetown Draft Vision and Guiding Principles*. February.