Municipal Class Environmental Assessment – Environmental Study Report

Mountainview Road, Town of Caledon
(between Olde Base Line Road and Granite Stones Drive)
Project No. TPB176049

Prepared for:

Town of Caledon
6311 Old Church Road, Caledon, ON L7C 1J6

August 2, 2019

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6311 Old Church Road, Caledon, ON L7C 1J6

Prepared by:

Wood Environment & Infrastructure Solutions
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August 2, 2019

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Third-party disclaimer

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List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ACE	Asbestos Containing Material
CHBDC	Canadian Highway Design Bridge Code
Class EA	Municipal Class Environmental Assessment
CVC	Credit Valley Conservation
DFO	Department of Fisheries and Oceans
EA	Environmental Assessment
EASR	Environmental Activity and Sector Registry
ECCC	Environment and Climate Change Canada
ELC	Ecological Land Classification
ESA	Endangered Species Act
ESC	Erosion and Sediment Control
ESR	Environmental Study Report
FLR	Field Liaison Representatives
FWCA	Fish and Wildlife Conservation Act
GEV	Generalized Extreme Value
GTHA	Greater Toronto and Hamilton Area
ha	hectare
LID	Low Impact Development
LOS	Level of Service
m	metres
MBCA	Migratory Birds Convention Act
MCFN	Mississaugas of the Credit First Nation
MECP	Ministry of Environment, Conservation and Parks
MNRF	Ministry of Natural Resources and Forestry
MTO	Ministry of Transportation
NEC	Niagara Escarpment Commission
NEP	Niagara Escarpment Plan
OPSS	Ontario Provincial Standards and Specifications
PDO	Property Damage Only
PIC	Public Information Centres
PTTW	Permit to Take Water
PWQO	Provincial Water Quality Objectives
Region	Region of Peel
ROW	right-of-way
SAR	Species at Risk
SUE	Sub-Surface Utility Engineering
TAC	Technical Agency Committee
TIS	Traffic Impact Study
Town	Town of Caledon
TRCA	Toronto and Region Conservation Authority

1.0 Introduction and Background

1.1 Introduction

The Town of Caledon (Town) has initiated a Municipal Class Environmental Assessment (Class EA) for Mountainview Road between Olde Base Line Road and Granite Stones Drive **Figure 1-1** as a part of the Revitalizing Caledon Streets Program. The improvements are required to meet the Town's development needs taking into consideration a satisfactory level of service (LOS) and safe driving conditions along Mountainview Road within the study area. Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), was retained by the Town to complete the study.

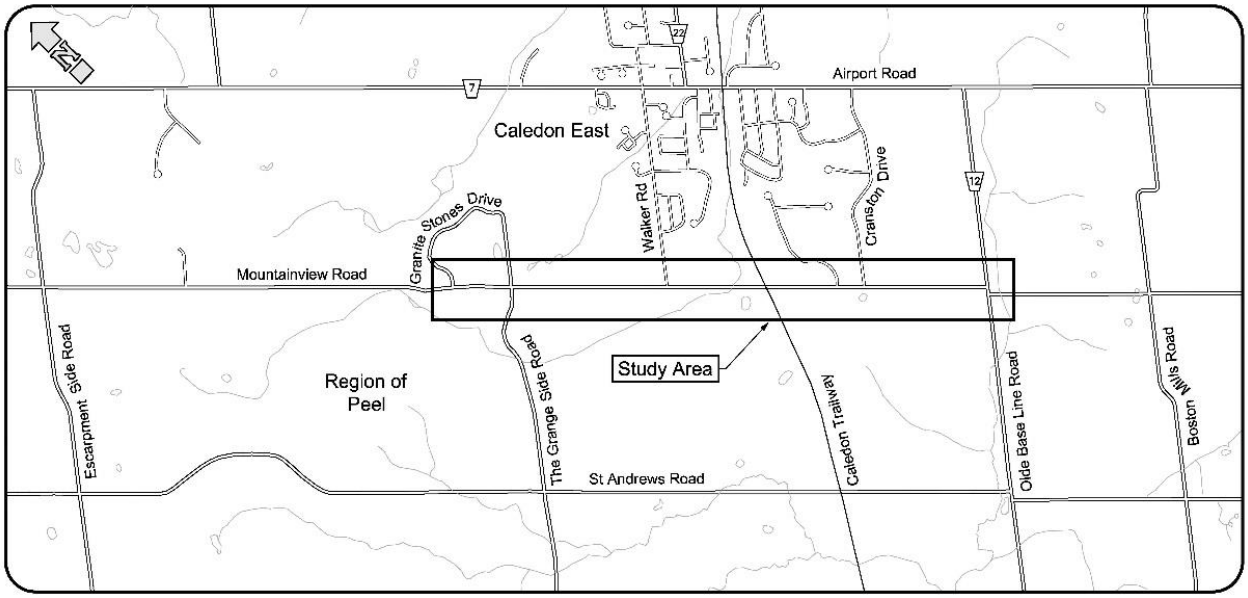


Figure 1-1 Key Plan

1.2 Environmental Assessment

The Ontario *Environmental Assessment Act* (R.S.O. 1990, c. E.18; *EA Act*) was put into place to provide for the protection, conservation and wise management of the environment within the province. The Act applies to all projects being undertaken by provincial, municipal or other public bodies within the province (unless explicitly exempted). It defines the environmental assessment works that must be completed prior to commencement of any undertaking, as well as the proponent's obligations to consult with all affected and / or interested parties.

No undertaking that falls under the scope of the *EA Act* can proceed until the Minister of the Ministry of Environment, Conservation and Parks (MECP) provides approval of the submitted EA documentation. This includes resolution of public appeals made in accordance with section 7.2(3) of the Act.

1.2.1 Class Environmental Assessment Process

The Class EA process is a mechanism by which planning, and approval of municipal infrastructure is provided in an efficient, timely, economical and environmentally responsible manner. It represents a consistent, streamlined and easily understood process for planning and implementing municipal

infrastructure projects. Under the *EA Act*, projects are classified as approved, subject to screening, subject to a Class Environmental Assessment, or subject to a full Environmental Assessment. This Project, the Mountainview Road Environmental Assessment, is classified as being subject to the Class EA process. It is being conducted according to the requirements outlined in the Municipal Engineers Association document titled *Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 & 2015)*.

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

1. Protection of the environment, including natural, social and economic components of the environment.

2. Participation of a broad range of stakeholders in the study process to allow for sharing of ideas, education, testing of creative solutions and developing alternatives.

3. Documentation of the study process in compliance with all phases of the Municipal Class EA process.

The Class EA process classifies projects according to their level of complexity and potential environmental impacts. These are termed "Schedules" and are summarized below:

- ***Schedules A and A+*** includes projects that involve minor modifications to existing facilities. Environmental effects of these projects are generally small; therefore, the projects are considered pre-approved.

- ***Schedule B*** includes project that involve improvements and minor expansion to existing facilities. There is a potential for some adverse environmental impacts and, therefore, the proponent is required to proceed through a screening process, including consultation with those affected. Schedule B projects are required to proceed through Phases 1, 2 and 5 of the Municipal Class EA process.

- ***Schedule C*** includes projects that involve construction of new facilities and major expansion of existing facilities. These projects proceed through the environmental assessment planning process outlined in the Municipal Class EA document. These projects are required to fulfill the requirements of all five phases of the Municipal Class EA process.

This Project is being completed under the requirements of a Schedule C Municipal Class EA. The following Schedule C trigger, as noted in the Municipal Engineers Association's Municipal Class EA Document (*October 2000, as amended in 2007, 2011 & 2015*), apply to this Project:

- All other related road works with cost greater than $2,400,000 *(Adjusted for inflation in 2019 to $2,600,000)*.

The following Class EA planning phases apply:

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

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

- ***Phase 3*** – Identify Alternative Design Concepts for the preferred solution implementation by taking into consideration the existing environment and establish the preferred design concept by considering public and review agency input.

- ***Phase 4*** – Document the Environmental Assessment including the design and consultation process in an Environmental Study Report (ESR) for public review.

- ***Phase 5*** – Complete contract drawings and documents and proceed to construction and operation. Monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facility.

The Phases of the Class EA process for this Project are illustrated in **Figure 1-2**.

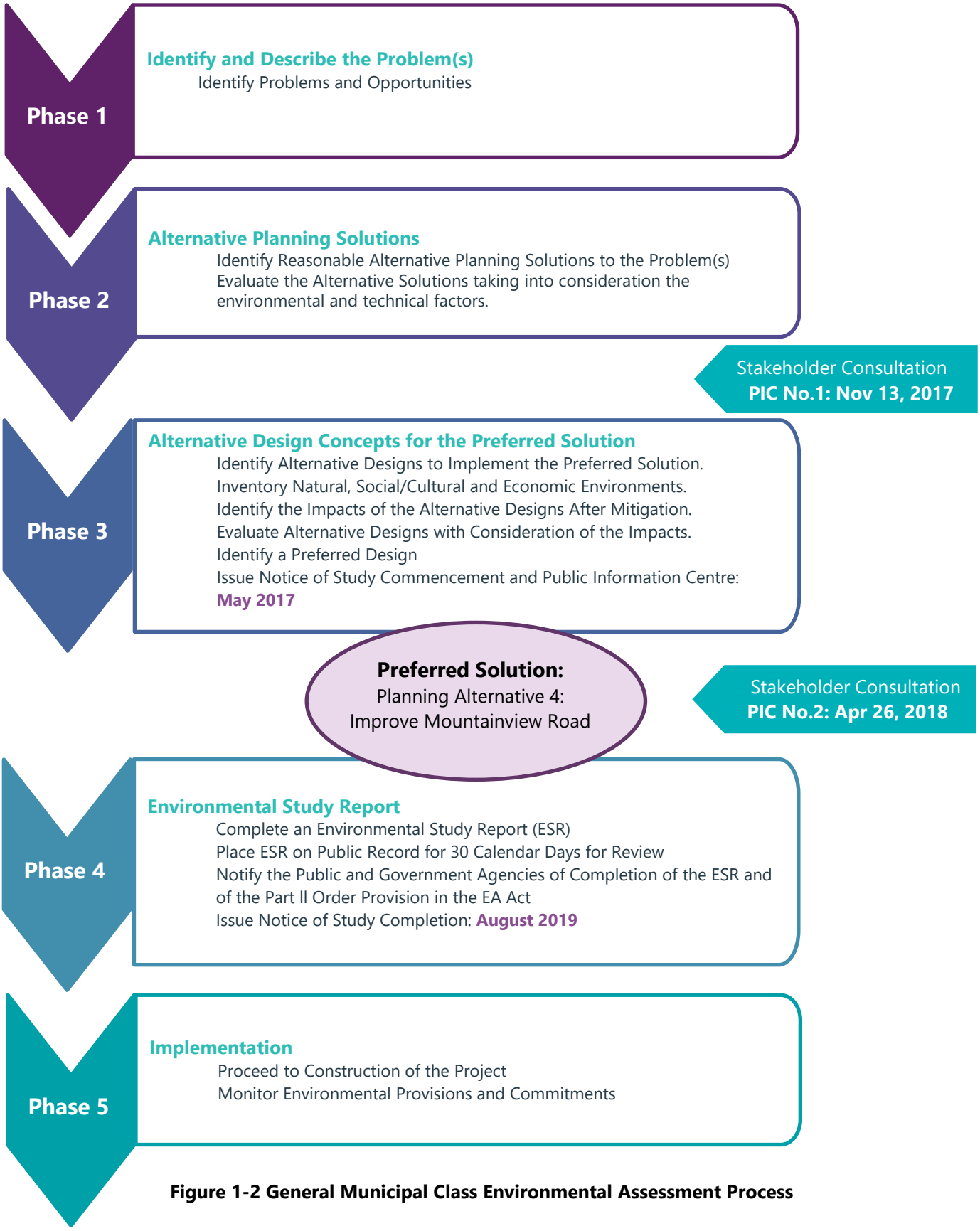


Figure 1-2 General Municipal Class Environmental Assessment Process

1.2.2 Environmental Study Report

This Environmental Study Report (ESR) documents the rationale for the Project, the background to the Project, existing and future conditions within the study area, the planning, design and consultation process leading to the preferred alternative, anticipated positive and negative impacts and proposed mitigation measures.

1.2.3 Filing of the ESR

All parties having expressed an interest in the Project will be notified by letter, regarding the completion of the project and filing of the ESR. In addition, a Notice of Study Completion will be placed in the local newspaper, the *Caledon Citizen* Newsletter, in accordance with the requirements of the Class EA process.

Copies of the ESR will be made available at the following locations:

The Corporation of the Town of Caledon
Caledon Services Counter
Caledon, ON L7C 1J6
Phone: 905-584-2272

Hours:
Monday - Friday: 8:30 am to 4:30 pm

Caledon Public Library – Caledon East Branch
6500 Old Church Road
Caledon, ON L7C 0H3
Phone: 905-584-1456

Hours:
Monday: 10:00 am to 6:00 pm
Tuesday - Thursday: 10:00 am to 8:30 pm
Friday: 10:00 am to 6:00 pm
Saturday: 10:00 am to 4:00 pm

A review period of no less than thirty (30) days will be provided, during which comments will be received from stakeholders and agencies. If members of the public, interest groups and / or government agencies feel that their concerns have not been addressed through the Class EA study process, a person or party may request the MECP to make an order for the project to comply with Part II of the *EA Act* (referred to as a Part II Order). More information on Part II Order requests is provide in Section 1.1.4; however, it is anticipated that all concerns will be resolved through discussion between the Town and the concerned party(ies).

1.2.4 Part II Order Request

The Class EA process provides an opportunity for the public and other stakeholders to appeal the Class EA process undertaken by the Project Team. Under the provisions of subsection 16 of the amended *EA Act*, there is an opportunity under the Class EA planning process for the Minister to review the status of a project. Members of the public, interest groups and review agencies may request the Minister to require a proponent to comply with Part II of the *EA Act*, before proceeding with a proposed undertaking. This is known as a "Part II Order" (formerly called "Bump-Up Request"). The procedure for dealing with concerns that may result in the Minister, by order, requiring the proponent to comply with Part II of the *EA Act* is outlined in the Municipal Class EA document. It is anticipated that all concerns will be resolved through discussion between the Town and the concerned party(ies).

Any Part II Order requests are to be made to the Minister with copies sent to the Director of the MECP'S Environmental Approvals Branch and to the Town's Project Manager at the following addresses:

Minister
Ministry of the Environment, Conservation and Parks
77 Wellesley St West, 11th Floor
Toronto, ON M7A 2T5
Fax 416-314-6748
Minister.mecp@ontario.ca

Town of Caledon
6311 Old Church Road
Caledon, ON L7C 1J6
Fax 905-584-4325

Director, Environmental Assessment and Permissions Branch
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto ON M4V 1P5
enviropermissions@ontario.ca

1.3 Project Organization

The Project Team consisted of staff from the following organizations:

Proponent:	**Town of Caledon** Arash Olia, Project Manager
Prime Consultant:	**Wood Environment & Infrastructure Solutions** David Sinke, Project Manager Muhammad Khan, Transportation Engineer Felix Wong, Transportation Engineer Rob Young, Environmental Planner Aniqa Shams, Environmental Planner Mary Kelly, Consultation Specialist Brian Bishop, Water Resources Engineer Daryl Rideout, Fisheries Biologist Jeff Balsdon, Terrestrial Ecologist Shaun Austin, Senior Archaeologist Shami Malla, Geotechnical Engineer Karam Albazi, Structural Engineer Buddy Ledger, Noise and Vibration Engineer Hoda Seddik, Pavement Engineer Jeff Carson, Environmental Engineer (Contamination Study)

1.4 Project Background and Purpose

The intent of this project is to improve Mountainview Road between Olde Base Line Road and Granite Stones Drive (approximate distance of 3.4 kilometers) in anticipation of improved traffic safety, provision of active transportation, new residential development *(Castles of Caledon)* and to improve the existing pavement and drainage conditions in the Caledon East settlement. The Town of Caledon wishes to maintain and enhance its infrastructure through proper maintenance, rehabilitation and reconstruction of Mountainview Road. The proposed residential development will be located directly northeast of the Mountainview Road and Walker Road West intersection.

1.5 Previous Studies and Adjacent Projects

The Project team reviewed the following planning documents, guidelines and other reports relevant to the Mountainview Road corridor. The list below presents some of the key documents being referenced by the Project and is not inclusive. Further details can be found in section 3.2.

- Official Plan, Town of Caledon (2016);
- Transportation Impact Studies, Town of Caledon Terms of Reference and Guidelines (2017);
- Official Plan, Region of Peel (2016);
- Sustainable Transportation Strategy, Region of Peel (2018); and
- Caledon Transportation Needs Study Update, Town of Caledon and Region of Peel (2009).

2.0 Stakeholder and Agency Consultation

2.1 Phase 1 Consultation

A Notice of Study Commencement, detailing the study area, summarizing the Project's objectives and requesting comments, was submitted to relevant stakeholders, property owners and agencies by mail, in May 2017. In addition, a Notice of Study Commencement was published in the *Caledon Citizen* on May 18 and 25, 2017 and the Town of Caledon website (https://www.caledon.ca/en/townhall/mountainview-road-environmental-assessment.asp).

Responses to this notice were received from the MECP. Copies of the newspaper advertisement and MECP's official response letter to the notice is found in **Appendix A**.

2.1.1 Project Mailing List

A Project Mailing List was generated from the Town's records. Additional contacts were added by request, including through completion of comment forms at public meetings. The Project Mailing List can be found in **Appendix A**.

2.2 Phases 2 and 3 Consultation

Consultation with agencies and public stakeholders was completed in Phases 2 and 3. **Table 2-1** presents an overview of the agency and public stakeholder consultation activities.

Table 2-1 Consultation Schedule

Consultation Event	Date
Notice of Commencement, published in newspaper and mailed to Project Mailing List	Newspaper Advertisement: May 18 and 25, 2017 Mail-out: May 2017
Site Visit with Toronto Region Conservation Authority	September 27, 2017
Technical Agency Committee Meeting #1	October 27, 2017
Notice of Public Information Centre No. 1 published in newspaper and mailed Project Mailing List	Newspaper Advertisement: November 2, 2017 Mail-out: October 2017
Public Information Center No.1	November 13, 2017
Technical Agency Committee Meeting #2	April 19, 2018
Notice of Public Information Centre No. 2 published in newspaper and mailed Project Mailing List	Newspaper Advertisement: April 5 and 12, 2018 Mail: April 2018
Public Information Center No. 2	April 26, 2018

Details regarding the consultation with agencies and public stakeholders are provided in the following sections. Meeting minutes and agenda with agencies and Project Team can be found in **Appendix B.**

2.3 Agency Consultation

2.3.1 Meetings

As part of the Class EA process, two Technical Agency Committee (TAC) meetings were arranged in order to review materials to be presented at the Public Information Centres (PIC) and to obtain feedback from the technical agencies on the proposed Project. Evaluation of the planning alternatives and preferred design was discussed with input from the agencies during these two meetings. The TAC meeting also focused on natural environment constraints and a review of stormwater management requirements for the Project. Other components of evaluation included the technical aspects, cost, and compatibility with regional, Town and Toronto and Region Conservation Authority (TRCA) plans and policies.

2.3.1.1 Site Meeting

Prior to the TAC meeting, a site meeting was held on August 27th, 2018 with TRCA to review the various aquatic and terrestrial features found in the study Area. This site visit was requested by TRCA in order to compare the existing information gathered by Wood in relation to the TRCA mapping. TRCA also identified areas of concern within the study area.

Meeting minutes can be found in **Appendix B**.

2.3.1.2 Technical Agency Committee Meeting #1

As part of Phase 2 consultation activities, a TAC meeting was held on October 27, 2017 at the Town of Caledon Town Hall (6311 Old Church Road Committee Room), from 11:00 am to 12:00 pm. The purpose of this meeting was to review materials for the upcoming PIC, discuss drainage issues, review existing conditions including terrestrial and aquatic studies and stormwater management.

Meeting agenda and minutes can be found in **Appendix B**.

Table 2-2 provides a list of agencies invited to the meeting and their attendance, including the number of attendees. The meeting invite was sent out on October 17, 2017.

Table 2-2 TAC Meeting #1 Participants

Type	Agency	Attendance
Utilities	Alectra Utilities	
	Bell Canada Municipal Operations Centre	
	Enbridge Gas Distribution Inc.	
	Hydro One Telecom	
	Zayo Group Holdings Inc. (Formerly MTS Allstream)	
	Rogers Cable (Brampton)	
	East Rogers Cable Communication Inc. / West Rogers Communications Canada Inc	
	Telus Network	
Conservation Authorities	Credit Valley Conservation Authority	
	Toronto and Region Conservation Authority	√ (4)
Federal Government	Fisheries and Oceans Canada	
	Environment Canada	
Provincial Government	Ministry of Agricultural, Food and Rural Affairs	
	Ministry of Community Safety and Correctional Services	
	Ministry of Municipal Affairs and Housing	
	Ministry of Natural Resources and Forestry	
	Ministry of Tourism and Culture	
	Infrastructure Ontario	
Regional	Region of Peel	

2.3.1.3 Technical Agency Committee Meeting #2

As part of Phase 3 consultation activities, a TAC meeting was held on April 19, 2018 at the Town of Caledon Town Hall (6311 Old Church Road Committee Room), from 1:30 pm to 3:30 pm. The purpose of this meeting was to review alternative design concepts for Mountainview Road.

Meeting agenda and minutes can be found in **Appendix B**.

Table 2-3 provides a list of agencies invited to the meeting and their attendance, including the number of attendees. The meeting invite was sent out on April 3, 2018.

Table 2-3 TAC Meeting #2 Participants

Type	Agency	Attendance
Utilities	Alectra Utilities	
	Bell Canada Municipal Operations Centre	
	Enbridge Gas Distribution Inc.	
	Hydro One Telecom	
	Zayo Group Holdings Inc. (Formerly MTS Allstream)	
	Rogers Cable (Brampton)	
	East Rogers Cable Communication Inc. / West Rogers Communications Canada Inc	
	Telus Network	
Conservation Authorities	Credit Valley Conservation Authority	
	Toronto and Region Conservation Authority	√ (4)
Federal Government	Fisheries and Oceans Canada	
	Environment Canada	
Provincial Government	Ministry of Agricultural, Food and Rural Affairs	
	Ministry of Community Safety and Correctional Services	
	Ministry of Municipal Affairs and Housing	
	Ministry of Natural Resources and Forestry	√ (1)
	Ministry of Tourism and Culture	
	Infrastructure Ontario	
Region	Region of Peel	

2.3.2 Utilities Consultation

Utility companies were contacted during the Notice of Commencement and invited to participate in the TAC. Responses was received from Hydro One Telecom, Telus, Rogers Cable, Zayo Utilities Circulation, and Hydro One Networks Inc. Based on the responses, there are various utilities present within the study area and further consultation and coordination will be required during detailed design to confirm conflicts and determine any required relocations. Information received from utilities can be found in **Appendix C**.

2.4 Public Consultation

Effective public consultation is an important part of the Class EA process. Feedback from the public is significant as it helps identify gaps and allows the project team to understand the design preference. Public Information Centres (PIC) provide a transparency to the EA process and gives individuals an opportunity to share their views. Two PICs were held in order to provide information about the project and present the alternatives. Details of the PICs are presented in **Appendices D and E,** including any other comments received from the public before or after the PIC.

2.4.1 Public Information Centre #1

The Town held a PIC on November 13, 2017 from 5:00 pm to 8:00 pm at Caledon Community Complex - Banquet Hall (6215 Old Church Rd, Caledon East, ON L7C 1J7, Caledon ON). The PIC was advertised via the Town of Caledon website (https://www.caledon.ca/en/townhall/mountainview-road-environmental-assessment.asp) and through publication of a notice and mailing of the notice to the Project Mailing List as outlined in **Table 2-1.**

The session included 21 poster boards displayed around the room to share information on the progress of the project, initial findings of the background studies, alternatives being considered, and next steps in the study. Project team members were on hand to guide attendees through the information, discuss the study and answer questions. Attendees were encouraged to sign-in and complete a Comment Form. Twenty-eight attendees signed into the PIC and one comment form was returned.

Details of this PIC are presented in **Appendix D**.

2.4.2 Public Information Centre #2

The Town held a PIC on April 26, 2018 from 5:00 pm to 8:00 pm at Caledon Community Complex - Lion's Den (6215 Old Church Rd, Caledon East, ON L7C 1J7, Caledon ON). The PIC was advertised through publication of a notice and mailing of the notice to the Project Mailing List as outlined in **Table 2-1**.

The session included 16 poster boards displayed around the room to share information on progress of the project, proposed design, alternative preferred solutions being considered, and next steps in the Project. Project team members were on hand to guide attendees through the information, discuss the Project and answer questions. Attendees were encouraged to sign-in and complete a comment form. 24 attendees signed into the PIC and one completed comment form was returned.

Details of this PIC is presented in **Appendix E**.

2.5 Indigenous Engagement

Indigenous engagement is a key component of the Class EA process. The MECP delegated the procedural aspects of the *Duty to Consult* to the Town in its response to the Notice of Commencement (letter dated February 7, 2018).

Copies of all Indigenous engagement documents can be found in **Appendix F.**

2.5.1 Identification of Indigenous Communities

In consultation with the MECP, the Town sought direction on the identification of Indigenous communities that may have an interest in the Project. Request for confirmation was submitted to the MECP on August 3, 2017. On August 21, 2017, an email including an introductory letter, Project Information Sheet and Notice of Commencement were sent to the following Indigenous groups:

- Six Nations of the Grand River;
- Mississaugas of the Credit First Nation; and
- Haudenosaunee Confederacy Chiefs Council.

The MECP confirmed on September 13, 2017 that only the Mississaugas of the Credit First Nation should be engaged.

2.5.2 Mississaugas of the Credit First Nation

On August 21, 2017, an email including an introductory letter, Project Information Sheet and Notice of Commencement was issued to the Mississaugas of the Credit First Nation (MCFN). On October 18, 2017, the Project team connected by phone with MCFN's Consultation Manager. MCFN requested an in-person meeting at their Department of Consultation and Accommodation office in Hagersville, Ontario to discuss the Project. A meeting was scheduled for November 15, 2017, for 2:00 pm to 4:00 pm.

The meeting began with introductions and a historical background of the traditional territory that the Town is located within. MCFN stated their expectations from the Town to provide any existing environmental (aquatic, terrestrial, plant, ecological, land classification) or archaeological studies, prior to submission to the government. The MCFN requested that two Field Liaison Representatives (FLR) be present during any fieldwork and that they work with Wood to create a budget for the FLR. The Town presented information on the Project to date and the slide deck from the first PIC. Key action items from the meeting were for the Town to share any relevant technical reports and the Caledon Transportation Master Plan (November 2017) with MCFN.

Meeting agenda and minutes can be found in **Appendix F**.

The Town subsequently entered into an Agreement with MCFN for participation of their FLR in Stage 2 Archaeological Assessments. The agreement was executed on April 6, 2018.

Table 2-4 provides a chronological summary of engagement activities with the MCFN.

Table 2-4 MCFN Engagement Summary

Engagement Activity, Date	Engagement Summary
Email, August 21, 2017	Wood sent an introductory email and information package to MCFN. The purpose of this letter was to introduce the Project and determine if the MCFN has an interest in the study.
Phone, October 18, 2017	Wood phoned MCFN and discussed the Project with MCFN's Consultation Manager. MCFN identified that they would like to meet at their office to discuss the Project.
Meeting, November 15, 2017	The Town and Wood met with the MCFN at their office in Hagersville. MCFN provided a historical overview of their community and outlined their expectations. The Project team provided an overview of the Project, studies and next steps.

3.0 Existing and Future Conditions

3.1 Study Area

The study area is located within the Town of Caledon on Mountainview Road between Olde Base Line Road and Granite Stones Drive (**Figure 1-1**).

3.2 Land Use and Development Plans

3.2.1 Official Plan – Town of Caledon (Consolidated in 2018)

The Official Plan indicates the commitment to implement sustainable development patterns and urban design throughout the Town.

The study area falls within the Caledon East division. More specifically, it is designated as a Rural Services Centre and Administrative Centre, where major educational, recreational and commercial facilities are located. All new residential and employment opportunities are concentrated in Caledon East; however, Bolton and Mayfield West are forecasted to be larger and subsequently incur greater intensification. The Plan states that Caledon East should be planned as a compact community with a focus on land use, housing, and economic development opportunities. The 2016 Caledon East population was 6,400 and by 2031, it is projected to grow to 8,412.

3.2.2 Official Plan – Region of Peel (2016)

The Region of Peel Official Plan is prepared under the *Planning Act* and provide direction to the Region in terms of land use policies, sustainable development framework and long-term regional strategic policy framework for growth. The goals of the plan are the following:

- "To create healthy and sustainable regional communities for those living and working in Peel which is characterized by physical, mental, economic and social well-being; minimized crime, hunger and homelessness; a recognition and preservation of the region's natural and cultural heritage; and an emphasis on the importance of Peel's future as a caring community".

- "To recognize, respect, preserve, restore and enhance the importance of ecosystem features, functions and linkages, and enhance the environmental well-being of air, water, land resources and living organisms".

- "To recognize the importance of a vital, competitive and diverse economy and a sound tax base, and manage and stage growth and development in accordance with the financial goals and overall fiscal sustainability of the Region".

- "To support growth and development which takes place in a sustainable manner, and which integrates the environmental, social, economic and cultural responsibilities of the Region and the Province".

The improvements to Mountainview Road adhere to the Region of Peel Official Plan directions as the road improvements may occur in a key natural heritage feature area or hydrologically sensitive area, however any impacts will be appropriately mitigated. The improvements will also protect any existing natural features and will not negatively impact the environment.

3.2.3 Caledon Transportation Needs Study Update – Town of Caledon and Region of Peel (2004, 2009)

The Caledon Transportation Needs Study Update was undertaken in order to determine the potential transportation improvements to accommodate future traffic demand. This document is an update from the original 2004 Caledon Transportation Needs Study.

The following changes prompted the update:

- The most current plan for the Provincial Highway 427 extension has the highway ending in the vicinity of Major Mackenzie Drive;
- To meet Provincial growth guidelines, Caledon is now planning for substantial additional growth with a target population of 108,000 persons by year 2031;
- The new Provincial Metrolinx agency is actively planning new transportation directions for the Greater Toronto and Hamilton Area, including improved public transit services to communities such as Caledon; and
- Several other new transportation studies have recently been initiated that will have future implications on Caledon. This study helps provide a basis on which the Town can respond to these studies.

The improvements to Mountainview Road are consistent with the Caledon Transportation Needs Study Update as the EA is determining the need to improve transportation infrastructure in anticipation of the future growth of Caledon East. The improvements to Mountainview Road, such as repairing the pavement and improving sightlines will provide an overall safer driving experience and will be able to accommodate future traffic demand.

3.2.4 Sustainable Transportation Strategy – Region of Peel (2018)

This framework is based on the 2011 Active Transportation Study and includes input from the City of Brampton, City of Mississauga, Town of Caledon, surrounding municipalities and other agencies. The purpose of this study is to increase active transportation within the Region by creating a regional vision and long-term goals for improvement. The study provides suggested policies, guidelines and programs to achieve the goals. The Region of Peel has committed to 50% of sustainable mode share by 2041, which includes increasing the current 37% of the trips by walking, cycling, transit, carpooling and telework to 50%. The strategy also aims to create a framework to:

- "Accommodate growth in a way that prioritizes environmental, societal and economic sustainability; and"
- "Contribute to a Regional transportation system that is safe, convenient, efficient, multi-modal, well-integrated and sustainable."

The strategy identifies Olde Base Line Road at Mountainview / Torbram Road as an existing on-road cycling facility with paved shoulders. Otherwise, there is no proposed / planned facility identified along Mountainview Road as per the strategy. However, the proposed design will include a paved shoulder, which can be used for cycling or walking in order to meet the Town's initiatives to promote active transportation.

3.3 Provincial Land Use Planning Initiatives

The following planning documents were reviewed to determine their applicability to the study area:

- Provincial Policy Statement;
- The Growth Plan for the Greater Golden Horseshoe;
- Oak Ridges Moraine Conservation Plan;
- The Niagara Escarpment Plan; and
- The Greenbelt Plan.

3.3.1 Provincial Policy Statement (2014)

The Provincial Policy Statement (2014) provides for appropriate development while protecting resources of provincial interest, public health and safety and the quality of the natural and built environment. The Provincial Policy Statement supports improved land use planning and management, which contributes to a more effective and efficient land use planning system.

The following policies within the Provincial Policy Statement support potential improvements to the Mountainview Road corridor:

> *Healthy, liveable and safe communities are sustained by (Section 1.1, subsection 1.1.1, (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."*

3.3.2 Growth Plan for the Greater Golden Horseshoe (2017)

The Growth Plan for the Greater Golden Horseshoe – Places to Grow, was adopted in July 2017, replacing the former Growth Plan for the Greater Golden Horseshoe (2006), under the provisions of the *Places to Grow Act, 2005*. The plan provides the framework for implementing the provincial government's vision for building strong, prosperous communities by better managing growth to the year 2041 in the burgeoning Greater Toronto and Hamilton Area (GTHA). Since implementation, the plan has been amended to provide population and employment forecasts to the year 2041.

The Growth Plan contains specific policies and directions regarding transportation infrastructure, land use planning, urban form, housing, natural heritage and resource protection to be considered by municipalities in their planning activities. Of particular interest, the Growth Plan provides direction on where growth can occur, the form of future development and future population and employment forecasts.

The proposed improvements discussed in the ESR are consistent with policies included in the Growth Plan for the Greater Golden Horseshoe (2017). Since the study area falls partially within the Oak Ridges Moraine Conservation Plan, Greenbelt Plan- Protected Countryside Designation and the Niagara Escarpment Plan area, the settlements within the study area can only be slightly expanded. The *Castles of Caledon* development, northeast of the study area will be modest in size.

3.3.3 Oak Ridges Moraine Conservation Plan (2017)

The Oak Ridges Moraine Conservation Plan was amended in July 2017. This plan provides ecological based information regarding land use and resource management for the land and water within the Moraine. The study area falls within the Oak Ridges Moraine Conservation Area, specifically within the Natural Core Area. The Natural Core Area consist of 38% of the Moraine. There are 11 permitted land uses within this area, however the only relevant use is transportation, infrastructure and utilities. The Project focuses only on the infrastructure component of this permitted use. The Oak Ridges Moraine Conservation Plan states that transportation, infrastructure and utilities are permitted if the need for the improvement can be identified and no other acceptable alternative options can be used instead. Transportation, infrastructure and utilities is defined as the following;

Section 41

1. *Transportation, infrastructure and utilities uses include:*

   (a) public highways;

   (b) transit lines, railways and related facilities;

   (c) gas and oil pipelines;

   (d) sewage and water service systems and lines and stormwater management facilities;

   (e) power transmission lines;

   (f) telecommunications lines and facilities, including broadcasting towers;

   (g) bridges, interchanges, stations, and other structures above and below ground, that are required for the construction, operation or use of the facilities listed in clauses (a) to (f); and

   (h) rights of way required for the facilities listed in clauses (a) to (g).

2. *An application for a transportation, infrastructure or utilities use with respect to land in a Natural Linkage Area shall not be approved unless,*

   (a) the need for the project has been demonstrated and there is no reasonable alternative; and

   (b) the applicant demonstrates that the following requirements will be satisfied, to the extent that is possible while also meeting all applicable safety standards:

      1. *The area of construction disturbance will be kept to a minimum.*

      2. *ROW widths will be kept to the minimum that is consistent with meeting other objectives such as stormwater management and with locating as many transportation, infrastructure, and utility uses within a single corridor as possible.*

      3. *The project will allow for wildlife movement.*

      4. *Lighting will be focused downwards and away from Natural Core Areas.*

5. *The planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum.*

3. *An application for a transportation, infrastructure or utilities use with respect to land in a Natural Core Area shall not be approved unless the applicant demonstrates that,*

   (a) the requirements of subsection (2) have been met;

   (b) the project does not include and will not in the future require a highway interchange or a transit or railway station in a Natural Core Area; and

   (c) the project is located as close to the edge of the Natural Core Area as possible.

4. *Except as permitted in subsection (5), with respect to land in a key natural heritage feature or a hydrologically sensitive feature, all new transportation, infrastructure and utilities uses and all upgrading, or extension of existing transportation, infrastructure and utilities uses, including the opening of a road within an unopened road allowance, are prohibited.*

5. *Transportation, infrastructure, and utilities uses may be permitted to cross a key natural heritage feature or a hydrologically sensitive feature if the applicant demonstrates that,*

   (a) the need for the project has been demonstrated and there is no reasonable alternative;

   (b) the planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum;

   (c) the design practices adopted will maintain, and where possible improve or restore, key ecological and recreational linkages, including the trail system referred to in section 39;

   (d) the landscape design will be adapted to the circumstances of the site and use native plant species as much as possible, especially along rights of way; and

   (e) the long-term landscape management approaches adopted will maintain, and where possible improve or restore, the health, diversity, size and connectivity of the key natural heritage feature or hydrologically sensitive feature.

6. *Service and utility trenches for transportation, infrastructure and utilities shall be planned, designed and constructed so as to keep disruption of the natural groundwater flow to a minimum.*

The road improvements will be minor and will not result in significant impact to the environment, thus complying with the Oak Ridges Moraine Conservation Plan.

3.3.4 The Greenbelt Plan (2017)

The Greenbelt Plan was amended in July 2017 and is an overarching document that serves to protect the Greenbelt Area from urbanization that would cause harm to its agricultural and ecological features. The Greenbelt Plan is complementary to The Growth Plan for the Greater Golden Horseshoe and the Niagara Escarpment Plan. The study area falls partially within the Niagara Escarpment Plan designation and partially in the Greenbelt Plan Protected Countryside designation, which means that the regulations under the Niagara Escarpment Planning and the Protected Countryside will both be applicable.

The suggested design improvements will not widen the corridor as additional lanes are not being proposed. The policies in the Greenbelt Plan, under the Protected Countryside designation states that any existing infrastructure must be maintained, and new infrastructure can be developed in order to serve the permitted uses in the study area. The general infrastructure policy states the following:

1. *b) It serves the significant growth and economic development expected in southern Ontario beyond the Greenbelt by providing for the appropriate infrastructure connections among urban centres and between these centres and Ontario's borders. (Section 4.2.1).*

Due to the expected growth in the study area, the road is being improved for increased usage.

3.3.5 The Niagara Escarpment Plan (2017)

Within the Greenbelt Plan falls the Niagara Escarpment Plan Area. The Niagara Escarpment Plan (NEP) was amended in June 2017 and was originally created to protect the Niagara Escarpment from significant human impact. The NEP serves to strike a balance between preservation and development of the area.

The NEP area was allocated across seven different land use categories, of which the most relevant to the current study is the Escarpment Rural Area. According to the plan, this land use designation is significant as it provides a buffer to the more ecologically sensitive areas of the Niagara Escarpment. The plan outlines 33 permitted uses of lands within an Escarpment Rural Area. Only a small section of the study area, on the west side of Mountainview Road falls within the Escarpment Rural Area. As per Ontario Regulation 828/90 (Development within the Development Control Area), Section 5 states the following:

5. *The following classes of development, if listed as permitted uses under the land use policies established in the Niagara Escarpment Plan and not in conflict with a development permit issued under the Act, are exempt from the requirement of obtaining a development permit:*

    1. *The maintenance or repair of land, buildings or structures damaged, without any human intervention, by fire, lightning, unusually severe weather, storms, floods or other natural causes.*

    4.3 *The maintenance, repair or renewal of highways or municipal roads if the maintenance, repair or renewal does not,*

        i. *open an unopened road allowance,*

        ii. *expand the width of the road,*

        iii. *change the road from a seasonal to a year round road,*

        iv. *change the surface of the road from gravel to pavement, or*

        v. *require road cuts and contour changes.*

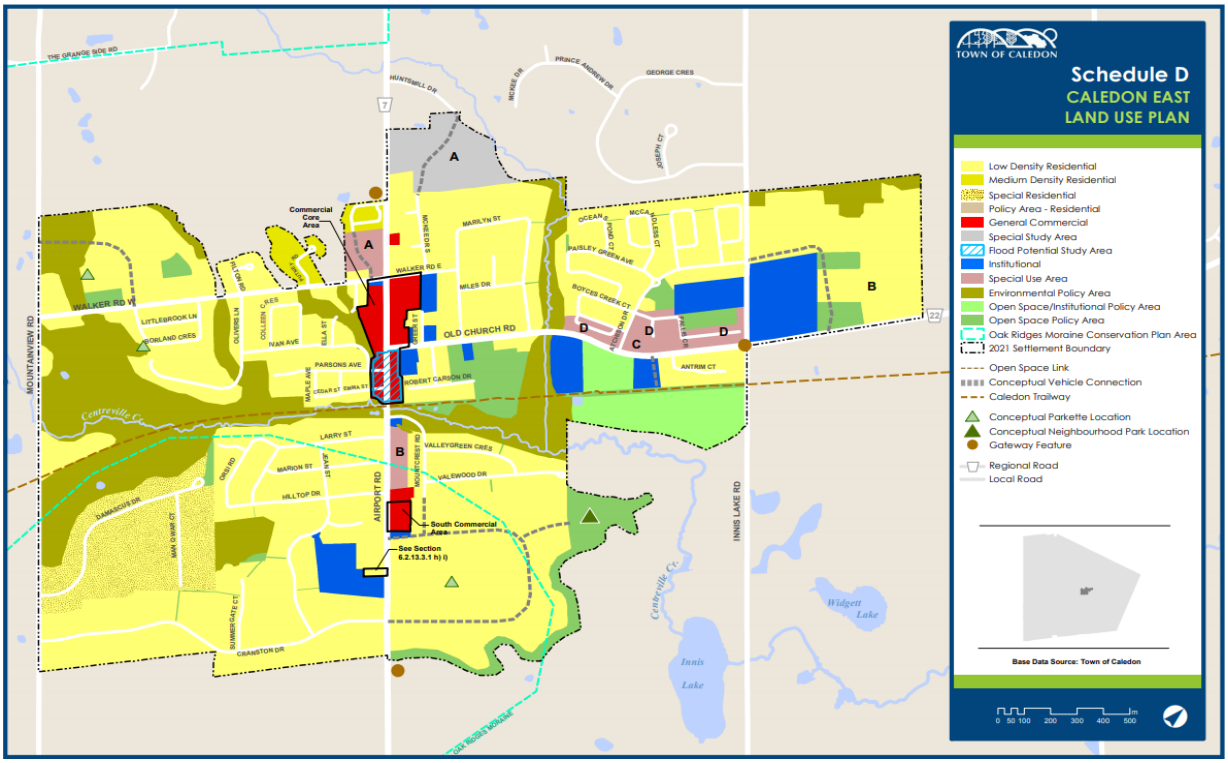
    4.4 *The maintenance, repair or cleaning of drainage ditches and swales along highways and municipal roads, including the replacement of culverts associated with driveway lanes and entrances onto municipal roads and highways.*

Therefore, the Project is exempt under Ontario Regulation 828/90 and a development permit from the Niagara Escarpment Commission (NEC) will not be required. However, upon consultation with the NEP during their review of the ESR, if a permit is deemed necessary, the Project team will proceed with obtaining a permit. All construction drawings for the portion north of The Grange Sideroad when detailed design is complete will be submitted to NEC in order to verify that the Project is exempt from Ontario regulation 828/90.

3.4 Existing Land Use

The land use adjacent to Mountainview Road, within the study area, is predominantly rural in nature. The following is a breakdown of the major land uses within and / or adjacent to the study area (see **Figure 3-3**):

- The majority of the east side of Mountainview Road is low density residential;
- Small portion of the east side of Damascus Drive is designated as special residential;
- No heritage designated properties within one kilometer of the study area;
- Significant environmental features include:
  - Headwaters of Centreville Creek;
  - Environmental Policy Area;
  - Caledon East Westland Complex;
  - Innis-Gibson Lake Kettle Lakes;
  - Widgett-Innis Lakes Wetland Complex;
  - Little Credit River Wetland Complex;
  - Little Credit Headwaters;
  - Oak Ridges Moraine; and
  - Niagara Escarpment Protection Area.
- Several locally significant natural areas, that provides linkage of habitat along the Town's land corridor for the migration of birds and animals.



Source: Caledon East Land Use Plan Schedule D. (2016). *Town of Caledon Official Plan*. Retrieved from https://www.caledon.ca/en/townhall/resources/Official_Plan_Schedule_D.pdf

Figure 3-3 Caledon East Land Use Plan Schedule D

3.4.1 Proposed Development

There is a proposed residential development, *Castles of Caledon* that will be located directly northeast of the Mountainview Road and Walker Road West intersection. The overall land use and development pattern within the study area are not anticipated to change substantially from what currently exists.

3.5 Existing Transportation

A Transportation and Traffic Analysis Report was completed to investigate existing and future traffic conditions and traffic safety in the study corridor. The report investigates short and long-term transportation needs related to the planned growth for the year 2032. The study assessed the need for improvements to accommodate traffic in a safe and efficient manner.

The study examined current traffic conditions, operational deficiencies, and constraints experienced by the public travelling along Mountainview Road. There are 9 intersections (stop controlled) and numerous accesses and driveways within the study area. The analysis of existing 2017 traffic conditions illustrate that:

- Traffic volumes throughout the corridor are currently operating at an acceptable LOS, with only minor delays during peak periods; and
- Intersections along Mountainview Road are operating at acceptable LOS.

The Transportation and Traffic Analysis Report can be found in **Appendix G**.

3.5.1 Existing Roadway Network

Mountainview Road begins just south of Caledon East where it intersects with Olde Base Line Road. It skirts the boundary of Caledon East and extends northward where it connects with Highway 9, east of Orangeville. The study area is comprised of the stretch of Mountainview Road between Olde Base Line Road and Granite Stones Drive, approximately 3.5 kilometers. A posted speed of 60 km/hr. is maintained along Mountainview Road through the study area. Existing features include rural cross sections with a single lane of travel in each direction throughout the corridor.

There is a total of 6 local roads that intersect with Mountainview Road within the study area, including:

- **Olde Base Line Road** - is an east-west collector road which intersects Mountainview Road at an unsignalized "T" intersection. It consists of a two (2) lane cross section under the jurisdictional control of the Region of Peel. The roadway maintains a posted speed limit of 80 km/hr. in the vicinity of the study area.

- **Cranston Drive** - is a local road on the east side that intersects Mountainview Road at a "T" intersection, which is stop controlled. It consists of a two (2) lane cross section under the jurisdictional control of the Town of Caledon. Both on-street parking and stopping is permitted on both sides of Cranston Drive within the study area. This local road is primarily used for residential access and maintains a posted speed limit of 40 km/hr.

- **Damascus Drive** - is a local road on the east side that intersects Mountainview Road at a "T" intersection, which is stop controlled. It consists of a two (2) lane cross section under the jurisdictional control of the Town of Caledon. This local road is only used for residential access as it is a dead-end street and maintains a posted speed limit of 50 km/hr.

- **Walker Road West** - is a local road on the east side that intersects Mountainview Road at a three-way-stop controlled intersection. It consists of a two (2) lane cross section under the jurisdictional control of the Town of Caledon. This local road is utilized heavily by residents of Caledon East as it provides direct access to the town centre. Neither on-street parking nor stopping is permitted on both sides of Walker Road within the study area. It maintains a posted speed limit of 40 km/hr in the vicinity of the proposed development.

- **Side Road 5 / The Grange Side Road** - are local roads that intersect Mountainview Road at a four-way-stop controlled intersection. They both consist of two (2) lane cross sections under the jurisdictional control of the Town of Caledon. Side Road 5, to the east, serves primarily for residential access and the Grange Side Road, to the west, provides access to Highway 10. Side Road 5 maintains a posted speed limit of 50 km/hr while the Grange Side Road maintains a posted speed limit of 60 km/hr.

- **Granite Stones Drive** - is a local road on the east side that intersects Mountainview Road at a "T" intersection, which is stop controlled. It consists of a two (2) lane cross section under the jurisdictional control of the Town of Caledon. This local road is only used for residential access and maintains a posted speed limit of 50 km/hr.

There are three additional intersections outside of the study area that are of interest due to the existing traffic volumes, current operational concerns and anticipated land use that could drive local traffic increases:

- **Torbram Road and Olde Base Line Road** - Torbram Road is a collector road that intersects Olde Base Line Road at a "T" intersection, which is stop controlled. It consists of a two (2) lane cross section under the jurisdictional control of the Town of Caledon. This collector road continues south from Olde Base Line Road until it reaches its end just north of Toronto Pearson International Airport. The posted speed limit within the study area is 80 km/hr.
  - The Region is currently undertaking an Infrastructure Feasibility Study for Old Base Line Road (Regional Road 12) from Hurontario Street (Highway 10) to Airport Road (Regional Road 7), which will address the current 50 m (metres) offset west of the intersection at Mountainview Road and Torbram Road. The Feasibility Study is still in progress and could not be reviewed at the time of this study.
- **Borland Crescent West and Walker Road West** - Borland Crescent West is a local road that intersects Walker Road West at a "T" intersection, which is stop controlled. It consists of a two (2) lane cross section under the jurisdictional control of the Town of Caledon. Both on-street parking and stopping is permitted on both sides of Borland Crescent. This local road is used primarily for residential access and has an unposted speed limit of 40 km/hr in the vicinity of the proposed development.
- **Borland Crescent East and Walker Road West** - Borland Crescent East is a local road that intersects Walker Road West at a "T" intersection, which is stop controlled. It consists of a two (2) lane cross section under the jurisdictional control of the Town of Caledon. Both on-street parking and stopping is permitted on both sides of Borland Crescent. This local road is used primarily for residential access and has an unposted speed limit of 40 km/hr near proposed development.

3.5.2 Existing Active Transportation

Currently, a multi-use path is found between Cranston Drive and Walker Road West, which facilitates pedestrian and cyclist activity. The rest of the study area does not have any on-road or off-road active transportation infrastructure. The absence of on-road bike lanes, multi-use trails, and sidewalks for majority of Mountainview Road makes it difficult for cyclists and pedestrians to utilize the area as a means of travel. The Caledon Trailway crosses Mountainview Road within the study area, which provides an active transportation corridor across the study area (Refer to **Figure 1-1** for study area map).

3.5.3 Public Transit

The Town of Caledon currently does not have a public transit system. However, GO Transit does operate two bus routes within the Town. One route serves to connect Orangeville and Brampton and travels through Caledon via Highway 10. It connects to the Brampton GO station on the Kitchener line. A second route serves Bolton (via Highway 50) and connects to the Malton GO station on the Kitchener line. Although both GO Transit routes make stops within the Town of Caledon, all stops are well outside the study area, and will not result in disruptions to general traffic.

3.5.4 Traffic Safety

Collision data from a period of five years (January 1, 2012 to December 31, 2016) was obtained from the Town. A total of five collisions were reported over this five-year span and all incidents were given the classification of Property Damage Only (PDO). No fatalities were reported during this period. Out of five, three collisions occurred at intersections, while two collisions occurred mid-block. There were no observable trends in terms of common locations for traffic incidents. Additionally, there are no apparent trends with respect to time of year (spring, summer, fall, winter) or time of week. It should be noted that all of the collisions occurred during daytime hours; with 80% of the collisions taking place during the PM peak hours (between 3:00 pm and 7:00 pm).

The complete collision data is included in the Transportation and Traffic Analysis Report found in **Appendix G**.

3.5.5 Future Traffic Conditions

Future traffic conditions for the horizon year 2022 along Mountainview Road will include a new residential development (*Castles of Caledon)* that is expected to generate traffic that will utilize Mountainview Road. In view of future conditions, a 2% compounded growth rate was applied to the background traffic to estimate future traffic conditions in order to be consistent with the growth rate adopted for the new development's Traffic Impact Study (TIS). Traffic volumes generated by the new development were taken from the TIS completed in 2012 by Cole Engineering. Total estimated traffic volumes for 2022 were derived by adding the forecasted traffic with the estimated development generated traffic.

Future traffic conditions for the horizon year 2032 for Mountainview Road assumed that the residential development has been fully completed prior to the year 2032. A growth of rate of 2% was also assumed and applied to background traffic. Total estimated traffic volumes for 2032 were derived by adding the forecasted traffic to the traffic that is expected to be generated by the development.

Based on the traffic analyses, it is noted that the corridor within the study area is currently (in 2017) performing at an acceptable LOS (LOS 'C' or better). The future growth (2022 and 2032) and proposed development are expected to add marginal demand and minimal delays to the corridor, where overall traffic operations are still expected to be acceptable under the existing geometric configuration.

The Transportation and Traffic Analysis can be found in **Appendix G**.

3.6 Natural Environment

3.6.1 Terrestrial Resources

The study area falls under the jurisdiction of the TRCA, Aurora District Ministry of Natural Resources and Forestry (MNRF) and within Ecoregion 6E.

Overall, the background information review indicated that 129 species of birds, 41 species of mammals, 15 species of amphibians and 10 species of reptiles are reported to occur within the natural heritage squares encompassing the study area. However, correspondence with the MNRF reports that 25 Species at Risk (SAR) have been recorded in the vicinity of the study area, which are terrestrial or semi-terrestrial. Through on-site field investigations, three (3) SAR (Barn Swallow, Bobolink and Eastern Meadowlark) and one (1) species of conservation concern (Eastern Wood-Pewee) were observed during breeding bird

surveys conducted from the right-of-way (ROW). Barn Swallow and Bobolink are likely to be found in the study area where there are open meadows, agricultural fields, fallow roadside areas and bridge or culvert nesting sites. Eastern Meadowlark are found in areas of grassland habitat, where tall grasses can be found. Lastly, Eastern Wood-Pewee are likely to be found in the numerous forested habitats on site for breeding and nesting habitat areas.

A total of 23 ecological land classification (ELC) community types / land uses were identified within the terrestrial study area. Of the 96.17 hectares (ha) that make-up the study area, 64.01% was made up of community types / land uses considered anthropogenic or cultural in origin (e.g., constructed / agricultural). Natural / semi-natural habitat represents 26.4% of the lands within the study area, with the remaining 9.59% comprised on coniferous plantations. These habitats are known to contain numerous non-native species due to their proximity to cultural habitats.

For further detail, the Terrestrial Assessment Report can be found in **Appendix H**.

3.6.2 Aquatic Resources

The study area contains a portion of Centreville Creek, which is a part of the Humber River Watershed, as well as the Little Credit River at the southern end of the study area, which is part of the Credit River watershed. Little Credit River is located approximately 90 m south of the Olde Base Line Road and Mountainview intersection. This watercourse flows immediately south of the study area and will not be directly impacted by the scheduled works. Through correspondence with the Aurora District MNRF office, it was indicated that the Centreville Creek and the Little Credit River have cold water thermal regimes.

Within the study area, Mountainview Road crosses Centreville Creek once, approximately 420 m south of Walker Road West. Three other tributaries of Centreville Creek come in close vicinity to the Mountainview Road but do not cross the road ROW. These include a tributary located just north of Granite Stones Drive, a tributary of Centreville Creek located approximately 370 m south of The Grange Side Road and another tributary of Centreville Creek running approximately 670 m south of The Grange Side Road. At the southern limit of the study area, Mountainview Road terminates at Old Baseline Road and Torbram Road continues as the north-south corridor.

Historical records indicate a total of 31 species present within Centreville Creek. This includes species such as brown trout and white perch, which have been introduced to the watercourse. In 2001, studies by TRCA indicated a reduced number of species present within the system, although this can be attributed to different sampling methodologies, fishing effort, etc.

Mountainview Road crosses one cross-drainage feature at the intersection of Mountainview Road and The Grange Side Road. This cross-drainage feature conveys roadside runoff. There are an additional two crossings within the study area, including the crossing of a tributary of Bracken Creek, located approximately 290 m south of Walker Road West (C2), and a crossing at the main channel of Bracken Creek 415 m south of Walker Road West (C3). Bracken Creek is a sub-catchment of Centreville Creek. Additionally, three drainage features come in close proximity to Mountainview Road but do not cross the road ROW. These include a drainage ditch located approximately 370 m south of the Grange Side Road (A1), a pond outlet drainage feature located approximately 690 m south of The Grange Side Road (A2) and a drainage ditch located at the intersection of Mountainview Road and Walker Road West (A3). These drainage areas are all located within approximately 20 m of the Mountainview Road ROW and therefore could potentially be impacted due to the scheduled improvement works.

For further detail, the Aquatic Assessment Report can be found in **Appendix I**.

3.7 Contamination Overview Study

The potential for significant environmental impacts due to contamination in the study area is considered to be low. The following sites contained evidence of potential contamination:

- 264 Walkers Road West, located within the study area, is registered for a commercial fuel oil tank (single wall UST). However, no evidence of fuel tanks was observed at time of site reconnaissance.
- 16247 Mountainview Road, located within the study area, is also registered for a commercial fuel oil tank (single wall UST). However, no evidence of fuel tanks was observed at time of site reconnaissance.
- 16626 Mountainview Road, RR2, located 41.6 m northwest of the study area, is registered as a TSSA Expired Facility. However, no evidence of fuel tanks was observed at time of site reconnaissance.
- Caledon Trailway Path, a former railway line, crosses the study area between Walkers Road and Damascus Drive. Railways are considered to be a potentially contaminating activity, due to the rail ties and ballast associated with the rail bed.
- Asbestos Containing Material (ACM) may be present in the road materials and sewer pipes used within the Site area.

For further detail, the Contamination Overview Study can be found in **Appendix J**.

3.8 Stormwater Management

A Stormwater Management Report was completed to evaluate the existing and future drainage in the study area. The existing roadway section is rural throughout the limits of the study area and drainage is typically conveyed by roadside ditches; however, various sections of road are not ditched, and drainage simply flows overland. The study limits cross the headwater divide between the Credit River and the Humber River watersheds. The Humber River Watershed is regulated by the TRCA and the Credit River Watershed by the Credit Valley Conservation Authority (CVC).

The main findings are the following:

- Nine culvert crossings were identified within the study area and evaluated with respect to the Ministry of Transportation (MTO), MNRF and Town of Caledon Design Criteria. All culverts apart from Crossing C5 have been found to provide a sufficient LOS. Refer to **Figure 3-4** for the location of all culverts.
- The existing roadway ROW does not implement formal quality controls.
- Centerville Creek was previously identified as having areas sensitive to erosion. Previous studies recommended future developments reduce total runoff volume to pre-development levels (ref. Centerville Creek Subwatershed Synthesis Report, TRCA 2008).

- Beaver damming activities were identified upstream of Crossing C5. These activities were presumed to have caused flooding, which in turn caused a side 'tributary' to form, located south of the main channel.

The watershed divide is located between Damascus Drive and the Caledon Trailway Path. North of the drainage divide, drainage is generally toward Bracken Creek, a tributary of Centerville Creek and the Humber River. Bracken Creek crosses Mountainview Road between the Caledon Trailway Path and Walker Road, flowing west, through a pair of culverts. South of the drainage divide and up to approximately 400 m southerly of Cranston Drive drains to a swampy area which is confined by local topography. The remaining south easterly area generally drains southwest toward a tributary of the East Credit River.

For further detail, the Stormwater Management Report can be found in **Appendix K**.

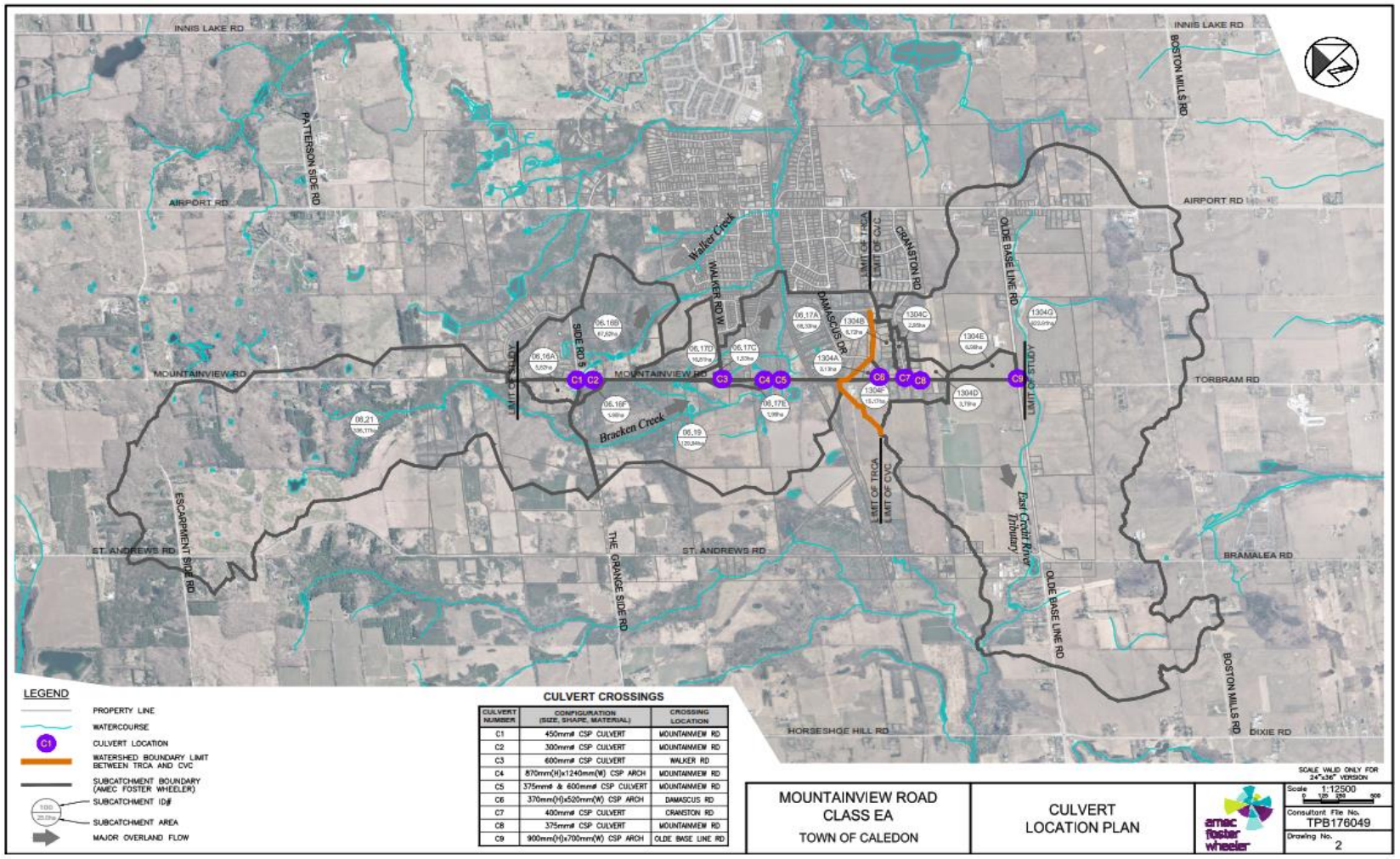


Figure 3-4 Culvert Location Map

3.9 Stage 1 Archaeological Assessment

The Stage 1 Archaeological Assessment indicated ~98.5% (308.1 ha) of the study area has archaeological potential and ~1.5% (4.4 ha) of land where archaeological potential has been removed. The undisturbed portions of the study area have archaeological potential for three principal reasons:

- Presence of a number of watercourses within the study area;
- Clear pattern of pre-contact Aboriginal and historic Euro-Canadian land use in the vicinity; and
- Two rail lines, Mountainview Road and several intersecting roads within the study area, were historically important transportation routes.

For further detail, the Stage 1 Archeological Assessment can be found in **Appendix L**. As the study area was deemed to have archaeological potential, Wood completed a Stage 2 Archaeological Assessment of the study area.

3.10 Stage 2 Archaeological Assessment

The Stage 2 Archaeological Assessment was triggered by the recommendations of the Stage 1 assessment. The Stage 2 assessment area examined the current ROW and consisted of approximately 8.4 ha (21 acres). 3.5 ha were determined to be disturbed due to the current roadway, disturbed gravel shoulders and paved driveways. An additional 1.7 ha was determined to contain areas of excessive slope, and 3.7 ha contained drainage ditches and underground utilities. The remaining 0.1 ha contained areas of archaeological potential. The areas of archaeological potential (0.1 ha) were systematically test pitted at 5 m intervals. No archaeological materials were recovered in any of the test pits and no archaeological sites were identified.

For further detail, the Stage 2 Archeological Assessment can be found in **Appendix M**.

3.11 Geotechnical Investigation

A Geotechnical Study was undertaken to obtain information on the subsurface conditions and existing pavement conditions along the investigated road section. The study included investigating boreholes, conducting in-situ tests and laboratory tests of soil samples. The pavement condition survey in 2018 showed that the existing asphaltic concrete surface condition was rated to be in 'Poor' to 'Very Poor' condition. The soil profile consisted predominantly of existing asphaltic concrete overlying of granular fill which is underlain by silty sand, or silty clay fill. The native soils were typically encountered at a depth of about 1.0 m. The native soils were composed of clayey silt till until BH 13 at Stn. 2+300, and silty fine sand was encountered from BH 14 at Stn. 2+400.

The overall subsurface soil profile encountered, within the depths of boreholes drilled for installation of underground utilities, consisted of surficial ground cover underlain by fill soils underlain by loose to compact silty sand / sandy silt and / or firm silty clay / clayey silt. Groundwater was encountered in some boreholes from 1.5 m to 1.8 m depth below the existing ground surface.

Based on the soil conditions encountered at the culvert borehole locations, the soil profile consisted typically, of ground surface cover (asphaltic concrete) underlain by fill soils, peat and natural soils (silty sand / sandy silt / sand). Fill soils included non-cohesive soils (sand and gravel, silty sand). The fill soils and

peat (where encountered) in culvert boreholes (BH 17, BH 18, BH 20A and BH 20B) were underlain by natural soils (silty sand / sandy silt) to the termination of boreholes. Groundwater was found in all boreholes at depths ranging from 3.0 m to 3.4 m below the existing ground surface.

For further details, the Geotechnical Investigation Report can be found in **Appendix N.**

4.0 Development and Evaluation of Alternative Planning Solutions

4.1 Problem and Opportunity Statement

The purpose of this study is to improve Mountainview Road, between Olde Base Line Road and Granite Stones Drive. The specific problems and opportunities to be addressed are as follows:

- Corridor geometrics;
- Traffic operations and safety;
- Future travel demand;
- Road alignment and profile;
- Pavement conditions;
- Drainage deficiencies and opportunities for stormwater management;
- Future municipal services and utilities;
- Mitigate impact to the natural environment; and
- Safe environment to accommodate vehicle traffic and active transportation.

4.2 Evaluation Criteria

As part of the initial phases of this study the following preliminary evaluation criteria were developed to reflect the concerns of various stakeholders, as communicated through Phase one and two consultation. **Table 4-5** provides a description of the evaluation criteria used in subsequent phases of the study:

Table 4-5 Evaluation of Criteria for Alternatives

Component	Evaluation Criteria	Description
Natural Environment	Terrestrial Resources and Vegetation	Potential adverse effects on terrestrial species and habitats
	Wildlife Habitat	Potential adverse effects on existing wildlife due to disturbance or loss of habitat
	Species at Risk	Potential effects on SAR identified in the study area and meeting Ontario Endangered Species Act and Federal SAR Act, including net benefit requirements
	Groundwater / Surface Water / Drainage	Potential adverse effect on groundwater, wells, surface water quality and flood potential
	Fisheries and Water Quality	Potential to minimize impact on aquatic features
	Flooding	Potential to minimize flooding impacts due to improvements
Social Environment	Land Use	Presence, number and characteristics of residences, community facilities, public parks, institutions or businesses within or adjacent to the study corridor
	Archaeology	Potential adverse effects on archaeological
	Utilities	Ability to minimize effects on existing and proposed utilities
	Property Impacts	Potential property impacts and requirements
Transportation	Traffic	Ability to improve vehicular traffic within study area

Component	Evaluation Criteria	Description
Costs	Capital Cost	Capital costs of the proposed improvements and maintenance costs
Technical	Safety	Ability to improve vehicular and active transportation safety
	Structural Integrity	Ensure the structure meets current structural adequacy in accordance with Canadian Highway Design Bridge Code (CHBDC)
	Expected Service Life	Expected duration before structure replacement is required.
	Maintenance and Future Inspection Requirements	Continued visual and nondestructive testing inspection requirements and ongoing maintenance
	Hydraulic Capacity	Ensure the structure meets current hydraulic design criteria
	Construction Disruptions	Ability to minimize construction constraints and complexity
Transportation Plans & Policies	Compatibility with Regional and City Transportation Plans and Policies	Compatibility with Regional, Municipal and Conservation Authority Area Plans and Policies

4.3 Identification of Alternatives

The following alternatives in **Table 4-6** have been identified for consideration in addressing the problems and opportunities discussed above:

Table 4-6 Planning Alternatives

Alternative 1: Do Nothing	Alternative 2: Improve Adjacent Road Network
• No Improvements • Continue Regular Maintenance	Improvements in the form of: • Signal Timing Changes • Road Geometrics • Corridor Design • Active Transportation Facilities • Public Transportation Opportunities • Roadside Landscaping
Alternative 3: Provide Multi-Modal Facility	**Alternative 4: Improve Mountainview Road**
Improvements in the form of Active transportation facilities: • Bike Lanes • Sidewalk • Multi-use Pathway • Public Transportation Opportunities	Improvements in the form of: • Road Geometric • Active Transportation Facility • Urbanization • Roadside landscaping • Drainage • Traffic Safety

4.4 Preferred Alternative

Based on the review of existing and future conditions, the assessment of planning alternatives, as well as consultation with stakeholders, the project team has selected the **Preferred Alternative 4: Improve Mountainview Road.** With proper environmental constraint avoidance and mitigation planning, the benefits of the Preferred Alternative outweigh its potential impacts to the natural and cultural environment. **Table 4-7** summarizes the evaluation undertaken.

Table 4-7 Evaluation Table

Component	Planning Alternative 1: Do Nothing	Planning Alternative 2: Improve Adjacent Road Network	Planning Alternative 3: Provide Multi-Modal Facility	Planning Alternative 4: Improve Mountainview Road
Natural Environment	No impacts.	Potential for minor impacts.	Potential for minor impacts.	Potential for minor impacts.
Social Environment	Lack of active transportation facilities.	Lack of active transportation facilities.	Opportunity to provide active transportation.	Potential for minor impacts associated with widening and property acquisition.
Transportation	Traffic safety would remain a concern. Impact associated with increased traffic not addressed.	Traffic safety would remain a concern. Impact associated with increased traffic not addressed.	Traffic safety would remain a concern. Impact associated with increased traffic not addressed.	Opportunity to address traffic safety. Opportunity to address future traffic demand.
Costs	Zero capital costs. Continued maintenance cost.	Zero capital costs. Continued maintenance cost.	Moderate capital costs associated with improvements.	Moderate capital costs associated with improvements.
Technical	No construction. No upgrading of existing infrastructure.	No construction. No upgrading of existing infrastructure.	Minor constructability concerns. Ability to upgrade some aspects of corridor to new standards.	Minor constructability concerns. Ability to upgrade corridor to new standards.
Transportation Plans & Policies	Recommended improvements for future growth would not be implemented.	Recommended improvements for future growth would not be implemented.	Complies with some aspects of Town and Regional Planning documents.	Complies with Town and Regional Planning documents.

Legend

Most Preferred | | Neutral | | Least Preferred

Preferred Alternative

5.0 Development and Evaluation of Alternative Design Concepts

The development of alternative design concepts was completed with consideration given to the characteristics of and constraints within the study area, with land use consisting of a mix use of agricultural land and residential properties. The mid-section of the corridor provides connection to local streets and collector. In view of existing land use and future development, two options 'Rural and Urban' were primarily developed and assessed for the entire corridor. Details of both alternatives initially developed are provided and illustrated below. However, changes were made to the design based on the discussion with the Town's staff, public consultation and agency input. These changes are reflected in the recommended design.

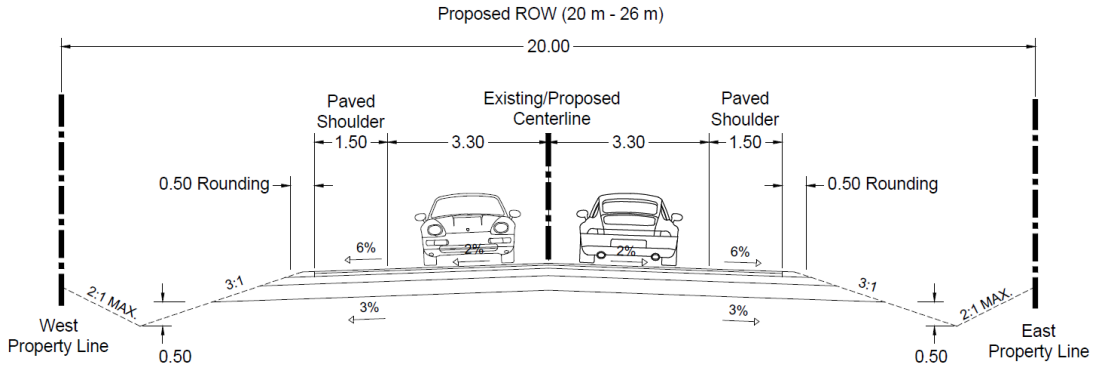


Figure 5-5 Typical Rural Cross-Section

RURAL:
Lane width = 3.30 m
Paved Shoulder on both sides = 1.50 m

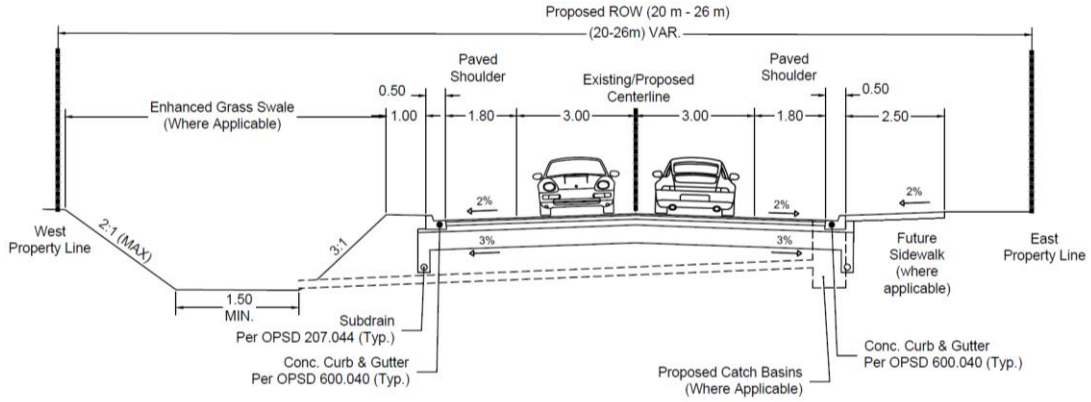


Figure 5-6 Typical Cross Section (Urban with Enhanced Grass Swale)

URBAN:
Lane width = 3.00 m
Paved Shoulder on both sides = 1.80 m
Boulevard = 1.00 m on both sides
Future Sidewalk (where applicable) = 2.50 m

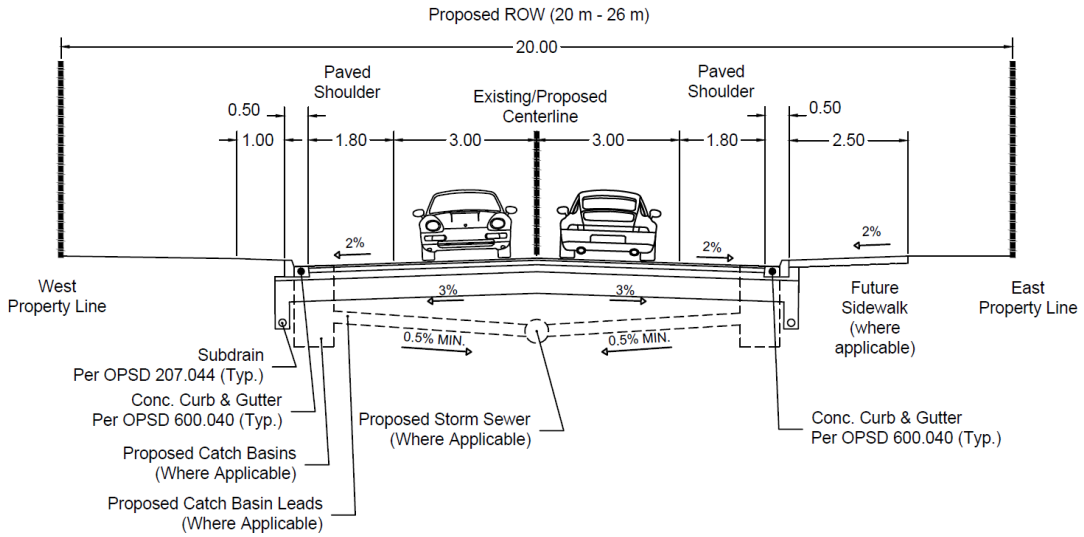


Figure 5-7 Typical Cross Section (Urban with Storm Sewer)

Based on the impact assessment and high-level evaluation as shown in **Figure 5-4**, it was determined that a **Hybrid – combination of urban and rural** provides the optimum solution. An evaluation of alternatives is summarized below.

	Rural	Urban	Rural-Urban Hybrid
Natural Environment	• High Impact	• High impact	• Moderate Impact
Social Environment	• Maintains existing corridor characteristics	• Impact existing corridor characteristics • Improved safety with reduced speed	• Maintains rural characteristics • Provides enhanced safety with reduce speed in mid-corridor section • Blends with new and future developments
Transportation	• Limited Active Transportation • Partially meets Transportation Master Plan	• Improved network • Mostly meets Transportation Master Plan	• Improved network • Mostly meets Transportation Master Plan
Cost	• Medium cost	• High cost	• Moderate Cost
Technical	• Impacts significantly extend beyond Right-of-Way • Improved sightlines • Improved drainage with high impacts	• Impacts moderately extend beyond Right-of-Way • Improved sightlines • Improved drainage with high impacts	• Impacts moderately extend beyond Right-of-Way • Improved sightlines • Improved drainage with low impacts
Transportation Plans and Policies	• Partially consistent with Transportation Plans and Policies	• Mostly consistent with Transportation Plans and Policies	• Mostly consistent with Transportation Plans and Policies

Preferred Alternative | Least Preferred | Neutral | Most Preferred

Figure 5-8 Alternative Designs

5.1 Horizontal Alignment Alternatives

The existing ROW within the study area varies in width at several locations. In most instances, the existing road centerline does not necessarily represent the mid-point of the ROW. A desktop review was completed to consider shifting the road alignment to the east and / or west. It was found that shifting is not feasible due to environmental sensitivities. Avoidance of impacts on one side results in added impacts on the other side of the road. It was therefore decided to maintain the existing centerline of the roadway.

5.2 Vertical Alignment Alternatives

Vertical alignment options were also reviewed to minimize impacts with the proposed grade being as close as possible to existing ground. This was found challenging as many sections of the road were found to have sub-standard road geometrics. Several iterations of adjusting road profile was performed to provide standard geometrics while minimizing impacts.

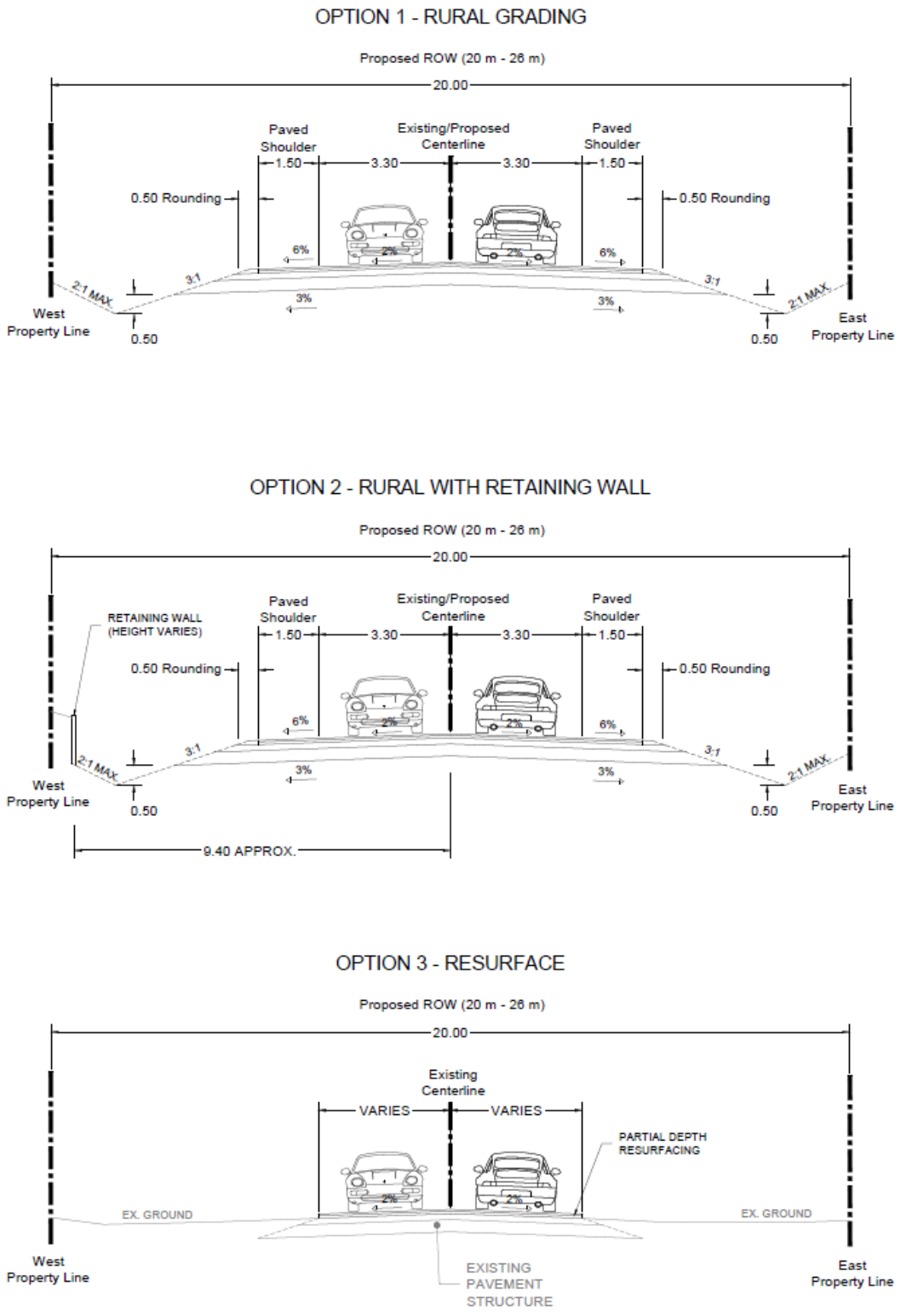
5.3 Resurfacing

At the northern end of the study area between Grange Side Road and Granite Stones Drive, the roadway improvements initially considered have the potential to significantly impact adjacent properties located on the west side of Mountainview Road, with grading extending into property well beyond the existing ROW. This not only would require property acquisition but also affect existing vegetation. The following three options were developed:

- Option 1: Rural Section with V Ditches on both sides of the roadway;
- Option 2: Concrete Retaining Wall to minimize grading impacts to adjacent properties; and
- Option 3: Resurfacing.

All three options are illustrated below in **Figure 5-9.** Based on the assessment, the Town of Caledon has decided to carry forward ***Option 3*** to rehabilitate by resurfacing the roadway while maintaining the existing width and road profile.

Figure 5-9 Improvement Options between Grange Side Road and Granite Stones Drive



5.4 Stormwater Management

In regard to stormwater management, the following potential measures to mitigate runoff may include:

- Oil and Grit Separators;
- Increased Catchbasin Sump depths with Goss Traps and CB ShieldTM Inserts;
- Super Pipe Storage;
- Underground Storage (Cellular Systems);
- Bioretention Systems;
- Infiltration Trenches;
- Silva Cells;
- Enhanced Grassed Swales and Dry Swales;
- Permeable Pavers/Pavement (For walkways and paved shoulders);
- Pervious Pipes (used with infiltration trenches); and
- Offsite Stormwater Management Facilities.

Based on comments received from TRCA regarding the type of quantity control proposed, the following options have been identified:

- Option proposed for quantity control is to use the downstream end of the roadside swales. For example, in the flattest slopes near the outlets, storage for quantity control can be provided and a control structure can be designed consisting of a transverse berm and culvert / weir outlet control.
- A secondary option if the swales do not offer sufficient quantity control is underground storage within the road ROW connected to the storm sewer system, with orifice control. The final configuration of the quantity control and storage will be determined through the detailed design stage.

A few options for stormwater management adjacent to wetlands south of Walkers Road were developed to identify and assess the impacts. A site visit with TRCA and Town's staff was arranged to review post beaver dam removal conditions, discuss potential stormwater strategy at wetlands, and provision of wildlife passage at culvert crossings. Based on the discussions held with TRCA resulted in the need for detailed evaluations to determine the type of stormwater management needed within the study area particularly adjacent to wetlands. In **Figure 5-10,**

Figure 5-11**,** and

Figure 5-12**,** cross sections immediately north and south of crossings illustrate impacts of grading limits adjacent to wetland with flat bottom and V-Ditches and retaining wall. Storm sewers are also provided in areas. All these three options were evaluated based on the following criteria:

- Terrestrial;
- Aquatic;
- Property;
- Stormwater Management;
- Maintenance;
- Aesthetics;
- Technical; and
- Cost.

Table 5-8 shows the stormwater management and typical cross section option evaluation. For further detail, the Stormwater Management Report can be found in **Appendix K**.

Figure 5-10 Option 2. Urban Section with Flat Bottom Ditch & No Storm Sewer

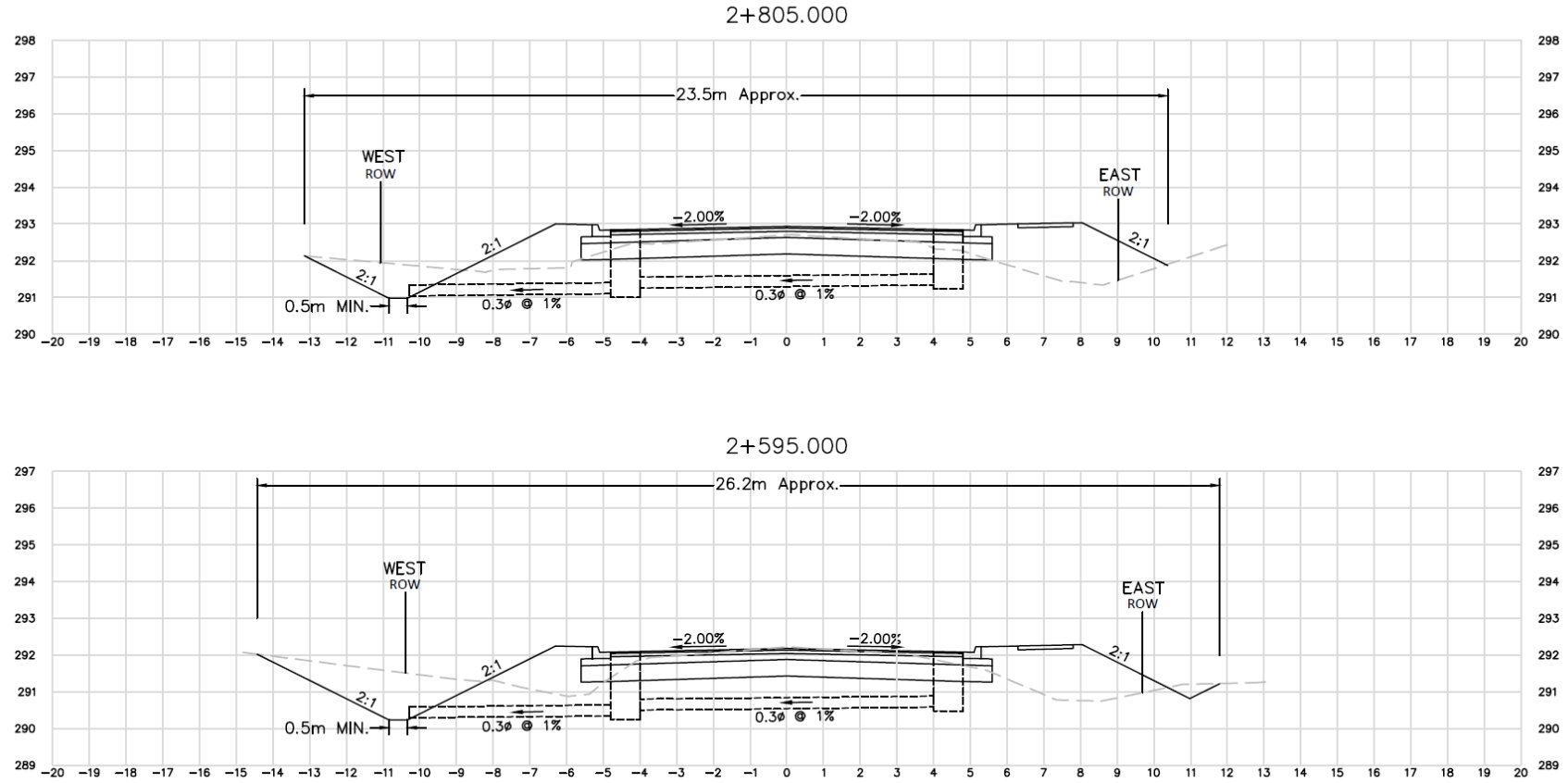


Figure 5-11 Option 3. Urban Section with V-Ditch & Storm Sewer

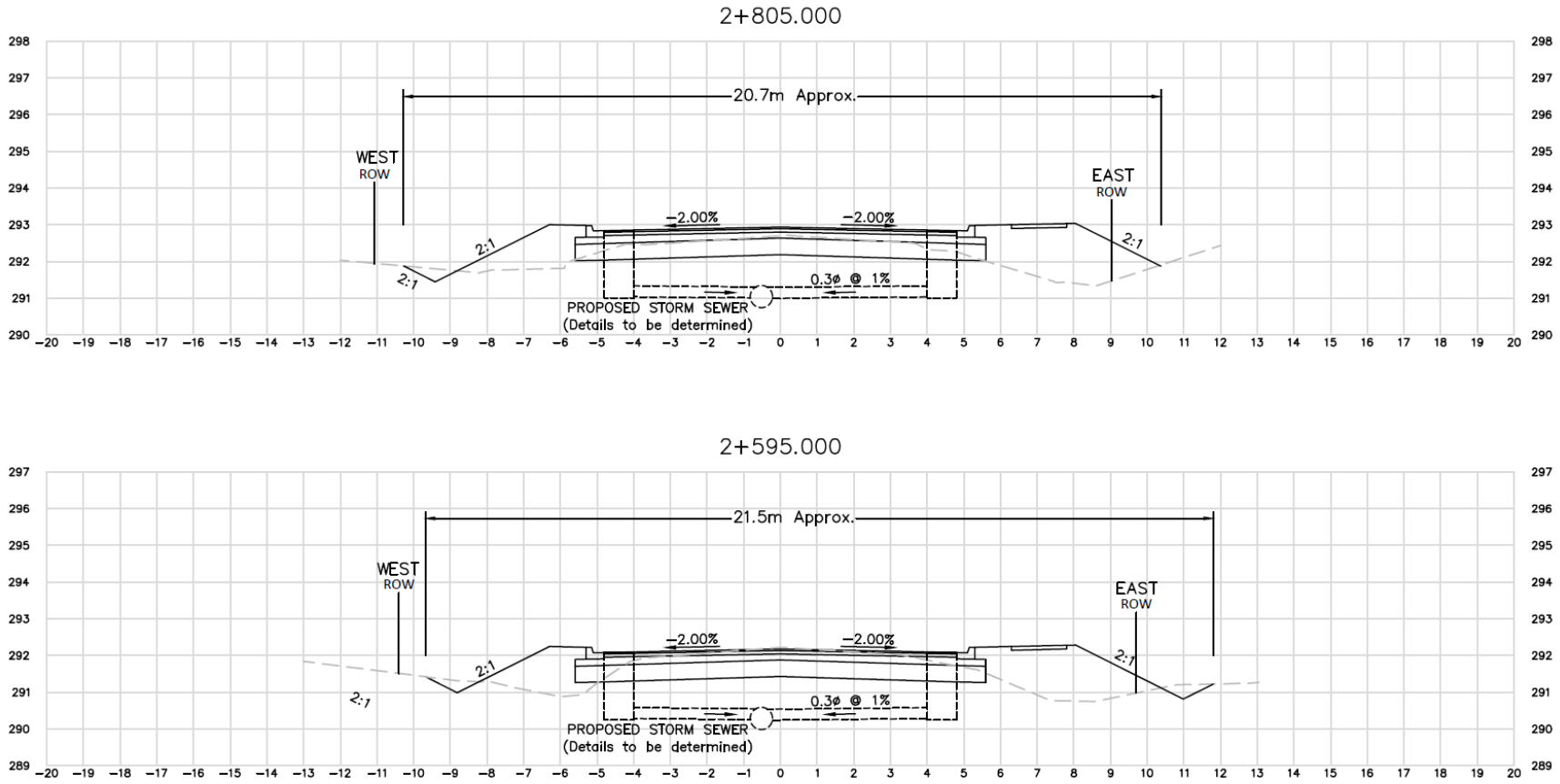


Figure 5-12 Option 4. Urban Section with Retaining Wall, V-Ditch & Storm Sewer

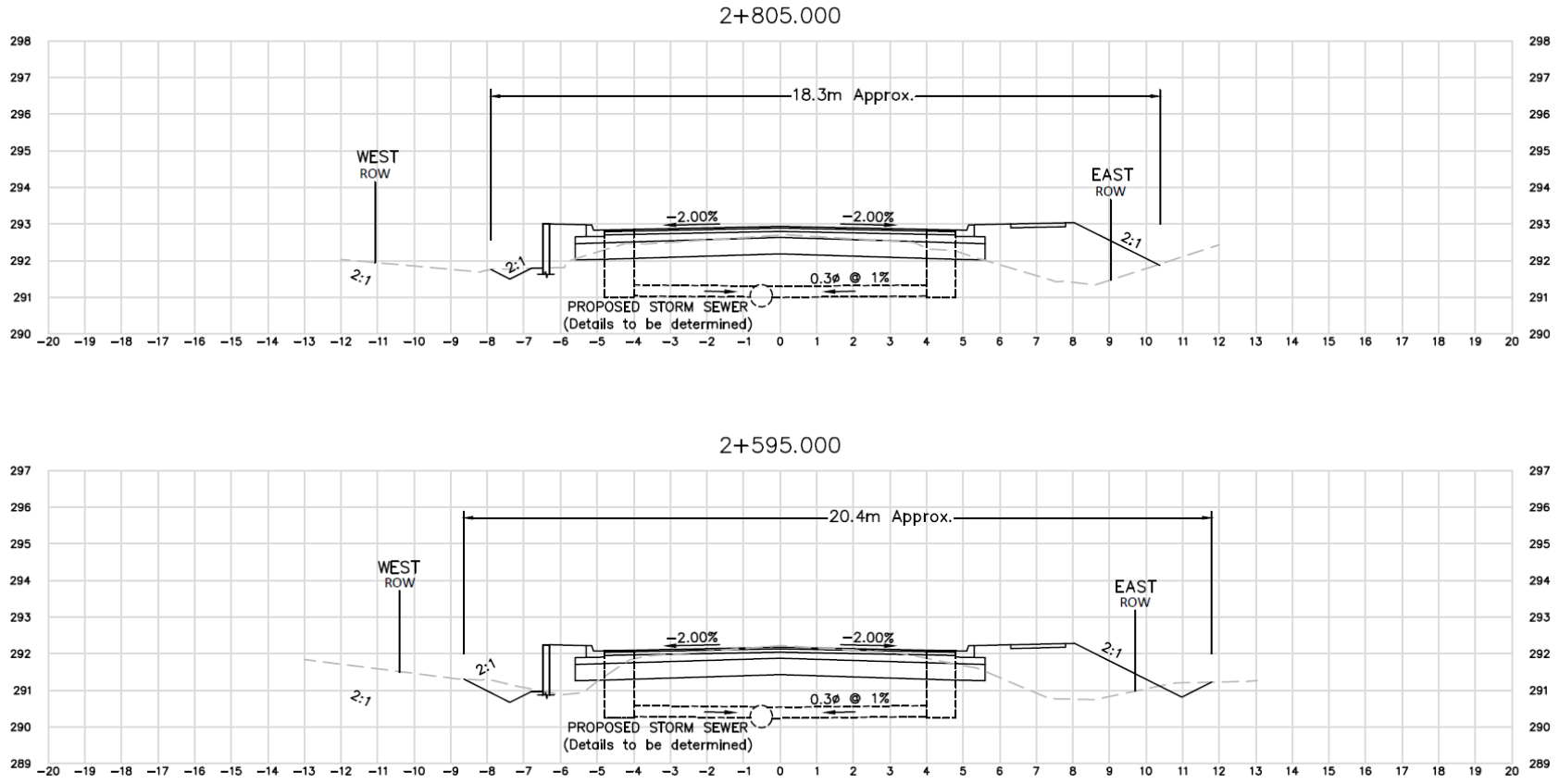


Table 5-8 Stormwater Evaluation

Component	Weighting (1-3)	OPTION 1. Do Nothing	OPTION 2. Urban Section with Flat Bottom Ditch & No Storm Sewer	OPTION 3. Urban Section With V-Ditch & Storm Sewer	OPTION 4. Urban Section with Retaining Wall, V-Ditch & Storm Sewer
Terrestrial	3	• No impact to vegetation loss or to current terrestrial ecological function	• Impact to vegetation will be approximately 9 to 11 m of current wetland system along the west side and 8 to 9 m along the east side, depending on the road alignment. • Majority of impacts will be temporary during construction to facilitate ditch construction. Vegetation will be restored.	• Impact to vegetation will be approximately 5 to 6 m of current wetland system along the west side and 5 to 7 m along the east side, depending on the road alignment. • Majority of impacts will be temporary during construction to facilitate ditch construction. Vegetation will be restored.	• Impact to vegetation will be approximately 3 to 4 m of current wetland system along the west side and 5 to 8 m along the east side, depending on the road alignment. • Majority of impacts will be temporary during construction to facilitate ditch construction. Vegetation will be restored. • Retaining wall represents new permanent piece of infrastructure (hardscape) within wetland system.
					
Aquatic	3	• No impact to fish or fish habitat. • No water quality and quantity improvement	• Improved water quality. Catch basin on east side will collect stormwater and outlet to west ditch. • The new ditch creation will be deeper than existing – approximately 1.5 to 2 m difference. • Ditch construction will temporarily impact fish and fish habitat, but it will be restored.	• Water quality improvement, as road drainage directed to storm sewer and not to ditch/fish habitat. • The new ditch will be slightly deeper than existing – approximately 0.5 m difference. • Ditch construction will temporarily impact fish and fish habitat, but it will be restored.	• Water quality improvement, as road drainage directed to storm sewer and not to ditch / fish habitat. • The new ditch will be slightly deeper than existing – approximately 0.5 m difference. • Ditch construction will temporarily impact fish and fish habitat, but it will be restored.
					

Component	Weighting (1-3)	OPTION 1. Do Nothing	OPTION 2. Urban Section with Flat Bottom Ditch & No Storm Sewer	OPTION 3. Urban Section With V-Ditch & Storm Sewer	OPTION 4. Urban Section with Retaining Wall, V-Ditch & Storm Sewer
Property	1	• No impacts to existing property	• Minor impacts on the west side • Minor impacts on the east side	• Potentially no impacts on the west side • Minor impacts on the east side	• No impacts to the existing property having retaining wall with v-ditch on the west side • Minor impacts on the east side
					
Stormwater Management	2	• No quantity control measure in place	• Enhanced grassed swales and / or bioswales for quantity and quality control • LID measures may include permeable sidewalks	• Hydrodynamic separator and / or CB shield for quality control • Underground storage under the road (oversized storm sewers or tank/modular units) for quantity control • LID measures may include perforated pipes, permeable sidewalks • V-ditch for local drainage only, limited quality control	• Hydrodynamic separator and / or CB shield for quality control • Underground storage under the road (oversized storm sewers or tank / modular units) for quantity control • LID measures may include perforated pipes, permeable sidewalks • V-ditch for local drainage only, limited quality control
					
Maintenance	2	• Low maintenance	• Lowest maintenance	• Higher maintenance due to storm sewer and stormwater management	• Highest maintenance due to storm sewer, stormwater management and retain
					

Component	Weighting (1-3)	OPTION 1. Do Nothing	OPTION 2. Urban Section with Flat Bottom Ditch & No Storm Sewer	OPTION 3. Urban Section With V-Ditch & Storm Sewer	OPTION 4. Urban Section with Retaining Wall, V-Ditch & Storm Sewer
Aesthetics	1	• No change in aesthetics	• Potential improved aesthetics due to urbanization and associated landscaping	• Potential improved aesthetics due to urbanization and associated landscaping	• Worsened aesthetics from perspective of private property due to construction of retaining wall
					
Technical	3	• No improvements	• Bioswale performance subject to water table • Multiple controls in series may be required as longitudinal slopes increase • Existing road profile is maintained to minimize impacts to adjacent property and provide adequate cover over culvert crossing	• Oversized sewers subject to grading and cover constraints • Potential use of tanks subject to local water table elevations • Existing road profile is maintained to minimize impacts to adjacent property and provide adequate cover over culvert crossing	• Oversized sewers subject to grading and cover constraints • Potential use of tanks subject to local water table elevations • Narrower overall footprint possible with retaining wall and v-ditch • Potential scour issues due to major flows overtopping retaining wall may require a separate major flow outlet from the road platform • Protective measures required for retaining wall exposed to flood elevation • Existing road profile is maintained to minimize impacts to adjacent property and provide adequate cover over culvert crossing
					

Component	Weighting (1-3)	OPTION 1. Do Nothing	OPTION 2. Urban Section with Flat Bottom Ditch & No Storm Sewer	OPTION 3. Urban Section With V-Ditch & Storm Sewer	OPTION 4. Urban Section with Retaining Wall, V-Ditch & Storm Sewer
Cost	3	• No associated cost	• Relatively low capital cost for enhanced grassed swales and bioswales • Low maintenance cost	• Relatively high cost for storm sewer, oil and grit separators, underground storage • Moderate to high maintenance cost	• Relatively high cost for storm sewer, oil and grit separators, underground storage • Significant cost for retaining wall and railing • High maintenance cost
					
Recommendation		**Least Preferred**	**Least Preferred**	**Most Preferred**	**Least Preferred**

Notes
LID – Low Impact Development

6.0 Description of Preferred Design

6.1 Major Features of the Recommended Plan

Significant features of the recommended plan include addressing traffic safety, provision of active transportation, improving drainage facilities, providing standard geometrics, minimizing impacts to environmentally sensitive areas and vegetation and maintaining existing roadway characteristics where impacts of reconstruction are too extensive. Separate geometric design criteria were developed, one for a rural and a second for an urban cross section. A lower design speed was considered for the urban section as a measure of traffic calming in the mid-section of Mountainview Road, where speeding was identified as a concern by the residents during the PIC. With the exception of Alternative #1 – Do-Nothing, all alternatives were similar in with respect to project impacts on climate change.

The recommended road design (Plan and Profile) sheets are provided in **Appendix O**. The limits of the hybrid solution, i.e. a combination of both rural and urban cross sections, are illustrated in **Figure 6-13** and **Figure 6-14** below.

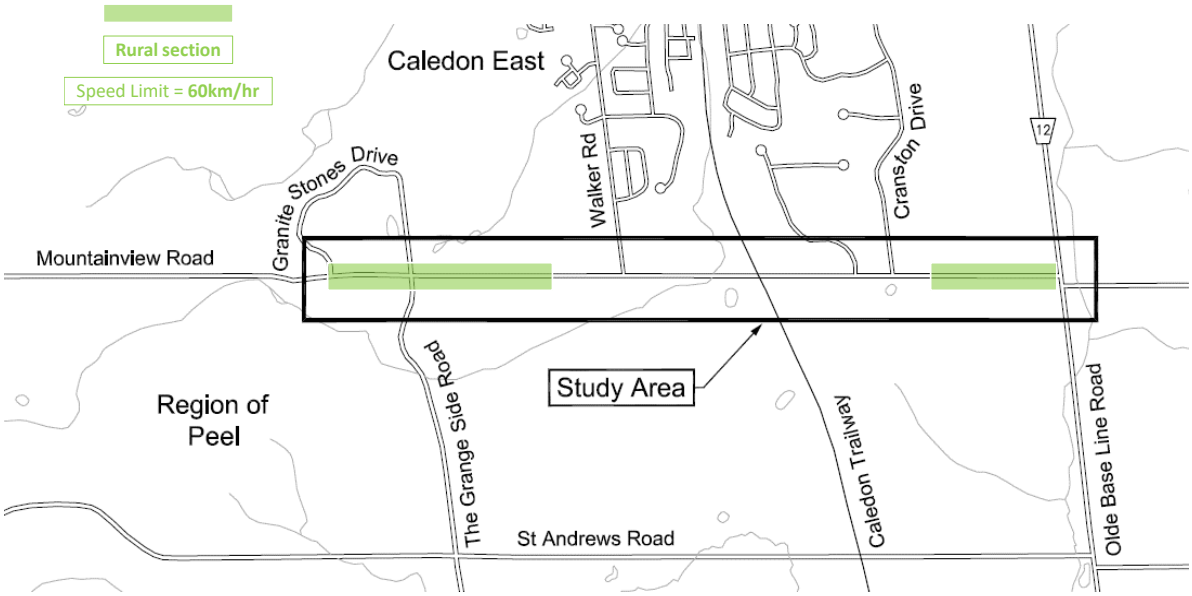


Figure 6-13 Proposed Rural Section

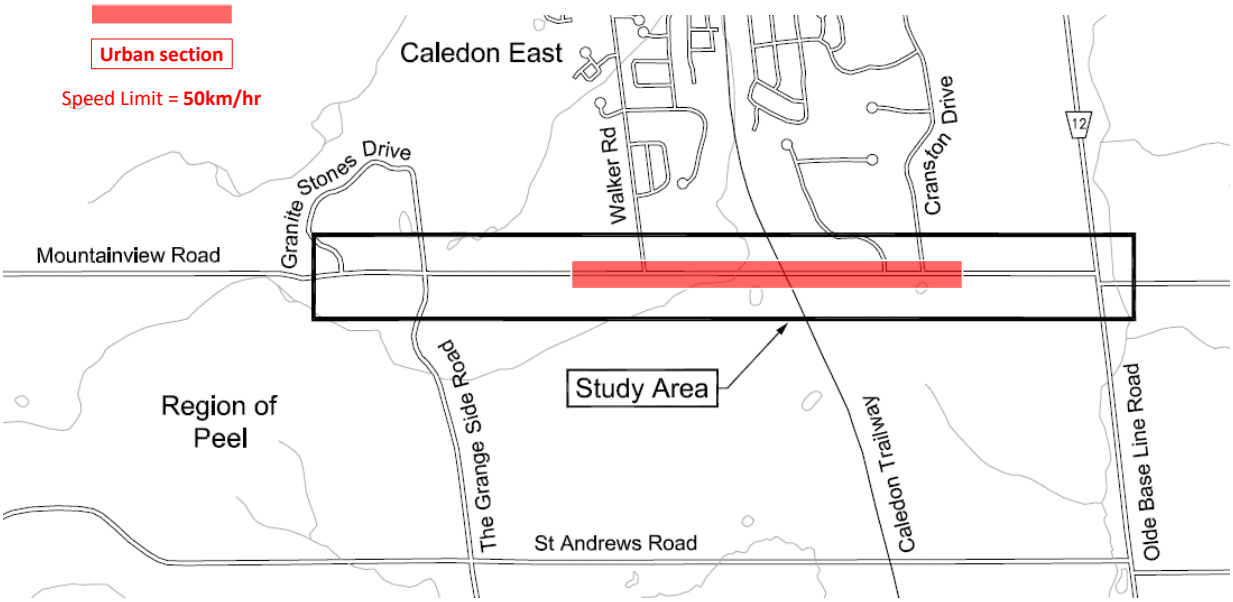


Figure 6-14 Proposed Urban Section

Active transportation infrastructure along Mountainview Road corridor was reviewed and assessed through the preliminary design phase, with the objective of providing a safe, efficient and consistent network with connectivity to existing trails throughout the study area. Active transportation infrastructure proposed in the design consists of a paved shoulder than can be used for cycling or walking. Adequate signage and / or pavement marking to alert driver of the Caledon trailway crossing will be considered as part of the detailed design stage.

6.1.1 Future Conditions Hydraulics

Under future conditions, select culvert crossings will require modification or replacement to accommodate the increase in roadway width and / or the change in roadway cross section. At a minimum, existing culverts will require an extension to accommodate the increased roadway width. That said, full replacements may be preferred as the proposed roadway works be an ideal opportunity to have replacement works completed.

As all the existing culverts, with exception to Crossing locations C4 and C5 were determined to have sufficient hydraulic capacity; it has been assumed that the crossings with sufficient capacity (under existing conditions) will be retained, extended, or replaced with similarly sized crossings. As such, preliminary sizing of a potential replacements for Crossings C4 and C5 has been advanced.

Note that the Town is in the process of assessing the potential impacts of climate change on rainfall. A number of climate change scenarios have been investigated (**Appendix R)** and are currently under review by the Town. The Town's engineering standards may ultimately be updated to reflect the impacts of climate change. In the case of roadway design, such as this project, the updated design criteria would most likely impact the generation of design flows for storm sewers and cross culverts. The preliminary

sizing in this section is based on the currently approved Town criteria. However, subject to the results of the assessment of climate change impacts, the culverts will need to be re-assessed during detailed design.

6.1.2 Design Criteria

The proposed design criteria for the rural section of Mountainview Road was based on a design speed of 70 km/h and is shown in **Table 6-9.** The design criteria for the urban cross section, based on design speed of 60 km/hr., is shown in **Table 6-10.**

Table 6-9 Design Criteria (Rural)

	Present Conditions	Design Standards	Actual Proposed
Highway Classification	RCU70	RCU70	RCU70
Number of Lanes	2	N/A	2
Posted Speed (km/h)	60	60	60
Design Speed (km/h)	70	70	70
Minimum Stopping Sight Distance (m)	55	105	105
Minimum 'K' Factor	Crest – 5 Sag – 5	Crest – 17[1] Sag – 23[2]	Crest – 17 Sag – 23
Grades Maximum	10%	5.0% - 8.0%	8%
Minimum Radius (m)	N/A	250	340
Lane Width – through (m)	3.70	3.3[3]	3.3
Shoulder Width (m)	Varies	1.5	1.5 (Paved)
ROW Width	20 – 26	N/A	20 – 26

Notes: A light single-unit truck (LSU) is the design vehicle of choice for Mountainview Road.

[1] TAC Table 3.3.2: K Factors to Provide Stopping Sight Distance on Crest Vertical Curves

[2] TAC Table 3.3.4: K Factors to Provide Stopping Sight Distance on Sag Vertical Curves

[3] TAC Table 4.2.1: Through Lane Widths – Rural Roadways (Design Hour Directional Volume <=450)

Table 6-10 Design Criteria (Urban)

	Present conditions	Design standards	Proposed Standards
Highway Classification	RCU70	UCU60	UCU60
Number of Through Lanes	2	N/A	2
Design Speed (Km/h)	70	60	60
Posted Speed (Km/h)	60	50	50
Minimum Stopping Sight Distance (m)	55	85	85
Minimum 'K' Factor	Crest – 5 Sag – 5	Crest – 11 Sag – 18	Crest – 11 Sag – 18
Grades Maximum	10%	5.0% – 8.0%	8%
Minimum Radius (m)	N/A	250	340
Lane Width – Through (m)	3.70	3.0[1]	3.0
Shoulder Width (m)	Varies	1.5	1.8 (Paved)
Sidewalk (m)	N/A	1.5	1.5
ROW Width (m)	20 – 26	N/A	20 – 26

Note:

[1] TAC Table 4.2.3: Through Lane Widths – Urban Roadways

6.1.3 Horizontal Alignment

The existing road centerline was determined to minimize impacts and will generally be maintained.

6.1.4 Vertical Alignment

The vertical alignment was set based on the proposed geometric design standards outlined in the design criteria above, except north of Grange Side Road where resurfacing is recommended. The roadway. The vertical profile has also been set to match constraints including intersecting sideroads and entrances.

6.1.5 Typical Cross Section

The recommended typical cross sections within Rural and Urban sections are illustrated below in Figure **6-15** and **Figure 6-16**:

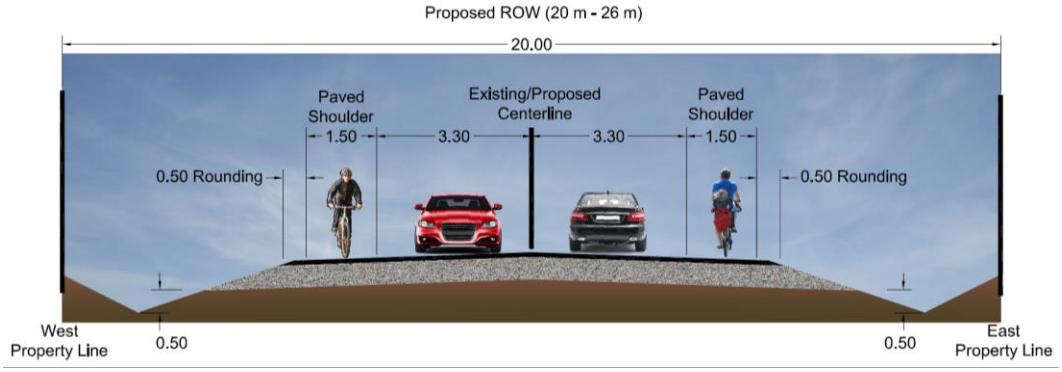


Figure 6-15 Typical Rural Cross Section

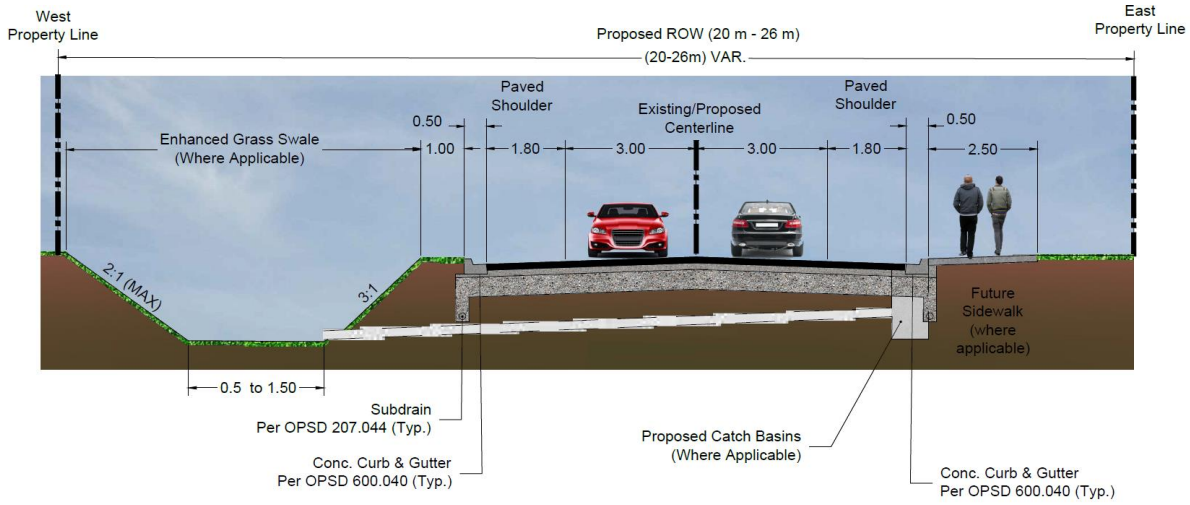


Figure 6-16 Typical Urban Cross Section with enhanced grass swale

The urban cross section may include provision of a 2.5 m multiuse path on the east side adjacent to concrete curb and gutter. This change will not affect the overall width of the roadway platform. A decision will be made later during detailed design.

Based on the evaluation of stormwater management options outlined in **Table 5-8**, it is recommended to provide V-Ditch in combination of storm sewer adjacent to wetlands located south of Walkers Road as shown in **Figure 6-17**.

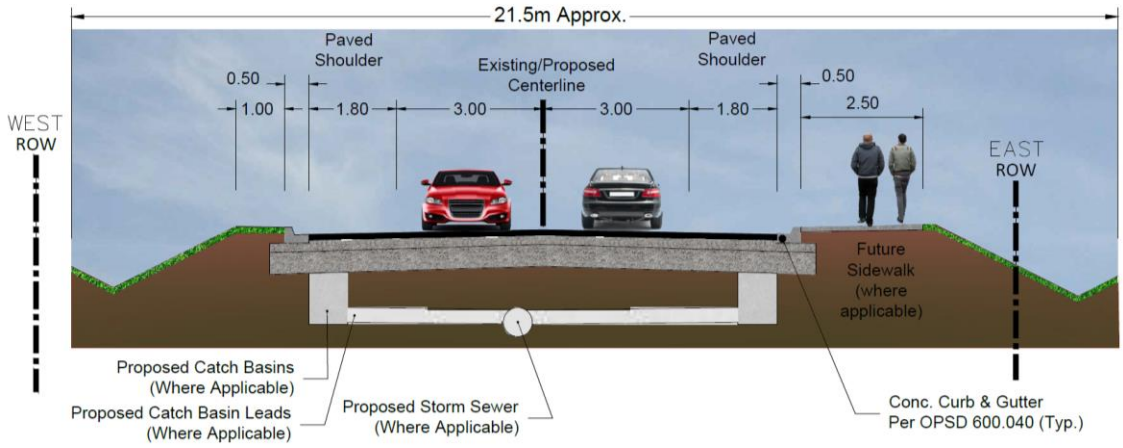


Figure 6-17 Typical Urban Cross Section with V-Ditch and Storm Sewer

During detailed design, cross-sections will be provided showing the alignment in adequate intervals and at critical locations. The designs and the site plan along the alignment will also include the extent of proposed grading with respect to the existing ground and will also show the existing locations of the slopes / banks.

6.1.6 Property Requirements

Preliminary property requirements (purchase of private property adjacent to the existing ROW) were determined based on the preliminary grading plan, including flat bottom ditches required for stormwater management, as summarized below in

Table 6-11. This is included for information purpose only, where final details may get revised and will be outlined during detailed design of the assignment.

Table 6-11 Preliminary Property Requirements

#	Plot/Address	Preliminary Design Sheet	Property Required (m^2)
WEST SIDE			
1	5370 Olde Base Line Road	1, 2	220
2	15566 Mountainview Road	2	19
3	Unknown Property (Station 1+600, west side of Mountainview Road)	2	23
4	15600 Mountainview Road	2	34
5	15634 Mountainview Road	2, 3	55
6	15654 Mountainview Road	3	43
7	15698 Mountainview Road	3	29
8	15770 Mountainview Road	3, 4	645
9	15848 Mountainview Road	4, 5	565
10	Unknown Property (Station 2+900 to 3+060 , west side of Mountainview Road)	6	17
11	16062 Mountainview Road	6, 7	736
12	Unknown Property (Station 3+520 to 3+990 , west side of Mountainview Road)	8, 9	510
EAST SIDE			
13	5570 Olde Base Line Road	1, 2	695
14	Unknown Property (Station 1+460 to 1+680, east side of Mountanview Road)	2	381
15	10 Damascus Drive	4	21
16	15865 Mountainview Road	5	207
17	Unknown Property (Station 2+695 to 2+705, east side of Mountanview Road)	5	13
18	15993 Mountainview Road	5, 6	331
19	16009 Mountainview Road	6	73
20	Unknown Property (Station 2+950 to 3+050, east side of Mountanview Road)	6	190
21	286 Walker Road W	6	45
22	89 Walker Road W	8	5
23	16331 Mountainview Road	8, 9	568
24	16357 Mountainview Road	9	169
Total Property Required			**5594**

6.1.7 Utilities

The existing utilities are identified on the preliminary design drawings. It is anticipated that the overhead hydro lines along the roadway will require relocation. Accurate determination of the location and need for relocation of underground utilities will be determined during detailed design. Any impacts to adjacent natural features due to relocation will be determined at that time.

6.1.8 Agency Approvals

Agency approvals are required before construction can begin. Approval requirements are summarized in **Table 6-12**.

Table 6-12 Required Agency Approvals/ Permitting Requirements

Agency	Approval / Permit Required	Comments
Required Permits		
Department of Fisheries and Oceans	Fisheries Act	Request for Review
Ministry of Natural Resources and Forestry	License to Collect Fish for Scientific Purposes	Required if a cofferdam is used during the replacement of Centreville Creek
Toronto Region Conservation Authority	Permit under O. Reg. 166/06	Required to construct in areas within regulated limit
Town of Caledon	Woodlands By-law 2000-100	Required for the removal of trees during construction.
Potentially Required (To be determined in the Detailed Design Stage)		
Ministry of the Environment, Conservation and Parks	Environmental Activity and Sector Registry (EASR) – Self Registration of Water Taking Activity	For road construction and construction site dewatering.
Niagara Escarpment Commission (NEC)	Ontario Regulation 828/90	To be determined. NEC has confirmed that the Project is exempt pending NEC's final review of all construction drawings north of the Grange Sideroad. Required to construct in NEC regulated area.

6.2 Environmental Issues and Commitments

6.2.1 Terrestrial Resources

The proposed improvements are expected to have minimal long-term impact on the natural environment due to the current existing ROW and traffic in the area; however, there is potential for direct and indirect effects on the terrestrial environment during construction activities. These impacts may be associated with disturbance to significant natural features (i.e., woodlands, wetlands, and wildlife habitat) and flora and fauna populations. The potential impacts within the Project study area may include:

- Some potential for loss of natural and cultural vegetation along existing road ROW.
- Potential for disturbance, damage, or harm to wildlife species protected under the *Migratory Birds Convention Act* (MBCA), the *Fish and Wildlife Conservation Act* (FWCA), and / or the *Endangered Species Act* (ESA) during construction activities.
- Potential increased noise and light disturbance to wildlife adjacent to the ROW during construction activities, as future traffic volumes on the roadway would not increase significantly from current volumes.
- Potential for temporary increased dust generation and deposition on vegetation resulting in effects on photosynthesis, respiration, and transpiration during construction activities.

- Potential increase in invasive species colonization within disturbed areas.
- Temporary increase in human presence during construction activities in the vicinity of potential bat maternal roost sites may cause females to drop young for their protection or abandon young altogether if stressed.
- Temporary increased risk of road mortality on birds, turtles, and amphibian associated with construction vehicles.
- Potential encroachment of the road ROW into streams or wetlands in the study area that may support turtle overwintering areas.
- Potential loss of amphibian breeding habitat adjacent to the ROW. Impacts may also include increased risk of sedimentation during construction activities which may also impact the composition of pond substrate.
- Potential Project encroachment on wetland features resulting in impacts to wetland hydrology (such as discharge and recharge potential) adjacent to the ROW.
- Loss of marginal habitat associated with raptor wintering activities adjacent to the ROW. May result in decreased roosting areas, foraging perches and prey populations along the roadside edges.
- Loss and disturbance to potential bat maternity colonies through destruction and / or noise disturbance in forested habitats / treed areas within and adjacent to the ROW.
- Potential impacts to deer movement corridors through potential loss of tree cover.
- Potential for direct loss of habitat for species of conservation concern. The footprint of the road along with associated shoulders, banks, and ditches will result in loss of habitat. Indirect loss of habitat may occur through changes in hydrology, introduction of non-native plant species, introduction of sediments and other contaminants, and salt spray and runoff.
- Increased sediment runoff associated with road construction and maintenance activities may introduce sediment or other deleterious materials to nearby waterbodies, thereby leading to contaminants entering waterbodies which may reduce their viability in providing overwintering habitat to turtle species and waterfowl nesting habitat.

Recommended design consideration and general mitigation measures are as follows:

- All materials and equipment shall be operated and stored in such a manner that prevents any deleterious substance from entering the water and drainage ditches.
- Apply standard sediment and erosion control measures (e.g., silt fence, silt curtain, sedimentation basins) consistent with Ontario Provincial Standards and Specifications (OPSS). The control measures shall be implemented prior to work and be maintained during construction and until disturbed areas have been effectively stabilized.
- Minimizing dust production to the extent practical by implementing dust suppression methods and thereby minimizing the zone of influence. Primary dust suppression methods can include road

watering in cases where watering will not promote entry of chemicals in to nearby wetlands or waterways.

- Prevent introduction of new invasive species by washing down equipment prior to transporting to site and limiting travel of equipment and vehicles to and from the study area.
- All disturbed areas of the work site shall be stabilized and re-vegetated promptly, and / or treated with appropriate erosion protection materials.
- Disturbance and removal of existing trees and vegetation will be minimized where possible and confined to the footprint of the Project.
- Sufficient culverts should be installed under the road to ensure that lateral drainage is not impeded. Where possible, roadside ditches should never be designed so that they remove water from the wetland and cause localized drying.
- A compensation strategy for encroachment and plantings, as well as a woody vegetation replacement to offset the loss of carbon sequestration function will be negotiated with TRCA during detailed design.
- The Mortality Study provided by the TRCA has been reviewed and will be considered in determining the wildlife crossing structure requirements during the detailed design stage.
- Restoration and landscaping plans will be completed during detailed design and will consider the use of only common native species in restoration plans, particularly in areas near natural features and species that support wildlife in areas within / adjacent to wildlife habitat. CVC Plant Selection Guideline (CVC 2018) and the Region of Peel Streetscaping Toolbox will be reviewed.
- Vertical facings suitable for nesting by bird species (i.e., soil piles, excavation areas) should be covered using tarps, or plastic sheets, or any other means of preventing nesting within the construction zone. Such barriers should be installed prior to April 1 and shall remain in place until August 30, or until the completion of rehabilitation works. Alternatively, vertical facings should be maintained daily at a 45° angle to deter nesting.
- Where feasible, works will be conducted during daylight hours, unless otherwise necessary, to avoid potential effects of artificial night lighting on crepuscular and nocturnal species.
- Minimize sources of unnecessary noise or encroachment of worker activities into nearby habitats in order to limit the extent of the project zone of influence when possible.
- All heavy equipment and tools used on-site shall be maintained in good working condition.
- Construction personnel shall avoid idling of vehicles when not necessary for construction activities.
- Equipment and vehicles shall be turned off when not in use unless required for construction activities and/or effective operation.
- Additional surveys may be required at the direction of the MNRF during detailed design to identify potential impacts to SAR, SAR habitat or significant wildlife habitat potentially posed by the works.

- The MNRF will be consulted to gain further direction relative to any technical and process requirements under ESA, and to obtain guidance on any additional mitigation measures that may be required during construction and operation phases of the Project.

For further detail, the Terrestrial Report can be found in **Appendix H**.

6.2.2 Aquatic Resources

As previously mentioned, Centreville Creek, a cold-water regime, crosses the study area and the tributaries come within close vicinity several times. The appropriate mitigation measure for a cold-water thermal regime is to only conduct work during appropriate timing windows in order to protect cold water fish species.

Specific mitigation measures have been developed to minimize and / or avoid significant short-term and long-term adverse environmental effects on fish and fish habitat. Principal mitigation measures for construction activities in or near the watercourses include:

- Prior to commencement of works, design and implement standard Erosion and Sediment Control (ESC) measures, consistent with OPSS and maintained ESC measures through all phases of the Project until vegetation is re-established, all disturbed ground is permanently stabilized. The ESC measures should be installed and meet the following requirements:
  - All ESC measures should be inspected at least weekly and during and immediately following rainfall events to ensure that they are functioning properly and are maintained and / or upgraded as required. If the sediment and erosion control measures are not functioning properly, no further work would occur until the sediment and/or erosion problem is addressed.
  - The ESC silt fencing should be installed around the Project footprint, allowing vehicle and construction staff access to the Project footprint only at designated areas.
- Watercourses will be accurately surveyed at the detailed design stage to ensure culvert extensions and replacements appropriately tie into the upstream and downstream ends of the watercourses. Sizing may need to be modified based on the results.
- Where appropriate, crossing structures will be designed for fish passage using natural channel design and will be addressed in detailed design;
- A site visit will be arranged during the detailed design stage in order to confirm TRCA regulated mapping, to accommodate the watercourses running parallel to the new road profile and to observe water ponding condition post removal of the beaver dam.
- Road profiles adjacent to environmental features such as wetlands and watercourses will be maintained as close to the existing grade as possible to avoid grading impacts.
- CVC will be consulted during detailed design for staking watershed boundary as a significant woodland area is found with the ROW and is within the management jurisdiction of CVC.
- Additional ESC measures relative to mitigating impacts of the aquatic ecosystem include:

  - Soil sediment and other impurities must be prevented from entering watercourses.
  - Stockpiles and embankments are to be protected whenever there is potential for soil erosion to impact watercourses.

- All materials and equipment used during construction will be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering any drainage feature:
  - Any stockpiled materials will be stored and stabilized at least 30 m away from watercourses.
  - Refueling and maintenance of construction equipment will occur a minimum of 100 m from any drainage feature.
  - Any part of equipment entering the water would be free of fluid leaks and externally cleaned / degreased to prevent any deleterious substance from entering the water.
  - Only clean material, free of fine particulate matter would be placed in the water.
- A protocol to minimize spills / leaks and their impact to the environment should be provided in an Emergency Response Plan. Routine inspection of the Project construction site should be conducted to ensure continued use and function of best management practices, mitigation measures and spill control and prevention measures. As appropriate, spills will be reported to the MECP Spills Action Centre.
- The watercourse bed and bank areas should be rehabilitated to pre-construction condition.
- Materials such as sand bags, straw bales, geotextile filters, and / or pumps should be readily available on-site in case of unexpected stream flow during construction activities.
- An Environmental Monitor (or designate) should be on-site during construction of watercourse crossings to ensure compliance with specifications and site plans. In particular, the Construction Contractor should ensure that pre-construction preparation is completed prior to commencement of in-stream work and that bank, bed, and floodplain conditions are restored to pre-construction conditions following completion of any construction activities.
- Staging of the Project will limit vegetation disturbance and minimize the amount of time disturbed soil is exposed.
- Temporarily store, handle and dispose of all materials used or generated (e.g., organics, soils, construction waste and debris, etc.) during site preparation, construction, and clean-up in a manner that prevents their entry into any drainage feature:
  - Store and stockpile materials a safe distance from any drainage feature and ensure they are stabilized / contained as necessary;
- Concrete wash water must never be released into a watercourse, catch basin, ditch, or any other part of a land drainage system. Mitigation measures should include:

  - Wash-out facilities will be available on site, with waterproof lining to prevent soil and groundwater contamination. These wash-out facilities will be situated away from watercourses or drains.

  - Liquid and solid concrete waste is disposed of lawfully using licensed haulers and licensed receiving facilities.

- Land drainage systems, whether naturally occurring or man-made are not to be used as receptors for any substance or material other than clean water complying with local municipal bylaws or storm water as intended.

Additional mitigation measures will be required in order to temporarily isolate the work area. The following mitigation measures will be implemented to conduct work "in the dry":

- Cofferdams (e.g., aqua-dams, sand bags, concrete blocks, steel or wood wall, clean riprap, sheet pile or other appropriate designs) can be used to separate the in-water work site from the watercourse.

- If riprap or sand bags are used, clean, washed material should be used to build the berm. The berm face would consist of clean, washed granular material that is adequately sized (i.e., moderate sized rip rap and not sand or gravel) to hold the berm in place during construction. Material to build the berms would not be taken from below the high-water mark.

- Cofferdams should be designed to accommodate any expected high flows of the watercourse during the construction period.

- Before starting construction, fish should be salvaged from within the cofferdam and returned to an area immediately upstream of the isolated area. Salvage operations must consist of techniques that successfully target the species and size classes of fish that inhabit the watercourse reach. A fish rescue permit from MNRF will be required for this activity.

- Accumulated sediment should be removed (ensuring that the original bed of the watercourse is not excavated) from behind the cofferdam before its removal.

- The original channel bottom gradient and substrate should be restored after cofferdam removal.

- Dewatering will include filtration socks and rings, filter pads, fish trash racks to prevent entrainment. All dewatering will be dispersed to a sediment basin or filtration bag located within a well-vegetated area at least 30 m from any watercourse, wetland or forest edge (as required by TRCA).

- Cofferdams should be removed in a downstream to upstream sequence to allow gradual re-introduction of water to the dewatered area and prevent excessive suspension of silt or other bed material.

- Pump intakes should be sized and adequately screened to prevent debris blockage and fish mortality (refer to the Department of Fisheries and Oceans (DFO) Freshwater Intake End-of-Pipe Fish Screen Guidelines). The pumping system should be sized to accommodate any expected high flows of the watercourses during the construction period. Back-up pumps should be kept on site in case of pump failure. The pump should be discharged to a vegetated area at least 30 m from the watercourses to allow water to re-enter the watercourse only after it has been filtered through vegetation to prevent

silt deposition. If no suitable areas exist, a filter bag should be place on the outlet to filter the water prior to re-entry into the watercourses.

- The contractor will not be permitted to work within the existing watercourse until all water has been diverted around the cofferdam area.

- Grading and bank stabilization via seeding and shrub plantings following project works will lead to greater bank stability which should decrease erosion and resulting sedimentation.

Follow-up with MNRF and TRCA will be conducted during the detailed design stage of the project. At that time, additional project work details will be discussed. The necessary measures needed to protect aquatic species and their habitat will also be discussed at that time.

For further detail, the Aquatic Report can be found in **Appendix I.**

6.2.3 Contaminated Material

The potential for significant environmental impacts due to contamination at the study area is considered to be low as based on ERIS reporting, potential USTs are likely located outside the footprint of the project. Should stained soils or soils with odour are encountered during construction, further investigation is recommended in order to ascertain the quality of the soil and groundwater beneath the study area. In addition, to address potential operational / management issues, the recommendation is to undertake a comprehensive asbestos survey, in order to comply with Ontario Regulation 278/05 and Ontario Regulation 279/05. ACM may be present in the road materials and sewer pipes used within the study area. In addition, if ACM is present, an Asbestos Management Plan will be required for any confirmed friable ACM which is not abated or has not been tested to be deemed non-asbestos.

For further detail, the Contamination Overview Study can be found in **Appendix J**.

6.2.4 Stormwater Management

The overall road profile of Mountainview Road has been proposed to be generally maintained as per the existing conditions, which means the future conditions stormwater drainage area for the major outlets will be maintained almost the same as the existing conditions. The minor increase in imperviousness in the ROW will require quantity and quality stormwater management controls.

Based on the preliminary design, no watercourse realignments are proposed, nor are any additional crossings proposed. The preliminary design is to replace or extend the existing crossings, with the limited extension not requiring any significant modifications to the existing watercourses.

Preliminary sizing for a replacement structure / culvert for Crossing C5 has been advanced and suggests that a 2.4 m span by 1.2 m rise box culvert would be hydraulically suitable and would match the existing culverts' inverts. This would provide suitable hydraulic capacity and would achieve the MTO and MNRF design objectives as well as accommodate the upstream watercourse with as nominal a transition as possible. The TRCA Crossing Guidelines will be followed to appropriately size the watercourse crossing during detailed design. Beaver damming activities were identified upstream of Culvert C5 and subsequently have been removed by the Town. A site visit was arranged with TRCA and Town's Staff to observe water ponding conditions post removal of the beaver dam and no water ponding was observed.

The study area was previously identified as being sensitive to erosion. Erosion protection and sizing will be provided at the detailed design stage, including details of connections to the existing ditches, culverts, and watercourses and opportunities to improve water quality and reduce runoff. Future developments were recommended to reduce total runoff volume to existing levels, which may not be feasible within the ROW due to the limited area available and the possible presence of a high ground water table. However, grassed swales designed with a trapezoidal geometry and flat longitudinal profiles with largely un-maintained turf can provide excellent filtration and treatment for storm runoff from roadways and is being proposed for Mountainview Road. Based on the proposed Mountainview Road ultimate urbanized road ROW, enhanced grassed swales within the ROW and outside of regulated watercourses and wetlands are considered a feasible alternative, and hence have been carried forward for further consideration. There was an instance of a swale receiving temporary flow as a result of the beaver activity. The dam has been removed and the watercourse now flows in the historic alignment, perpendicular to the road. This roadside ditch upstream and south of the main crossing is not considered to be regulated.

The swale design north and south of the identified watercourse / wetland are proposed to have 0.5m flat bottoms and be used for stormwater management. The proposed roadside swales adjacent to wetlands will be designed as V-Ditch in combination with storm sewer in order to minimize footprint and potential impact to the wetlands. The final preferred plan for stormwater control will be determined during the detailed design stage.

6.2.5 Traffic and Access

Based on the traffic assessment, no road widening is required. All accesses to adjacent properties and intersecting sideroads will be maintained.

6.2.6 Stage 1 and 2 Archaeological Assessment

The Stage 1 Archaeological Assessment recommended that a Stage 2 Archaeological Assessment be completed. The Stage 2 investigations revealed that approximately 0.1 ha or 0.7% of the study area has archaeological potential. However, due to the low impact, the Stage 2 investigation confirms that no further archaeological assessments will be required.

The recommendation is subject to Ministry of Tourism, Culture and Sport (MTCS) review. However, no grading or other activities that may result in the destruction or disturbance of the study area is permitted until notice of MTCS approval has been received.

For further detail, the Stage 1 and 2 Archeological Assessment can be found in **Appendix L and M.**

6.2.7 Geotechnical Investigation

After reviewing the field data and laboratory test results, the minimum pavement structural design for Mountainview Road is presented in

Table 6-13 and was determined in accordance with the 1993 American Association of State Highway and Transportation Officials ('AASHTO') Guide for the Design of Pavement Structures using the Darwin Software Program.

Table 6-13 Summary Recommended Minimum Structural Pavement Design for Reconstruction

Material Description	AASHTO'93 Darwin Analysis For 20 years	Town of Caledon Minimum Roadway Design Standards 20 years
Hot Mix Asphalt Concrete HL 3 (HS), HL 8	**HMA = 135 mm** HL 3 = 40 mm HL 8 = 45+50 mm	**HMA = 130 mm** HL 3 = 40 mm HL 8 = 90 mm
Granular Base 'A'	150 mm	150 mm
Granular Subbase 'B' Type II	300 mm adjusted to 450 mm (1)	450 mm
Design Structure Number (DSN) mm	SN = 119 mm	n/a
Selected Structure Number (SSN) mm	SN > DSN (ok).	n/a
Total Pavement Thickness (mm)	**735 mm**	**730 mm**

Note:
(1) Granular B thickness should be increased to 450 mm to comply with the Town minimum roadway Design Standards.

The AASHTO pavement design structural thickness was compared to the Town of Caledon minimum roadway standards. It is recommended that the AASHTO pavement design to be adopted since it is tailored to the site specifics regarding traffic loading and field conditions. However, the granular thickness in the design was increased to 450 mm to comply with the Town of Caledon minimum Roadway Design Standards.

The following geotechnical investigations will be conducted during detailed design:

- Investigation of proposed road improvements in order to assess the ground condition along the preferred road alignment and to provide the geotechnical design recommendations.
- Slope stability and erosion hazard assessment will be conducted to ensure that the proposed road improvements are not undermined by erosion hazard in the long-term or does not destabilize valleys.
- Slope stability assessments will account for heavy machinery / equipment loads and vibrations.
- The position of the Long-Term Stable Top of Slope with a minimum safety factor of 1.50 to define the setback will be required from the existing top of bank / slope.
- Construction methodology, sequencing, slope stability assessment and cross-sections (cuts and fills) will be undertaken in areas where the work is in proximity of the steep slope and valleys and / or the work requires construction access into the steep slopes and valleys to ensure that the surrounding ground / slope is not adversely impacted during construction.

All engineering drawings for the retaining walls, abutments and wing walls, culverts, crossings, stabilization works, embankments and cuts will be prepared showing all necessary details and specifications.

For further details, the Geotechnical Investigation Report can be found in **Appendix N.**

6.2.7.1 Pavement Rehabilitation Strategy

The existing pavement condition is rated poor to very poor. In order to minimize impacts to adjacent properties and vegetation, partial depth rehabilitation / resurfacing will be implemented along Mountainview Road between Grange Side Road and Granite Stones Drive from Sta. (4+140) to Sta. (4+560).

Two rehabilitation strategies were considered and proposed based on Wood's geotechnical / pavement investigation and analysis.

For further details, the Geotechnical Investigation Report can be found in **Appendix N**.

6.2.8 Noise

The improvements to Mountainview Road will not include an increase in the number of lanes or changes to the alignment. Therefore, the predicted increase in traffic noise levels on completion of the project, when compared to the do-nothing scenario, were determined to be negligible.

For further details, a Noise Impact Memo can be found in **Appendix P**.

6.2.9 Groundwater

The proposed improvement activities consist primarily of reconstructing and repaving areas within the existing ROW as well as the replacement of two culverts at creek crossings and the installation of underground utilities under the road. The proposed improvements are not expected to have a significant impact on the current groundwater regime. An expansion of the current paved area will likely increase the runoff to the ditches existing paved areas, where in good condition, do not allow for groundwater recharge and allow for runoff to the ditches and ultimately the surface water features bordering Mountainview Road.

The planned improvements may result in a temporary impact to the local groundwater system due to drawdown from dewatering operations during construction. These impacts are expected to be of relatively short duration and will cease once the dewatering ceases as they will only operate while the construction is being completed. With an increase in paved surface area, it is expected that there will be a marginal increase in the use of road salt which can impact the local groundwater quality. Implementing measures that would reduce the amount of road salt application would help to mitigate this impact. Additionally, compensation will be required for any well owners that have wells located within the footprint of the private property being purchased for the construction.

The proposed improvements generally include localized temporary excavations where dewatering is likely to be required but release of collected water downstream and downgradient of the excavation area will allow for the water to remain in the watershed and to infiltrate back into the groundwater system or ultimately enter the local surface water features. With the expected short duration of the excavations and the release of the collected water back in the nearby watershed, no significant or lasting impacts are expected to the local groundwater system.

Impacts to the surface water features where the culverts may be replaced are not expected to have more than temporary impacts, as the potential for diversions and dewatering effort to complete the construction is expected to be short-term. Some measures to consider to minimize impacts include

completing the construction during periods of lower flows and groundwater levels (such as during the summer or winter months), as well as ensuring that water being removed or pumped is returned downstream at a similar temperature and of a similar visible quality to minimize impacts to the cold-water system and to minimize the potential for suspended solids to enter the surface water system.

Based on comments received from the Region of Peel, MECP and TRCA, additional hydrogeological monitoring will be occurring during detailed design. The following additional monitoring will be undertaken:

- Reinstall pressure transducers in two monitoring wells to continue groundwater monitoring through to the start of construction. It is expected that the monitoring wells will not be able to be retained during the construction stage, so monitoring will not be able to continue in these wells during and post-construction. The pressure transducers will be set to read at a frequency of 2 hours and will be removed prior to construction.

- Continue groundwater monitoring until the start of construction with site visits conducted on a quarterly basis to download the pressure transducers and collect manual groundwater levels. The data will be incorporated into hydrographs.

- Complete a pre-construction private well survey along the length of the planned improvements within a 500 m radius. The private well survey will collect information on the presence and use of wells located and establish those well owners willing to participate in the private well monitoring program prior to, during, and following construction.

- Collect site specific information in order to obtain a Permit to Take Water (PTTW) for the purposes of completing a Category 3 Hydrogeological Assessment / construction dewatering EASR.

- Collect water levels in domestic wells prior to, during and following construction.

- Collect a groundwater sample for comparison to Provincial Water Quality Objectives (PWQO) to establish background water quality.

For further details, the Hydrogeological Desktop Investigation can be found in **Appendix Q.** A hydrogeological field investigation is currently in progress. The hydrogeological field investigation will include hydraulic conductivity testing, a surface water/groundwater interaction assessment, and a seep assessment.

6.2.10 Source Water Protection

Based on the Source Protection Plan for the CTC Source Protection Region and the Approved Updated Assessment Report: Toronto and Region Source Protection Area, a short segment of the Mountainview Road study area (approximately 235 m south of Granite Stones Drive) lies within the Significant Groundwater Quality Threat Area and the Wellhead Protection Area (WHPA-C) for the Caledon East Well No. 4. The WHPA Vulnerability Score in the study area is 8. The study area is also within a Significant Groundwater Recharge Area and overlies a Highly Vulnerable Aquifer. Given the proposed extent of construction within the WHPA summarized in Section 6.2.9 the construction of the project will not pose a risk to drinking water due to limited excavation and dewatering. Post construction, it is anticipated that road salt usage on Mountainview Road will remain at similar levels as the two current travel lanes will be maintained. Discussions with TRCA indicate that policies SAL 10 and SAL 11 of the Source Protection Plan

are applicable to the project. These policies encourage the Town to implement a salt management plan including the adoption of best management practices and the reduction in use of salt in order to the protect groundwater quality. The Region of Peel's Source Water Protection office has reviewed the project in relation to Caledon East Well No. 4 and their comments have been addressed in the final ESR. Their comments can be found in **Appendix B**.

6.2.11 Climate Change

6.2.11.1 Project Impact on Climate Change

Wood reviewed the potential for impact on the atmosphere through the emissions of greenhouse gases and the impact of the project on changes to the landscape which could alter the ecosystem's ability to remove carbon dioxide from the atmosphere.

Mountainview Road traffic volumes are projected to increase slightly from existing volume over the planning horizon (see Section 3.5.5), however traffic volumes will increase regardless of whether this Project is built. The improvements proposed to Mountainview Road does not include addressing any traffic capacity issue, which identifies that the Project will not results in an increase in greenhouse gases. The project will result in the temporary loss of local carbon sinks, primarily woodlot, however, it is expected that the loss of woodlot will be offset through compensatory planting to be negotiated with TRCA in the detailed design stage.

6.2.11.2 Impacts of Climate Change on the Project

The analysis to determine the impact of climate change on the project has focused on the 25-year rainfall return amount for the period of 6-hour and 12-hour duration events. The focus of this climate change review is on the sizing of culverts to address higher flows resulting from climate change. The future timeframes for this analysis have been identified as 2050 and 2080. The results demonstrate that rainfall estimates are generally higher for the Mountainview Road specific location in comparison with estimates for the Guelph Turfgrass CS station location. **Table 6-14** provides a summary of the projected rainfall estimates.

The following recommendations stem from the foregoing assessment of climate change influenced rainfall:

1. It is recommended that the project maintain reliance on the Gumbel based estimates for assessment and design, given the direction adopted by Environment and Climate Change Canada (ECCC) and the differences between the Gumbel and Generalized Extreme Value (GEV) based estimates.

2. It is recommended that the project consider using rainfall estimates based on a GEV approach for design stress testing purposes.

3. It is recommended that the client be consulted to determine the appropriate rainfall scenario to use for detailed design of drainage works associated with the roadway.

Further details regarding the Climate Change Review, can be found in **Appendix R – Climate Change Review**.

Table 6-14 Summary of Projected Rainfall Estimates

Tool	Location	25 Year Return Period Rainfall Estimates (mm)					
		Today		2050		2080	
		6 hour	12 hour	6 hour	12 hour	6 hour	12 hour
Town of Caledon Standards	*Municipality*	*74.9*	*80.0*				
ECCC	*Guelph Turfgrass CS*	*62.3 (Gumbel)*	*72.1 (Gumbel)*				
IDFCC Tool	*Guelph Turfgrass CS*	*64.2 (GEV)*	*74.8 (GEV)*				
		RCP 4.5 (GEV)		80.5	94.2	96.1	112.4
		RCP 8.5 (GEV)		86.8	101.5	96.5	112.9
	Mountainview Road	*69.9 (GEV)*	*85.8 (GEV)*				
		RCP 4.5 (GEV)		92.2	113.2	119.5	146.7
		RCP 8.5 (GEV)		94.1	115.5	120.9	148.5
OCCDP	*Mountainview Road*	*Gumbel*		*106.6*	*126.2*	*117.0*	*141.5*
MTO Trending Tool	*Mountainview Road*	*Gumbel*		*69.6*	*86.4*	*72.6*	*90.0*
Town of Caledon Standards +15%	Municipality	Gumbel		*86.1 (6 hour) / 92.0 (12 hour)*			
Town of Caledon Standards +20%	Municipality	Gumbel		*89.9 (6 hour) / 96.0 (12 hour)*			

6.3 Preliminary Cost Estimate

The preliminary cost estimate of the entire project is divided in four sections based on the proposed geometric improvements as follows:

- Section 1: Rural (Sta. 1+007 to Sta. 1+684);
- Section 2: Urban (Sta. 1+684 to Sta. 3+510);
- Section 3: Rural (Sta. 3+510 to Sta. 4+140); and
- Section 4: Rural (Sta. 4+140 to Sta. 4+570).

Estimates for each section are summarized in **Table 6-15**. Note that these estimates do not include the cost of utility relocations or property purchase.

Table 6-15 Preliminary Cost Estimates

			SECTION 1 - RURAL STA -1+007 to STA 1+684		SECTION 2 - URBAN STA 1+684 to STA 3+510		SECTION 3 - RURAL STA 3+510 to STA 4+140		SECTION 4 - RURAL (Rehabilitation) STA 4+140 to STA 4+570	
ITEMS	**UNIT**	**UNIT COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
Removal										
ROAD REMOVAL (PARTIAL DEPTH)	m^2	5	0	0	0	0	0	0	3182	15910
EARTH EXCAVATION	m^3	15	11383	170740	12656	189840	13890	208351	0	0
New Construction										
TACK COAT	m^2	1	13632	6816	50878	25439	13200	6600	3020	1510
PROPOSED PAVEMENT (ROADWAY, SHOULDER & DRIVEWAYS) AND GRANULAR BASE										
HL-3 (40mm Thickness)	tonnes	120	668	80156	2493	299163	647	77616	0	0
HL-8 (45mm & 50mm Thickness)	tonnes	100	1586	158642	5921	592093	1536	153615	0	0
Granular Base A (150mm Thickness)	tonnes	22	2454	53983	9158	201477	2376	52272	0	0
Granular Subbase B Type II (450mm Thickness)	tonnes	20	6134	122688	22895	457902	5940	118800	0	0
PAVEMENT RESURFACING (120mm HMA Overlay)										
HL-3 (40mm Thickness)	tonnes	120	0	0	0	0	0	0	312	37420
HL-8 (80mm Thickness)	tonnes	100	0	0	0	0	0	0	624	62367
CONCRETE CURB & GUTTER	m	55	0	0	3747	206085	0	0	0	0
SUBDRAIN (150mm)	m	25	1354	33850	3652	91300	1260	31500	0	0
SIDEWALK	m^2	60	0	0	3527	211620	0	0	0	0
PAVEMENT MARKINGS	m	5	2437	12186	6574	32868	2268	11340	1548	7740
Storm Sewer										
Catch Basins	each	3000	3	9000	51	153000	16	48000	0	0
Manholes	each	5000	0	0	9	45000	4	20000	0	0
Catch Basin Leads	m	250	30	7500	320	80000	80	20000	0	0
Storm Sewer Main	m	500	0	0	791	395500	435	217500	0	0
Curlvert (Reinforced Concrete Box 2.4mx1.5m closed botto	m	8000	0	0	16	128000	0	0	0	0
Sub-Total				**655837**		**3227797**		**977425**		**124948**
Miscellaneous										
MOBILIZATION	LS	30000		7500		7500		7500		7500
SITE OFFICE	LS	30000		7500		7500		7500		7500
ENGINEERING (10% of Subtotal)	LS	10%		65584		322780		97742		12495
MINOR ITEMS (30% of Subtotal)	LS	30%		196751		968339		293227		37484
CONTINGENCY (10% of Subtotal)	LS	10%		65584		322780		97742		12495
SECTION TOTAL * (plus HST)			**$998,755**		**$4,856,696**		**$1,481,137**		**$202,421**	
GRAND TOTAL * (plus HST)			**$7,539,010**							

7.0 Summary of Environmental Effects, Proposed Mitigation, Commitment to Further Work

Table 7-16 Summary of Environmental Effects, Proposed Mitigation, Commitment to Further Work

Category	Expressed By	Details
Aquatic Resources	MECP, TRCA, MNRF	Prior to commencement of works, design and implement standard ESC measures, consistent with OPSS and maintained ESC measures through all phases of the Project until vegetation is re-established, all disturbed ground is permanently stabilized.
		All ESC measures should be inspected at least weekly and during and immediately following rainfall events to ensure that they are functioning properly and are maintained and / or upgraded as required. If the sediment and erosion control measures are not functioning properly, no further work would occur until the sediment and/or erosion problem is addressed.
		Erosion protection and sizing will be provided at the detailed design stage, including details of connections to the existing ditches, culverts, and watercourses and opportunities to improve water quality and reduce runoff.
		CVC will be consulted during detailed design for staking watershed boundary as a significant woodland area is found with the ROW and is within the management jurisdiction of CVC.
		The ESC silt fencing should be installed around the Project footprint, allowing vehicle and construction staff access to the Project footprint only at designated areas.
		Soil sediment and other impurities must be prevented from entering the watercourse.
		Stockpiles and embankments are to be protected whenever there is potential for soil erosion to impact to the watercourse.
		All materials and equipment used for the purpose of site preparation and Project construction will be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering any drainage feature: - Any stockpiled materials will be stored and stabilized at least 30 m away from the watercourse - Refueling and maintenance of construction equipment will occur a minimum of 100 m from any drainage feature. - Any part of equipment entering the water would be free of fluid leaks and externally cleaned / degreased to prevent any deleterious substance from entering the water. - Only clean material, free of fine particulate matter would be placed in the water.
		Minimizing dust production to the extent practical by implementing dust suppression methods and thereby minimizing the zone of influence. Primary dust suppression methods can include road watering in cases where watering will not promote entry of chemicals in to nearby wetlands or waterways.

Category	Expressed By	Details
		A protocol to minimize spills/leaks and their impact to the environment should be provided in the Emergency Response Plan. Routine inspection of the Project construction site should be conducted to ensure continued use and function of best management practices, mitigation measures and spill control and prevention measures. As appropriate, spills will be reported to the MECP Spills Action Centre.
		Staging of the Project will limit vegetation disturbance and minimize the amount of time disturbed soil is exposed.
		An Environmental Monitor (or designate) should be on-site during construction of watercourse crossings to ensure compliance with specifications and site plans. In particular, the Construction Contractor should ensure that pre-construction preparation is completed prior to commencement of in-stream work and that bank, bed, and floodplain conditions are restored to pre-construction conditions following completion of any construction activities.
		Materials such as sand bags, straw bales, geotextile filters, and / or pumps should be readily available on-site in case of unexpected stream flow during construction activities.
		Sufficient culverts should be installed under the road to ensure that lateral drainage is not impeded. Where possible, roadside ditches should never be designed so that they remove water from the wetland and cause localized drying.
		The watercourse bed and bank areas should be rehabilitated to pre-construction condition.
		Temporarily store, handle and dispose of all materials used or generated (e.g., organics, soils, construction waste and debris, etc.) during site preparation, construction, and clean-up in a manner that prevents their entry into any drainage feature.
		Store and stockpile materials a safe distance from any drainage feature and ensure they are stabilized / contained as necessary.
		Wash-out facilities will be available on site, with waterproof lining to prevent soil and groundwater contamination. These wash-out facilities will be situated away from watercourses or drains.
		Liquid and solid concrete waste is disposed of lawfully using licensed haulers and licensed receiving facilities.
		Grading and bank stabilization via seeding and shrub plantings following project works will lead to greater bank stability which should decrease erosion and resulting sedimentation.
		The contractor will not be permitted to work within the existing watercourse until all water has been diverted around the cofferdam area.
		Pump intakes should be sized and adequately screened to prevent debris blockage and fish mortality (refer to the DFO Freshwater Intake End-of-Pipe Fish Screen Guidelines). The pumping system should be sized to accommodate any expected high flows of the watercourse during the construction period. Back-up pumps should be kept on site in case of pump failure. The pump should be discharged to a vegetated area at least 30 m from

Category	Expressed By	Details
		the watercourse to allow water to re-enter the watercourse only after it has been filtered through vegetation to prevent silt deposition. If no suitable areas exist, a filter bag should be place on the outlet to filter the water prior to re-entry into the watercourse.
		Cofferdams should be removed in a downstream to upstream sequence to allow gradual re-introduction of water to the dewatered area and prevent excessive suspension of silt or other bed material.
		Dewatering will include filtration socks and rings, filter pads, fish trash racks to prevent entrainment. All dewatering will be dispersed to a sediment basin or filtration bag located within a well-vegetated area at least 30 m from any watercourse, wetland or forest edge (as required by TRCA).
		The original channel bottom gradient and substrate should be restored after cofferdam removal.
		Accumulated sediment should be removed (ensuring that the original bed of the watercourse is not excavated) from behind the cofferdam before its removal.
		Cofferdams should be designed to accommodate any expected high flows of the watercourse during the construction period.
		If riprap or sand bags are used, clean, washed material should be used to build the berm. The berm face would consist of clean, washed granular material that is adequately sized (i.e., moderate sized rip rap and not sand or gravel) to hold the berm in place during construction. Material to build the berms would not be taken from below the high-water mark.
		Cofferdams (e.g., aqua-dams, sand bags, concrete blocks, steel or wood wall, clean riprap, sheet pile or other appropriate designs) can be used to separate the in-water work site from the watercourse.
		Land drainage systems, whether naturally occurring or man-made are not to be used as receptors for any substance or material other than clean water complying with local municipal bylaws or storm water as intended.
Stormwater	TRCA	Option proposed for quantity control is to use the downstream end of the roadside swales. For example, in the flattest slopes near the outlets, storage for quantity control can be provided and a control structure can be designed consisting of a transverse berm and culvert / weir outlet control.
		A secondary option if the swales do not offer sufficient quantity control is underground storage within the road ROW connected to the storm sewer system, with orifice control. The final configuration of the quantity control and storage will be determined through the detailed design stage.
Contaminated Material		Should stained soils or soils with odour are encountered during construction, further investigation is recommended in order to ascertain the quality of the soil and groundwater beneath the Site.
		ACM may be present in the road materials and sewer pipes used within the study area. Due to the potential presence of suspected ACM, a comprehensive asbestos survey is recommended in order to comply with Ontario Regulation 278/05 and Ontario Regulation 279/05. In addition, if ACM is present, an asbestos management plan

Category	Expressed By	Details
		will be required for any confirmed friable ACM which is not abated or has not been tested to be deemed non-asbestos.
Fisheries/ Watercourse	TRCA & MNRF	The timing restrictions for the associated cold-water watercourses restrict work from October 1 to May 31 of any given year. As such, all in works are to proceed outside of this window.
		Before starting construction, fish should be salvaged from within the cofferdam and returned to an area immediately upstream of the isolated area. Salvage operations must consist of techniques that successfully target the species and size classes of fish that inhabit the watercourse reach. A fish rescue permit from MNRF will be required for this activity.
		Road profiles adjacent to environmental features such as wetlands and watercourses will be maintained as close to the existing grade as possible to avoid grading impacts.
		Watercourses will be accurately surveyed at the detailed design stage to ensure culvert extensions and replacements appropriately tie into the upstream and downstream ends of the watercourses. Sizing may need to be modified based on the results.
		Where appropriate, crossing structures will be designed for fish passage using natural channel design and will be addressed in detailed design.
		The TRCA Crossing Guidelines will be followed to appropriately size the watercourse crossing during detailed design.
		A site visit will be arranged during the detailed design stage in order to confirm TRCA regulated mapping, to accommodate the watercourses running parallel to the new road profile and to observe water ponding condition post removal of the beaver dam.
		Scheduling work to avoid wet, windy and rainy periods that may increase erosion and sedimentation
Landscaping and Vegetation	TRCA & MNRF	All disturbed areas of the work site shall be stabilized and re-vegetated promptly, and/or treated with appropriate erosion protection materials.
		A compensation strategy for encroachment and plantings, as well as a woody vegetation replacement to offset the loss of carbon sequestration function will be negotiated with TRCA during detailed design.
		Restoration and landscaping plans will be completed during detailed design and will consider the use of only common native species in restoration plans, particularly in areas near natural features and species that support wildlife in areas within/adjacent to wildlife habitat. CVC Plant Selection Guideline (CVC 2018) and the Region of Peel Streetscaping Toolbox will be reviewed.
		Disturbance and removal of existing trees and vegetation will be minimized where possible and confined to the footprint of the Project.

Category	Expressed By	Details
		In the event forest/woodland habitat requires removal for road improvements, removal of habitat must occur outside critical periods for the bat species, which encompasses the summer active period of April 1 to September 30 or at least the maternity period of approximately June 1 to July 31.
		Prevent introduction of new invasive species by washing down equipment prior to transporting to site and limiting travel of equipment and vehicles to and from the study area.
Archaeology	MTCS	If any archaeological artifacts are located during construction, work in the area will cease and the MTCS will be contacted. The MTCS and the Registrar of the Cemeteries Regulation Unit will be contacted in the event that human remains are encountered during construction.
Wildlife	MNRF	Comply with the MBCA 1997 regulations and guidelines for vegetation clearing recommended by Environment Canada. In order to minimize the potential for incidental take of nesting migratory birds, vegetation clearing and any proposed work activities in migratory bird habitat should be undertaken outside of the active breeding season. Clearing is to be avoided from April 1 to August 30 for this project location, although these timing constraints should not be perceived as absolutes. This period represents the core breeding period, although some species may nest in March and September. Ultimately, the objective from a compliance perspective is to not circumvent the MBCA. As such, due diligence measures should be implemented and documented for any nest searching efforts, including record control, to ensure compliance with the MBCA.
		Vertical facings suitable for nesting by bird species (i.e., soil piles, excavation areas) should be covered using tarps, or plastic sheets, or any other means of preventing nesting within the construction zone. Such barriers should be installed prior to April 1 and shall remain in place until August 30, or until the completion of rehabilitation works. Alternatively, vertical facings should be maintained daily at a 45° angle to deter nesting.
		Where feasible, works will be conducted during daylight hours, unless otherwise necessary, to avoid potential effects of artificial night lighting on crepuscular and nocturnal species.
		Minimize sources of unnecessary noise or encroachment of worker activities into nearby habitats in order to limit the extent of the project zone of influence when possible.
		All heavy equipment and tools used on-site shall be maintained in good working condition.
		Construction personnel shall avoid idling of vehicles when not necessary for construction activities.
		A Wood biologist will conduct additional surveys during the detailed design phase of the project to identify potential impacts to SAR, SAR habitat or significant wildlife habitat potentially posed by the works and if necessary, MNRF will be consulted to gain further direction relative to any technical and process requirements under ESA.
		Where overtopping of the roadway is permitted for the Regulatory event, MNRF criteria for safe ingress / egress for Emergency Vehicles shall be provided where feasible

Category	Expressed By	Details
		Equipment and vehicles shall be turned off when not in use unless required for construction activities and/or effective operation.
	TRCA	Meet TRCA Crossings Guideline for Valley and Stream Corridors which includes considerations for minimum opening sizes for fluvial geomorphology, aquatic ecology and wildlife passage, where applicable.
		The Mortality Study provided by the TRCA has been reviewed and will be considered in determining the wildlife crossing structure requirements during the detailed design stage.
Groundwater	MECP	Complete the construction during periods of lower flows and groundwater levels (such as during the summer or winter months), as well as ensuring that water being removed or pumped is returned downstream at a similar temperature and of a similar visible quality to minimize impacts to the cold-water system and to minimize the potential for suspended solids to enter the surface water system.
	TRCA, Region of Peel & MECP	Reinstall pressure transducers in two monitoring wells to continue groundwater monitoring through to the start of construction. It is expected that the monitoring wells will not be able to be retained during the construction stage, so monitoring will not be able to continue in these wells during and post-construction. The pressure transducers will be set to read at a frequency of 2 hours and will be removed prior to construction.
		Continue groundwater monitoring until the start of construction with site visits conducted on a quarterly basis to download the pressure transducers and collect manual groundwater levels. The data will be incorporated into hydrographs.
		Complete a pre-construction private well survey along the length of the planned improvements within a 500 m radius. The private well survey will collect information on the presence and use of wells located and establish those well owners willing to participate in the private well monitoring program prior to, during, and following construction.
		Collect site specific information in order to obtain a PTTW for the purposes of completing a Category 3 Hydrogeological Assessment / construction dewatering EASR.
		Collect water levels in domestic wells prior to, during and following construction.
		Collect a groundwater sample for comparison to PWQO to establish background water quality.
Source Water Protection	Region of Peel	Discussions with TRCA indicate that policies SAL 10 and SAL 11 of the Source Protection Plan are applicable to the project. These policies encourage the Town to implement a salt management plan including the adoption of best management practices and the reduction in use of salt in order to the protect groundwater quality.
Climate Change	MECP	It is recommended that the project maintain reliance on the Gumbel based estimates for assessment and design, given the direction adopted by ECCC and the differences between the Gumbel and GEV based estimates.
		It is recommended that the project give consideration to using rainfall estimates based on a GEV approach for design stress testing purposes.

Category	Expressed By	Details
		It is recommended that the client be consulted to determine the appropriate rainfall scenario to use for detailed design of drainage works associated with the roadway.
Utilities	TRCA	Accurate determination of the location and need for relocation of underground utilities will be determined during the detailed design. Any impacts to adjacent natural features due to relocation will be determined at that time.
Geotechnical	TRCA	Investigation of proposed road improvements in order to assess the ground condition along the preferred road alignment and to provide the geotechnical design recommendations.
		Slope stability and erosion hazard assessment will be conducted to ensure that the proposed road improvements are not undermined by erosion hazard in the long-term or does not destabilize valleys.
		Slope stability assessments will account for heavy machinery/equipment loads and vibrations.
		The position of the Long- Term Stable Top of Slope with a minimum safety factor of 1.50 to define the setback will be required from the existing top of bank/slope.
		Construction methodology, sequencing, slope stability assessment and cross- sections (cuts and fills) will be undertaken in areas where the work is in proximity of the steep slope and valleys and/or the work requires construction access into the steep slopes and valleys to ensure that the surrounding ground/slope is not adversely impacted during construction.
		All engineering drawings for the retaining walls, abutments and wing walls, culverts, crossings, stabilization works, embankments and cuts will be prepared showing all necessary details and specifications.
Niagara Escarpment Plan	NEC	All construction drawings for the portion north of The Grange Sideroad when detailed design is complete will be submitted to NEC in order to verify that the Project is exempt from Ontario regulation 828/90.

7.1 Monitoring

A monitoring program will be established to ensure that the mitigation measures specified in **Table 7-16** are undertaken. The key impacts to the environment are the short-term impacts that require monitoring during construction. The construction of this project will be monitored on site by the Town to ensure that the Contractor is implementing standard construction practices. This will include erosion and sedimentation control, dust and noise control, protection of existing vegetation, assurance of traffic safety and maintenance of traffic flow without causing unnecessary delays, etc. The overall performance and effectiveness of the environmental mitigating measures specified to be monitored and assessed during and subsequent to the construction of the project.

The environmental impacts outlined in this section are considered as normal impacts associated with roads construction, the established standard construction practices outlined as the mitigating measures will be incorporated in the contract documents. The Contract Administrator is to ensure that these mitigating measures are undertaken during construction. Should unforeseen environmental concerns and/or issues arise during the construction period, the appropriate ministry and agencies will be contacted, and appropriate measures will be taken to mitigate the environmental concerns / issues.

7.2 Commitments to Further Investigations

Commitments to further investigation during detailed design stage are:

- Utilities coordination and possible sub-surface utility engineering (SUE) to determine types, location, and depths of the existing and any new facilities;
- Detailed Stormwater Management design and coordination with agencies;
- Culvert design at crossing C4;
- Provision of wildlife passage at crossing C4 and C5 in view of TRCA Mortality Study;
- Landscape Design;
- Property acquisition;
- Detailed Cost Estimate;
- Construction Phases/implementation;
- Construction Staging & Detour; and
- Additional investigations identified by agencies (Refer **Appendix B** 'Agency Consultation' for details).

Appendix A

Notice of Study Commencement

Appendix B

Agency Consultation and Project Team Meeting Minutes

Appendix C

Utilities Consultation

Appendix D

Public Information Centre No. 1

Appendix E

Public Information Centre No. 2

Appendix F

Indigenous Consultation

Appendix G

Transportation and Traffic Study

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Appendix H

Natural Environment – Terrestrial Report

Appendix I

Natural Environment – Aquatic Report

Appendix J

Contamination Overview Study

Appendix K

Stormwater Management Assessment Report

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Appendix L

Archaeological Assessment Stage 1

Appendix M

Archaeological Assessment Stage 2

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Appendix N

Geotechnical Investigation Report

Appendix O

Preliminary Road Design (Plan & Profile) Drawings

Appendix P

Noise Impact Memo

Appendix Q

Hydrogeological Desktop Investigation

Appendix R

Climate Change Review