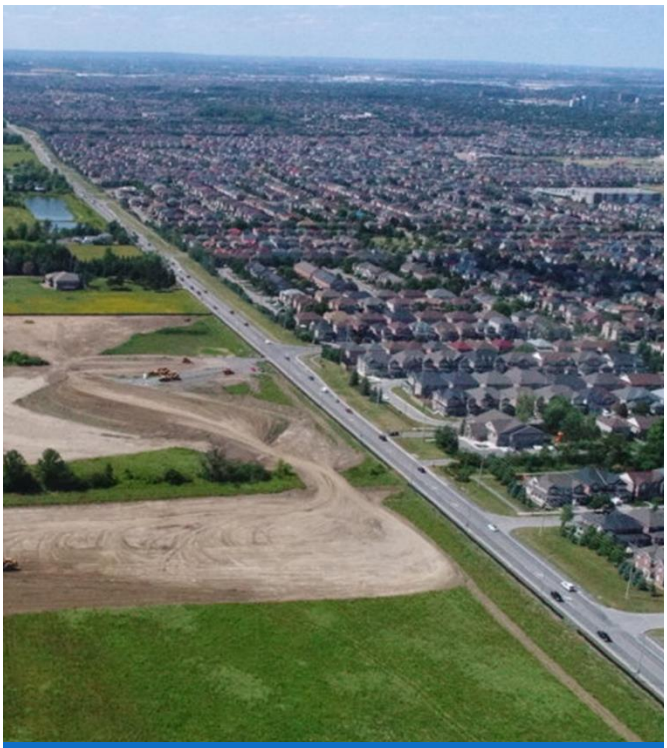

Environmental Study Report

Schedule ‘C’ Class Environmental Assessment for Ninth Line from Eglinton Avenue West to Derry Road West

City of Mississauga

June 2021

Disclaimer

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1 Introduction

The City of Mississauga has completed a Schedule 'C' Municipal Class Environmental Assessment (Class EA) study for Ninth Line Improvements between Eglinton Avenue West and Derry Road West. The EA study is being completed in accordance with the planning and design process for Schedule 'C' projects as outlined in the Municipal Engineers Association (MEA), Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011, and 2015).

Ninth Line is a north-south arterial road in the City of Mississauga. The study area spans approx. 6.2 km from Eglinton Avenue West to Derry Road West and consists of a 2 lane semi-rural road cross-section with a centre two-way left-turn lane. Ninth Line is adjacent to the last remaining greenfield land in Mississauga, which is planned to be sustainable, transit-supportive, connected and distinct. Current and future Ninth Line residents will have access to a linked natural heritage system, multi-use trails, parks and open spaces. Higher-order transit, community uses, and facilities and a variety of housing choices and employment opportunities are also anticipated to realize this vision for the emerging neighbourhood, as outlined in the Shaping Ninth Line Study.

1.1 Study Purpose

The purpose of this study is to confirm the need for multi-modal improvements to Ninth Line which support new development and improve mobility for all road users, explore alternative solutions and identify a preferred solution. Alternative designs will be developed to address the preferred solution, evaluated and a preferred design will be selected which strikes a balance between transportation engineering and environmental protection principles. The Preferred Preliminary Design will develop the technically preferred design to a 30% design level of detail, incorporating feedback from stakeholders and identifying opportunities to support the City's vision in which "everyone and everything will have the freedom to move safely, easily, and efficiently to anywhere at any time".

1.2 Study Area

Ninth Line is a north-south arterial road in the western part of the City of Mississauga in the Region of Peel. It connects Highway 403 to the south and Highway 401 to the north. The City of Mississauga Ninth Line jurisdiction begins at Highway 407, continuing north across Highway 401 where it terminates at Steeles Avenue in Halton Region. The study area spans the segment of Ninth Line between Eglinton Avenue West and Derry Road West.

Within the study limits, Ninth Line currently has a posted speed limit of 70 km/h and a 2-lane semi-rural road cross-section (one lane in each direction) with a centre two-way left-turn lane. Sidewalks are discontinuous and cycling facilities do not exist for the majority of the study area. The total length of roadway for the project is approximately 6.2 km, as shown in **Exhibit 1-1**.

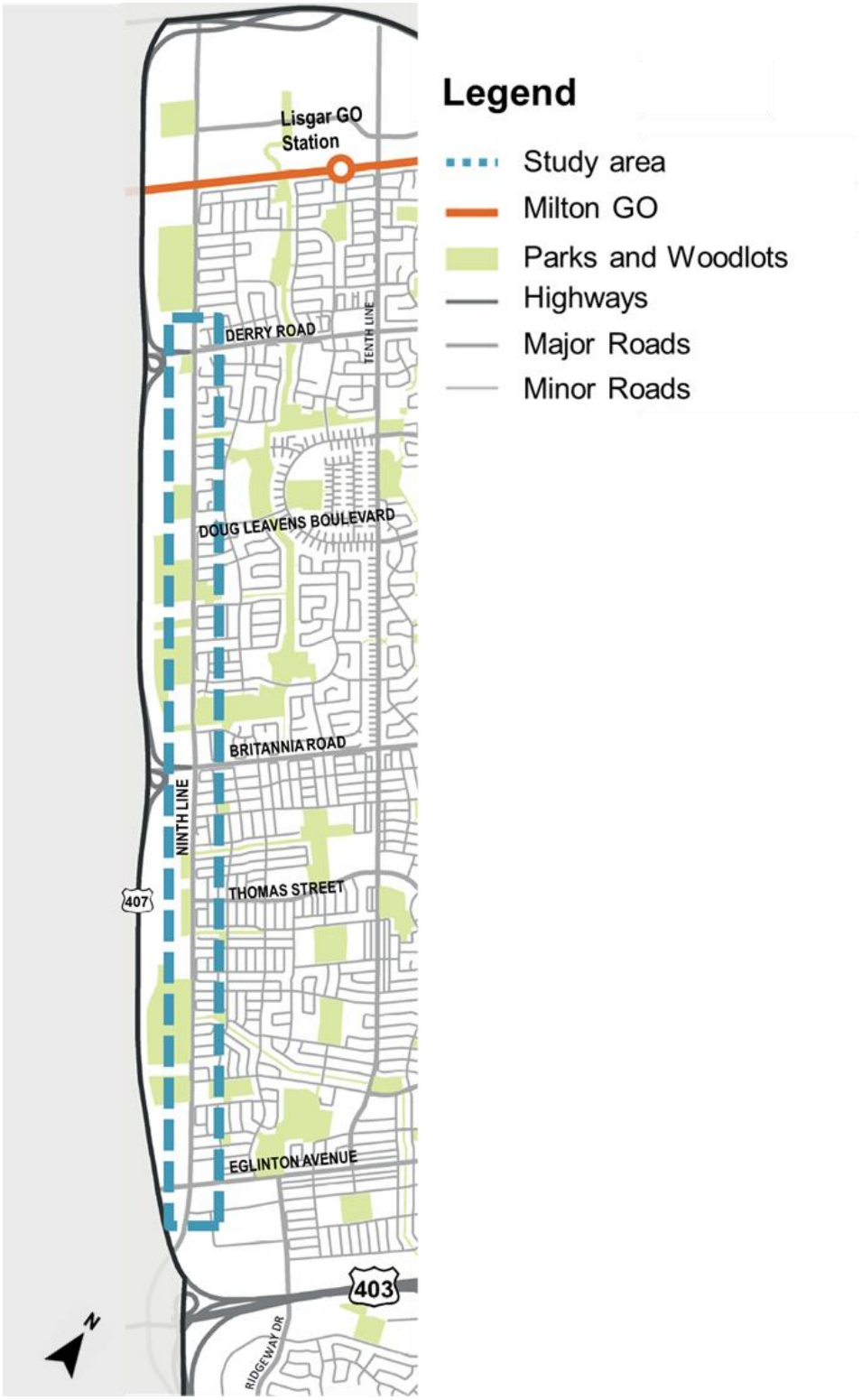


Exhibit 1-1: Ninth Line Study Area and Corridor

1.3 Environmental Assessment Process

An overview of the Environmental Assessment Act of Ontario (EAA), the Municipal Class Environmental Assessment (MCEA) process, and the Canadian Environmental Assessment Act, 2012 (CEAA 2012) is provided in this section as they relate to the Ninth Line Class EA.

1.3.1 Municipal Class Environmental Assessment Process

The Environmental Assessment Act of Ontario (EAA) provides for the protection, conservation, and management of the environment in Ontario. The EAA applies to municipalities and to activities including municipal road projects. Activities with common characteristics and common potential effects may be assessed as part of a "class" and are therefore approved subject to compliance with the pre-approved Class EA process.

The Municipal Class Environmental Assessment (MCEA) process is an approved Class EA process that applies to municipal infrastructure projects including roads, water, and wastewater. This process provides a comprehensive planning approach to consider alternative solutions and evaluate their impacts on a set of criteria (e.g. transportation, environmental, social, engineering considerations) and determine mitigating measures to arrive at a preferred alternative for addressing the problem (or opportunity). The Class EA process involves a rigorous public consultation component that includes various provincial and municipal agencies, Indigenous communities, and the public, at each of the project stages.

The Ninth Line Class EA study was undertaken in accordance with the guidelines of the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 and 2015). Due to the type of project, anticipation for potential effects, and estimated capital costs, the Ninth Line Class EA is defined as a Schedule 'C' project. A Schedule 'C' project involves either the construction of new facilities or major modifications to existing facilities. Modifications to existing facilities could include road widening, intersection improvements, and/or other operational improvements.

Exhibit 1-2 illustrates the sequence of activities within the approved Class EA process leading to project implementation. The phases for this study are summarized below:

Phase 1 (Problem and Opportunity) – Establish the vision and identify the problem (deficiency) or opportunity.

Phase 2 (Alternative Solutions) – Identify alternative solutions to address the problem or opportunity considering the existing environment, and establish the preferred solution considering public and agency input.

Phase 3 (Alternative Design Concepts for Preferred Solution) – Examine alternative methods of implementing the preferred solution, based on the existing environment, public and agency input, anticipated environmental effects, and methods of minimizing negative effects and maximizing positive effects.

Phase 4 (Environmental Study Report) – Document in an Environmental Study Report (ESR) a summary of the study background, problem statement, alternative solutions,

alternative designs, and the public consultation process. Place the ESR on public record for a minimum 30 calendar days for review and notify completion of the ESR and opportunity for Part II Order requests.

Phase 5 (Implementation) – This phase involves detailed design and the preparation of contract/tender documents followed by construction, operation, and monitoring. This phase is not within the scope of the Ninth Line Class EA study.

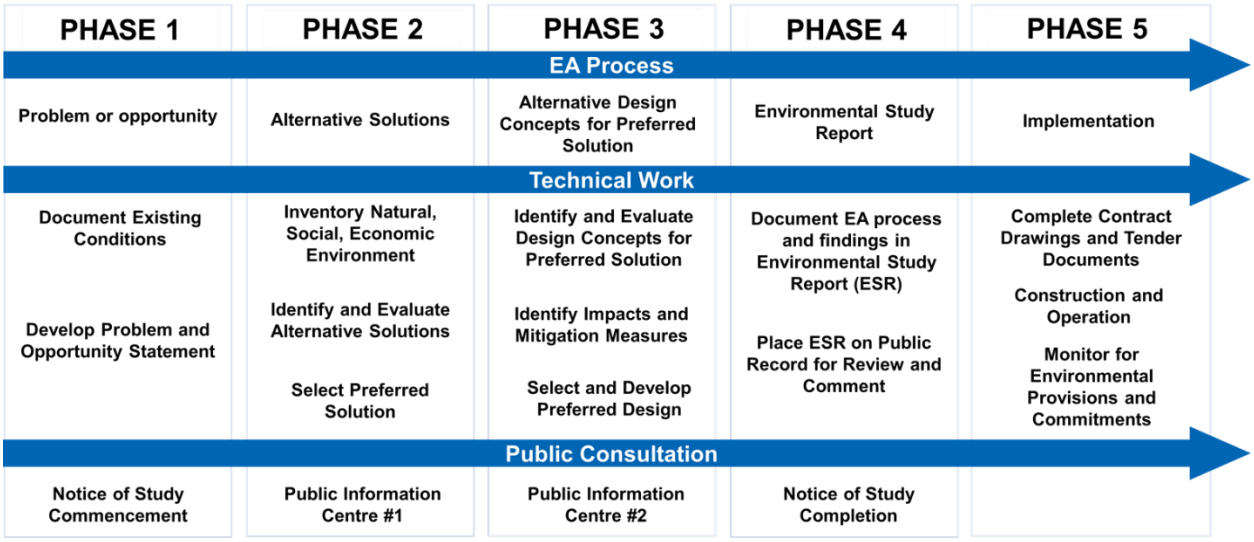


Exhibit 1-2: Class EA Process

1.3.2 Part II Orders

After the ESR is finalized, it will be filed and placed on public record for a minimum of 30 calendar days for review by the public and review agencies. At the time the report is filed, a Notice of Study Completion will be advertised, to advise the public and other stakeholders where the ESR may be seen and reviewed, and how to submit public comments. The Notice will also advise the public and other stakeholders of their right to request a Part II Order, and how and when such a request should be submitted.

On July 21, 2020, the Ontario province passed the *COVID-19 Economic Recovery Act*, which included important amendments to the Environmental Assessment (EA) Act. The amendments to the EA Act included, changes to the Part II Order Request (PIIOR) process and sets up the authority of the Ministry of Environment Conservation and Parks (MECP) to create new regulations that would replace all Class EAs, including the Municipal Class Environmental Assessment (MCEA) process.

1.3.2.1 NEW APPEAL PROCESS

As part of the new appeal process, implemented by the amendments to the EA, proponents will continue to issue a Notice of Study Completion and place the EA documentation/Environmental Study Report (ESR) on the public record for 30-days; however, instead of concerns being filed with the Ministry, concerns will be addressed to the proponent. The PIIOR process will only

apply if the objective deals with aboriginal or treaty rights. All other concerns, the PIIOR process has been replaced with an additional 30-day window for the Ministry to decide if the Minister should take any action. Regional coordinators from the Ministry of Environment, Conservation and Parks (MECP) will continue their role of monitoring MCEA projects. During the additional 30 days the Minister will decide if the project will be elevated (PIIOR granted) or if it will be approved with conditions. If the Minister advises the proponent that the project will be approved but with conditions, the Minister has more time to draft these conditions. If there is no response from the Minister within the additional 30-days, the proponent may proceed with the project.

1.3.3 Canadian Environmental Assessment Act

Under the Canadian Environmental Assessment Act, 2012 (CEAA, 2012), a federal environmental assessment study may be required to comply with the physical activities that constitute a “designated project”, under the project list identified in the Regulations Amending the Regulations Designating Physical Activities, 2013. This project list ensures that federal environmental assessments are focused on the major projects with the greatest potential for significant adverse environmental impacts to matters of federal jurisdiction.

The Ninth Line Class EA study does not constitute a “designated project” and therefore does not require an Environmental Assessment under the CEAA, 2012. However, the Minister of the Environment, Conservation and Parks may order an assessment for any project not included in the project list, where there may be adverse environmental effects related to federal jurisdiction.

2 Public Consultation Strategy

2.1 Public Consultation Approach

Public input is an important part of the Class EA and the public was presented opportunities to participate in the planning process through a number of public and stakeholder consultation activities. Key consultation events undertaken throughout the EA study are listed in **Table 2-1** and are further elucidated in the following sections. Copies of the notices are provided in **Appendix A**.

Table 2-1: Key Consultation Events

Consultation Event	Date
Notice of Study Commencement and Introductory Open House	February 13, 2020
Introductory Open House *(in-person)*	February 20, 2020
Notice of Public Information Centre #1	June 10 and June 17, 2020
Public Information Centre #1 *(virtual)*	June 25 to July 17, 2020
Notice of Public Information Centre #2	December 31, 2020 and January 7, 2021
Public Information Centre #2 *(virtual)*	January 13 to February 3, 2021
General Committee	June 9, 2021
Notice of Study Completion	June 24 to July 14, 2021

Communication with agencies, stakeholders, Indigenous communities and the public took place through:

- Letters
- Emails
- Meetings
- Phone calls
- Notices and Postcards
- Online surveys
- Mobile Road Signs
- Open House/PIC's
- Newspaper advertisements (Mississauga News)
- Project website (http://www.mississauga.ca/NinthLineEA)
- City of Mississauga website (http://www.mississauga.ca)
- Social Media (Mississauga Facebook, Mississauga Twitter)

Residents living along the study corridor directly received mailed notices. Following the study commencement, individuals who expressed interest in the project and as requested, were added to the project mailing list (mail or email) to receive regular updates on the study progress.

To maximize public awareness, efforts such as mobile roadside signage, social media posts (Facebook and Twitter), newspaper advertisements, and regular updates to the project website provided information on the study. Online feedback forms (online surveys) were available on the project website, which allowed individuals to remotely participate in the study.

2.2 Study Commencement and Introductory Open House

The following was used to notify the public and stakeholders of the Study Commencement and invite them to participate in an Introductory Open House:

- Notice of Commencement and Introductory Open House postcards mailed out to local residents and stakeholders on February 13, 2020,
- Notice of Commencement and Introductory Open House emails sent to public, agencies, stakeholders, and the Indigenous Communities on February 13, 2020.

The City held the Introductory Open House on February 20, 2020 from 7 to 8:30 p.m. at Osprey Woods Public School at 6135 Lisgar Drive. The purpose of the Open House was to:

- Introduce the project to the community
- Receive initial feedback on issues and opportunities
- Provide background on the EA process being followed for this study
- Obtain public input and answer questions
- Provide information on how the public can be involved throughout the study
- Discuss next steps

The Open House was organized as a drop-in to enable the public to attend at any time between 7 and 8:30 p.m. to view displays, participate in public input activities and to share ideas with the project team. Over 70 people attended the Open House. There were several ways of providing input including the following:

1. By placing coloured stickers/dots on two boards under elements/ aspects that participants felt were most important to them.

2. By placing post-it notes and writing comments on aerial maps of the study area to identify points of interest, areas of concern and ideas for possible improvements.

3. By providing comments on a general comment form.

Public feedback received from the Introductory Open House is summarized as follows. These comments were considered in assessing and understanding the existing conditions, needs and opportunities for improvements in the corridor:

- Congestion and queuing along Ninth Line are an issue today. Increased road capacity and reduced travel times are seen as being important
- Intersections are not operating efficiently and improvements are needed to improve safety

- Active transportation improvements are needed
- Streetscaping, landscaping, and public realm improvements are very important
- Preservation of natural heritage, features and wildlife is important
- There are concerns about noise and disruption from construction due to growth in the area
- Flooding was noted to be a problem along Ninth Line and in the Lisgar Community
- There are concerns that transportation infrastructure is not keeping up with growth and the Ninth Line improvements should be completed before new development occurs

2.3 Public Information Centre #1

The City held a virtual public meeting for Public Information Centre (PIC) #1 in place of an in-person event to keep the community safe by complying with regional and provincial guidelines and supporting physical distancing. Engagement for essential and priority projects continued online, paired with universally accessible methods.

The following was used to notify the public and stakeholders of the virtual Public Information Centre (PIC) #1:

- Notice of PIC #1 published in The Mississauga News on June 11 and June 18, 2020
- Notice of PIC #1 postcards mailed out to local residents and stakeholders on June 10, 2020,
- Notice of PIC #1 emails sent to public, agencies, stakeholders, and the Indigenous Communities on June 11, 2020.

Prior to PIC #1, the project team held a Technical Advisory Committee (TAC) meeting on June 4, 2020, to review the PIC materials. Attendees of TAC meeting included members from City of Mississauga, Region of Peel, Credit Valley Conservation, Conservation Halton, Ministry of Transportation, 407 ETR, and Peel District School Board, Dufferin-Peel Catholic District School Board.

PIC#1 was held virtually from June 25th, 2020 to July 17th, 2020 on the City's project website at http://www.mississauga.ca/portal/residents/ninth-line-class-ea-study. Community members participated by:

- Viewing PIC#1 display materials
- Completing the online comment form
- Emailing additional comments to the City

The PIC#1 materials available for viewing were:

- Public Information Centre #1 Display Boards (PDF)
- Public Information Centre # 1 Video Presentation
- Online Comment Form (Online Survey)

The purpose of PIC#1 was to:

- Present background information on the study and findings to date
- Provide information and receive input on alternative solutions to address problems and opportunities along Ninth Line
- Receive input on how many travel lanes Ninth Line should have in the future
- Receive input on how cyclists and pedestrians should be accommodated along Ninth Line
- Collect additional comments and suggestions for the City to consider
- Provide information on how the public can continue to be involved throughout the study
- Discuss next steps

There was a total of 23 display boards available for viewing on the project website (as a PDF file and explained in a video presentation, both of which were available for participants to view at their own pace). These boards conveyed the following:

- Study purpose and an overview of the Class EA process being followed for this study
- An overview of the corridor characteristics, including the existing and planned land uses
- Relevant policies applicable to the project
- Existing walking, cycling, traffic and transit conditions
- Problem and Opportunity Statement
- Relevant technical studies that are being carried out as part of this project
- A list of alternative solutions considered
- Preliminary evaluation criteria to evaluate the alternative solutions
- A summary of alternative solutions evaluation, identifying the preliminary preferred solution to be carried forward through the next phase of the EA process
- Potential cross-sections to be considered in the next phase of the study
- Project schedule, next steps, and project team contact information

Key public feedback received through PIC #1 is summarized as follows:

- Congestion and queuing along Ninth Line are an issue today. There are concerns that transportation infrastructure is not keeping up with growth and should be completed before new development occurs
- Four lanes are seen to best address the problems and opportunities along Ninth Line
- Preference for Alternative 7 (combination of widening from 2 to 4 lane, multimodal improvements, and operational improvements) to best address problems and opportunities along Ninth Line
- Improvements for Active Transportation are especially important. Support for more options for pedestrian interconnections, off-road cycle track, sidewalks and multi-use paths
- Intersections are not operating efficiently and improvements are needed to improve safety
- Preservation of natural heritage features and wildlife is important. Mitigation measures are especially important
- Noise mitigation measures need to be considered

Responses to the key public feedback include:

- The proposed improvements to the Ninth Line corridor will increase the road capacity through additional lanes and intersection improvements and will improve traffic congestion
- Improvements for pedestrians and cyclists along the Ninth Line corridor will consider connections along the corridor and at intersection crossings
- A natural heritage inventory and impact assessment will be completed as part of the EA study. Impacts and mitigation measures will be identified and reviewed in consultation with the conservation authority
- A noise impact study will be conducted as part of the EA study to assess the impacts from the project

A copy of the PIC #1 Consultation Feedback Report is provided in **Appendix A**.

2.4 Public Information Centre #2

Similar to PIC#1, the City held a virtual public meeting for Public Information Centre #2 in place of an in-person event to keep the community safe by complying with regional and provincial guidelines and supporting physical distancing. Engagement for essential and priority projects continued online paired with universally accessible methods.

The following was used to notify the public and stakeholders of Public Information Centre (PIC) #2:

- Direct mail notice of PIC #2 (in postcard format) to approximately 2,900 members of the public, including property owners and residents within the study corridor.
- Direct email notice to approximately 260 agency representatives, stakeholder group representatives and individual public members who are on the project email list
- Direct email notice to five (5) Indigenous Community representatives from four (4) different communities
- Updates to the project website, including notification of PIC #2, PIC #2 materials, and online public meeting website
- Newspaper advertisement (Notice of PIC #2) posted on December 31, 2020 and January 7, 2021 in the Mississauga News
- Two (2) mobile road signs were posted in the study area and advertised PIC #2 from January 13th, 2021 to February 2nd, 2021. Prior to PIC #2, the project team held a Technical Advisory Committee (TAC) meeting on December 7, 2020, to review the PIC materials. Attendees of TAC meeting included members from City of Mississauga, Region of Peel, Credit Valley Conservation, Conservation Halton, Ministry of Transportation, 407 ETR, and Peel District School Board, Dufferin-Peel Catholic District School Board.

PIC #2 was held as a virtual on-demand meeting and community members participated by viewing materials on the City website from January 13 to February 3, 2021. Individuals could visit the City website anytime 24/7 during this period to learn about and share their input on the

study. An online commenting form was available for completion, and additional comments could be e-mailed to the City. The purpose of PIC#2 was to:

- Share key feedback received on the project.
- Present the design approach, alternatives considered, evaluations and preliminary recommendations for Ninth Line Improvements.
- Present the Preferred Preliminary Design.
- Receive input regarding the project and recommendations.
- Discuss next steps

When individuals visited the site, they were able to click through the slides to learn more about the study and had the option to play a voice-over of the same material (each slide). Some slides had areas where the public could provide feedback on the information being presented in the slide. There was also the option of providing a comment at any point by clicking on the "Comment" button at the top right corner of the screen. The 12 slides conveyed the following information:

- How to Navigate and Participate
- Project Objectives including Study Purpose, an overview of the Class EA process being followed for this study and purpose of PIC #2
- An overview of what was heard at online PIC #1 and engagement strategies that are being used to connect with community members
- The Preferred Solution
- Evaluation Criteria for Alternative Design Concepts
- Alternatives Design Concepts for Road Widening including Alternative 1 (Widen to West), Alternative 2 (Widen about the Centreline), Alternative 3 (Widen to East) and Evaluation and Recommendations
- Alternative Design Concepts for Active Transportation including Alternative 1 (On-Street Bike Lanes with buffer), Alternative 2 (Separated Boulevard Cycle Tacks), Alternative 3 (Multi-use Paths) and Evaluation and Recommendations
- An overview of proposed improvements for Intersection Controls including Traffic Signals and Roundabouts
- Preferred Preliminary Design Concept including 3D Renderings, Noise Impacts and Mitigation, Watercourse Crossings, Centre Median Treatments, and Intersection Crossing Treatments
- Project Timeline and Next Steps, and project team contact information

Public feedback received through PIC #2 is summarized as follows:

- Commenters generally agree with the recommendation of Alternative 1 – Widen to West.
- Commenters generally agree with the identified preferred alternative - Alternative 2 Separated Boulevard Cycle Tracks and Sidewalks
- Three new traffic signals are warranted in the corridor and are proposed at the Ninth Line intersections of Tacc Drive, McDowell Drive and Beacham Street. While there is

agreement with the recommended intersection improvements, many comments were received noting concerns with too many traffic lights being proposed.
- Commenters generally agree with the Preliminary Design Concept for Ninth Line

Key responses to comments received at the PIC#2 include:

- Approvals of future development(s) are beyond the scope of this transportation EA Study
- The proposed improvements to the Ninth Line corridor will increase the road capacity through additional lanes and intersection improvements and will improve traffic congestion. However, future lane widths will be narrowed from existing lane widths and the posted speed will be reduced to 60km/h (from 70km/h)
- Traffic count data was collected pre-pandemic (2013 to 2019). Growth factors were applied to traffic data to address the planning horizon year of 2041.The traffic data was used to inform the transportation decisions for the EA Study
- The Ninth Line corridor improvements include locations for landscaping and tree planting (where feasible)
- An air quality impact assessment, cultural heritage inventory and impact assessment, drainage and stormwater management assessment, and noise impact study assessment were conducted as part of the EA Study
- The recommended active transportation facilities along Ninth Line include designated crossrides at signalized intersections to facilitate continuous movements of cyclists and pedestrians
- A traffic signal warrant assessment was conducted to identify intersections that require traffic signals. Design for roundabouts were also considered and evaluated but determined not feasible

A copy of the PIC #2 Consultation Feedback Report is provided in **Appendix A**.

2.5 Notice of Report to General Committee

The Notice of Report to General Committee was distributed to property owners within the study corridor, and those who requested to be on the mailing list through direct mail in the form of a postcard or e-mail issued on May 31, 2021. The Notice highlighted that the draft study report to General committee will include the preferred solution, staff recommendations and executive summary. The Notice also included the General Committee date, time and meeting location.

2.6 Notice of Study Completion

The Notice of Study Completion was published in Mississauga News on June 24th and July 1st, 2021. The notice was directly mailed and emailed to those who requested to be on the study mailing list, including properties within the study corridor, stakeholders and agencies, Indigenous Communities and placed on the study website. It invited those interested in the study to review the ESR and where to submit comments.

2.7 Agency Consultation

2.7.1 Technical Advisory Meeting (TAC)

A Technical Advisory Committee (TAC) was formed comprising representatives from the City of Mississauga, Region of Peel, Credit Valley Conservation, Conservation Halton, Ministry of Transportation, 407 ETR, and Peel District School Board, Dufferin-Peel Catholic District School Board. TAC meetings and individual agency meetings as required were held to discuss input, concerns, and technical details at various decision-making points throughout the study. The list of meetings is provided as follows. In addition members of the committee were also invited to participate in the PICs.

Technical Advisory Committee Meetings:

- TAC Meeting #1: June 4, 2020, to share the study findings and recommendations to date and obtain input prior to the first PIC
- TAC Meeting #2: December 7, 2020, to share the study findings and recommendations and obtain input prior to the second PIC

2.7.2 City of Mississauga Stakeholder Meeting

A stakeholder meeting was held to develop and refine the preferred alternative design concept of Ninth Line. This meeting included stakeholders from internal City departments such as transit, traffic operation, planning, active transportation, development and streetscaping.

City of Mississauga Stakeholder Meetings:

- Alternative Design Stakeholder Workshop: August 27, 2020

2.7.3 Conservation Halton Meetings

Two meetings were held with the Conservation Halton as part of the study. The purpose of these meetings was to determine the stormwater management methodology and findings for the Ninth Line EA.

Conservation Halton Meetings:

- Stormwater Management Methodology Meeting: February 24, 2021
- Stormwater Management Findings Meeting: April 22, 2021

2.7.4 Region of Peel Meetings

Three meetings were held with the Region of Peel to discuss the future intersection improvement requirements for Britannia Road and Derry Road.

Region of Peel Meetings:

- Future improvements at Britannia Road and Derry Road Intersection Meeting #1: February 25, 2021

- Future improvements at Britannia Road and Derry Road Intersection Meeting #2: March 19, 2021
- Future improvements at Britannia Road and Derry Road Intersection Meeting #3: April 8, 2021

Meeting minutes are documented in the City's project file. Key agency-specific correspondence is included in **Appendix B.**

2.7.5 Other Agencies

In addition to TAC, other agencies including federal departments, provincial ministries, municipalities, and utilities were contacted for information, comments and input to the study.

The list of agencies contacted includes:

Federal and Provincial Agencies and Stakeholders

- Ministry of Municipal Affairs
- Ministry of Transportation (MTO)
- Ministry of the Environment, Conservation and Parks (MECP)
- Ministry of Natural Resources and Forestry (MNRF)
- Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)
- Infrastructure Ontario (IO)
- Ontario Provincial Police (OPP)

Local and Regional Stakeholders

- Bell Canada
- "Enbridge Distribution Asset
- Management"
- Hydro One
- Ontario Power Generation Inc.
- Rogers Cable
- Blink Communications Inc.
- Aptum Technologies (previously Cogeco Data Services Inc.)
- Enersource Hydro Mississauga
- Zayo
- Telus Network
- Peel EMS
- Lisgar Residents Association
- Churchill Meadows Resident Association
- Mattamy Homes
- Your Home Developments

2.8 Indigenous Communities Engagement

Indigenous Communities who may have an interest in the study area were identified by the Ministry of Environment, Conservation and Parks (MECP) in the response to the Notice of Study Commencement letter dated April 30, 2020. These communities were included in the mailing list and received study notices through email. They were invited to participate in the study by providing input, feedback and also reviewing Public Information Centre materials available on the project website. A summary of correspondence with Indigenous Communities is provided in **Appendix C.** The Indigenous Communities that were contacted are:

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

Representatives from Huron-Wendat First Nation and Mississaugas of the Credit First Nation contacted the project team to acknowledge receipt of some notices sent. For the groups that did not respond, the project team followed up by email on March 29, 2021 to the Haudenosaunee Confederacy Chiefs Council and by telephone (via voice message) to the Six Nations of the Grand River to confirm if they had any interest in the study and to provide the opportunity for any comments, questions or feedback.

The Huron-Wendat First Nation requested a copy of the Stage I Archaeological Assessment for review and were provided it in February 2021. They concluded that they did not have concerns and were interested in participating in future fieldwork for Stage II Archaeological Assessment.

The Mississaugas of the Credit First Nation requested a copy of the Stage I Archaeological Assessment for review and were provided it in March 2021. They concluded that they did not have any comments but noted that they require FLR participation for all field work done as part of the Stage II Archaeological Assessment. They also noted that they will evaluate their interest in the Stage III Archaeological Assessment for the St. Peter's Catholic Cemetery pending conclusion of the Stage II Archaeological Assessment during Detailed Design.

The Haudenosaunee Confederacy Chiefs Council requested a meeting with the Ninth Line EA project team, which took place on April 21, 2021. The City is continuing to meet and engage in meaningful consultation (as required) to satisfy the Haudenosaunee Confederacy Chiefs Council requirements.

3 Planning and Policy Context

A summary of the Provincial, Regional, and Municipal planning and policy context is provided as it relates to the Ninth Line Class EA. As the study aims to serve future travel demands, the planning documents reviewed consider long-term recommendations and vision for the study area. The detailed policy review is documented in the **Transportation and Traffic Analysis Report** in **Appendix D**.

3.1 Provincial Planning Context

The following provincial planning policies/studies were reviewed to identify their relevance to the Ninth Line Class EA:

- Provincial Policy Statement (2020)
- Oak Ridges Moraine Conservation Plan (2017)
- Greenbelt Plan (2017)
- Parkway Belt West Plan (2017 Amendment)
- A Place to Grow Act / Growth Plan for the Greater Golden Horseshoe (2006, 2017)
- 2041 Regional Transportation Plan (RTP) (2018)
- Provincial Co-ordinated Plan Review (2017)
- Ontario's Cycling Strategy (2013)

Key points of relevance from these respective studies include:

Ninth Line between Eglinton Avenue and Derry Road does not fall within the boundaries of the Greenbelt Plan, nor the Oak Ridges Moraine.

The land surrounding Ninth Line within the study limits is classified as a 'Built-Up' area in the Growth Plan.

Ninth Line is not identified as part of the RTP's 2041 Frequent Rapid Transit Network. However, roads intersecting the study area, such as Eglinton Avenue, Britannia Road and Derry Road, are identified as Priority Bus Routes by 2041. Also, in the vicinity, Highway 407 is planned to accommodate future Frequent Regional Express Bus service.

3.2 Regional Planning Context

The following Regional planning policies/studies were reviewed to identify their relevance to the Ninth Line Class EA:

- Peel Region Official Plan (2018)
- Peel Region Long Range Transportation Plan (LRTP, 2019)
- Peel Region Sustainable Transportation Strategy (STS, 2018)
- Region of Peel Water and Wastewater Master Plan (2020);
- Peel Region Major Transit Station Area Study (ongoing)

Key points of relevance from these respective studies include:

The Peel Region Official Plan indicates that a trunk sewer is present along Ninth Line spanning from Osprey Marsh north of Britannia Road to approximately Erin Centre Boulevard, north of Eglinton Avenue. The Region of Peel Water and Wastewater Master Plan (2012) confirms the presence of a sanitary trunk sewer running below Ninth Line from Osprey Marsh to Erin Centre Boulevard.

The LRTP designates Ninth Line as a Local Major Road. However, as a city road, the LRTP does not identify improvements for Ninth Line within the study limits.

The LRTP does not indicate any nearby road widenings through 2041 that may impact the study area. However, the LRTP shows westward extensions to the existing cycling network along Derry Road and Britannia Road from Ninth Line to Highway 407. Priority Bus Routes are shown to cross the study area at Eglinton Avenue, Britannia Road and Derry Road.

Though the STS does not recommend specific actions for Ninth Line, it focuses on broadly applicable recommendations to enable and support walking and cycling throughout Peel Region, including:

- Providing comfortable, continuous cycling facilities and walking routes.
- Making roads safer for vulnerable road users.
- Influence personal travel decisions by providing necessary infrastructure and maintenance.

3.3 Municipal Planning Context

The following Municipal planning policies/studies were reviewed to identify their relevance to the Ninth Line Class EA:

- Mississauga Official Plan (OP 2019 Consolidation)
- The City of Mississauga Transportation Master Plan (TMP 2019)
- The City of Mississauga Development Charges Background Study (2018)
- City of Mississauga Cycling Master Plan (2018)
- Mississauga Strategic Plan (2009, 2016)
- MiWay5: Transit Service Plan (2016 – 2020)
- Development Charges Background Study (2019)
- Mississauga Noise Wall Replacement Policy (2003)
- Mississauga Culture Master Plan (2019);
- Mississauga Stormwater Quality Control Strategy (2012)
- Shaping Ninth Line (2018)
- Draft Ninth Line Lands Scoped Subwatershed Study (2017)

- Ninth Line Improvements: Derry Road West to Highway 401 EA (2014)
- City of Mississauga Natural Heritage and Urban Forest Strategy (2014)

Key points of relevance from these respective studies include:

The Mississauga Official Plan Long Term Road Network (Schedule 5) identifies Ninth Line as an arterial road. The study area is bisected by Regional arterials at Britannia Road and Derry Roads, by an arterial at Eglinton Avenue and by a major collector at Thomas Street. The OP Schedule 8 designates a right-of-way of 35m for Ninth Line within the study limits.

The OP Long Term Transit Network (Schedule 6) indicates a Potential 407 Transitway running north-south between Ninth Line and Highway 407. A potential Transitway Station is located at the southwest quadrant of the Ninth Line and Britannia Road intersection.

The OP's Long-Term Cycling Routes (Schedule 7) shows that Ninth Line within the study area is anticipated to be a Primary On-Road / Boulevard Cycling Route. The route is planned to connect with regional cycling facilities at Britannia Road and Derry Road, Primary On-Road / Boulevard Routes on Eglinton Avenue and Thomas Street, and with the Pipeline Corridor Trail.

Although the City of Mississauga Transportation Master Plan (2019) does not provide specific directions for the future of Ninth Line within the study limits, its goals are pertinent to the study and will help guide study recommendations to ensure the transportation system fulfills its essential role in city building. Improvements to Ninth Line will aim to create a street that is safe, accessible, integrated, connected, resilient and conducive to healthy communities.

The City of Mississauga Cycling Master Plan (2018) proposed to implement a multi-use trail along Ninth Line between Eglinton Avenue and the Mississauga-Halton Hills boundary.

The Development Charges Background Study (2019) identified the need to widen Ninth Line between Eglinton Avenue West and Derry Road West from two (2) to four (4) lanes, with an estimated timing year of implementation in 2023 – 2024 (Arterial Road System Items 1.1.17 and 1.1.18). Widening of Ninth Line north of the study area to Highway 401 is slated for 2029 – 2033.

The Shaping Ninth Line (2018) study undertook a preliminary transportation study to identify the required network improvements to accommodate traffic growth through 2041. It recommended the widening of Ninth Line south of Derry Road to Eglinton Avenue from two (2) to four (4) lanes as well as the addition of an eastbound through lane at the Eglinton Avenue and Ninth Line intersection. Active transportation improvements recommended included a multi-use path on the east side and a sidewalk on the west side of Ninth Line. The 2018 study's recommendations for Ninth Line are depicted in **Exhibit 3-1.**

Exhibit 3-1: Proposed Concept for Ninth Line per the Shaping Ninth Line Study (2018)

The Shaping Ninth Line (2018) Study also provided direction on the design of Arterial Roads in recognition of their role regionally and locally and as major gateways into Mississauga. Arterial Roads such as Ninth Line are to be designed as “complete streets” that serve a variety of functions with an emphasis on the highest level of design, cycling facilities, and pedestrian-supportive boulevards (6 m minimum). The guidelines encouraged wider sidewalks, street trees (1.75-2.0 m offset from the roadway), consistent paving, lighting and public art to enhance the pedestrian environment. Moreover, travel lane widths were recommended to be as narrow as possible to accommodate wider boulevards within the smallest possible right-of-way. Finally, acknowledging the impact of utilities and service infrastructure on the visual quality of the neighbourhood, the study recommended that utilities be buried below grade wherever possible and suggested integrating different utility services to minimize street clutter.

4 Land Use and Growth

4.1 Existing Land Use

The City of Mississauga Official Plan designates the lands adjacent to Ninth Line as follows:

- **"Neighbourhood"** east of Ninth Line within the study limits.
- **"Green System"** and **"Neighbourhood"** west of Ninth Line between Eglinton Avenue West and Derry Road West.

The City of Mississauga Official Plan also identifies the following three character areas surrounding Ninth Line:

- **The Churchill Meadows Neighbourhood**, located east of Ninth Line between Hwy 403 and Britannia Road West,
- **The Lisgar Neighbourhood,** located east of Ninth Line between Britannia Road West and the Canadian Pacific Railway (North of Derry Road)
- **The Ninth Line lands**, located west of Ninth Line between Highway 403 and Highway 407.

The Neighbourhood Character Areas are discussed in additional detail in the following sub-sections in accordance with the Mississauga Official Plan Schedules.

4.1.1 Churchill Meadows

The Churchill Meadows neighbourhood is bounded by Britannia Road to the north, Winston Churchill Boulevard to the east, Highway 403 and Eglinton Avenue to the south and Ninth Line to the west.

Along Ninth Line, Churchill Meadows is predominantly Residential Low-Density II, which permits the following uses:

- detached dwelling;
- semi-detached dwelling;
- duplex dwelling; and
- triplexes, street townhouses and other forms of low-rise dwellings with individual frontages.

At Britannia Road, Thomas Street and between Erin Centre Boulevard and Eglinton Avenue, Ninth Line frontages are designated Residential Medium Density, which permits all forms of townhouse dwellings.

The northeastern quadrant of the Ninth Line and Eglinton Avenue intersection is noted to be an entry point into the city. Therefore, the intersection is intended to promote built form of high architectural standards and discourages parking and loading areas at the streetlines. Landscape treatments at the corner are recommended here as well.

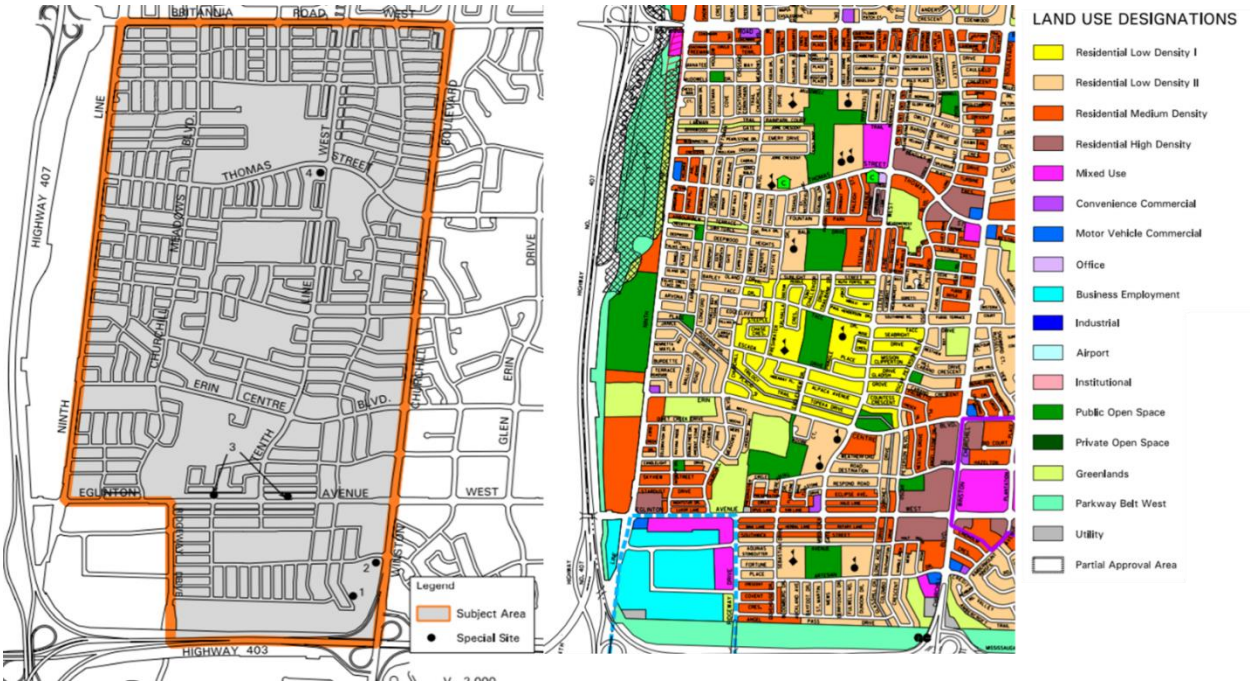


Exhibit 4-1: Churchill Meadows Character Area and Land Use
Source: City of Mississauga Official Plan (2019)

4.1.2 Lisgar

The Lisgar character area stretches northward from Britannia Road past Derry Road to the Canadian Pacific Railway and from Ninth Line east towards Tenth Line, as shown in **Exhibit 4-2**.

As with the Churchill Meadows neighbourhood, lands adjacent to Ninth Line are mostly Residential Low Density II with some Public Open Space and Greenlands uses at Cordingley Park and Osprey Marsh, respectively. Residential Medium Density uses are concentrated around Derry Road and Britannia Road.

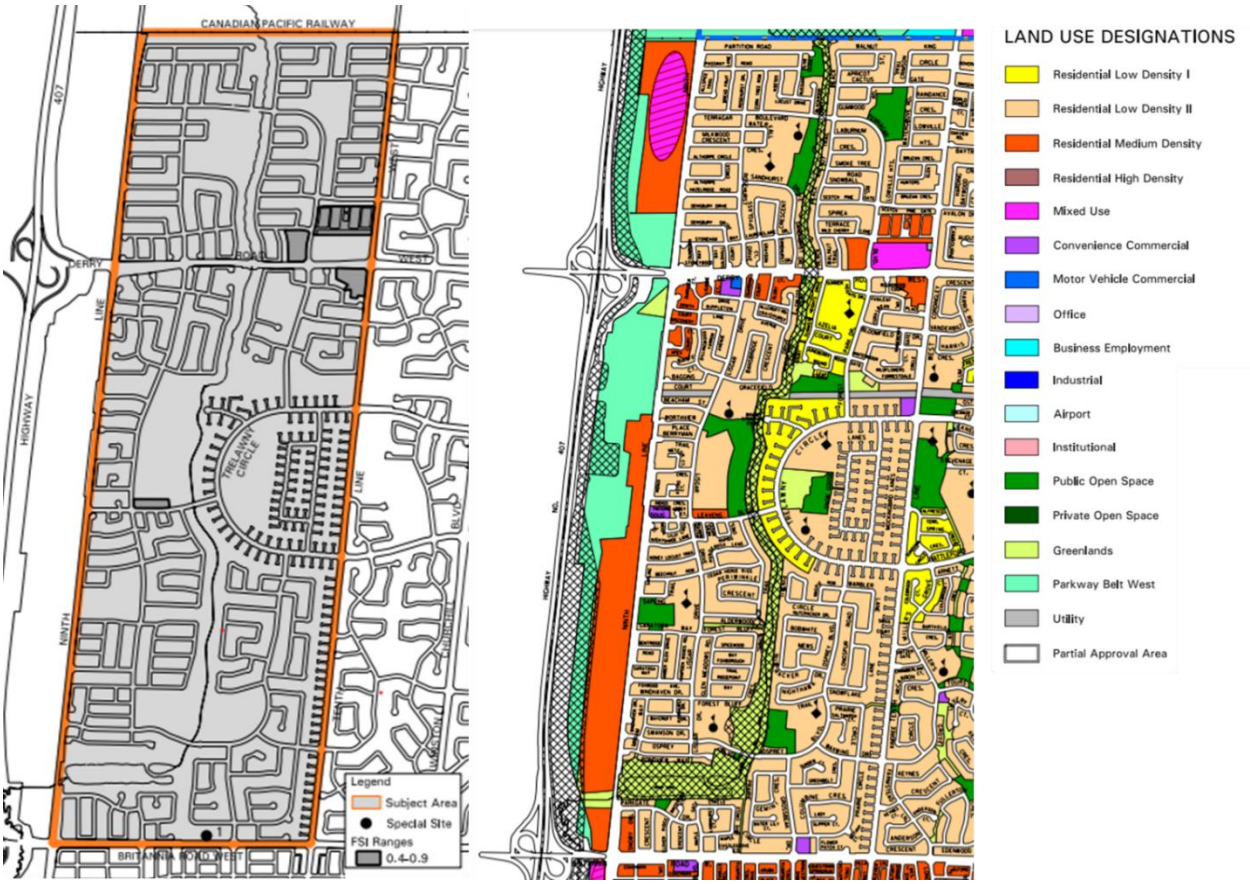


Exhibit 4-2: Lisgar Character Area and Land Use
Source: City of Mississauga Official Plan (2019)

4.1.3 Ninth Line Lands

In July 2018, the City of Mississauga Official Plan Amendment 90 created a new Neighbourhood Character Area for the Ninth Line Lands, west of the study area, and removed the Special Study Area identification over those lands. Following the completion of the Shaping Ninth Line Study in 2018, the Official Plan ratified area policies and Zoning By-law amendments for the Ninth Line Lands.

The OP land use maps M1 and M2, shown in **Exhibit 4-3**, illustrate the land use designations in the Ninth Line lands. These are composed of:

- **"Residential Medium Density"** for a portion of the lands west of Ninth Line and for major intersections such as Ninth Line and Eglinton Avenue West, Britannia Road and the southeast quadrant at Derry Road. No intensification centres are located in the study area.
- Some parcels of "**Public Open Space**", "**Greenlands**" and "**Parkway Belt West**"
- **"Utility"** southwest of Derry Road.

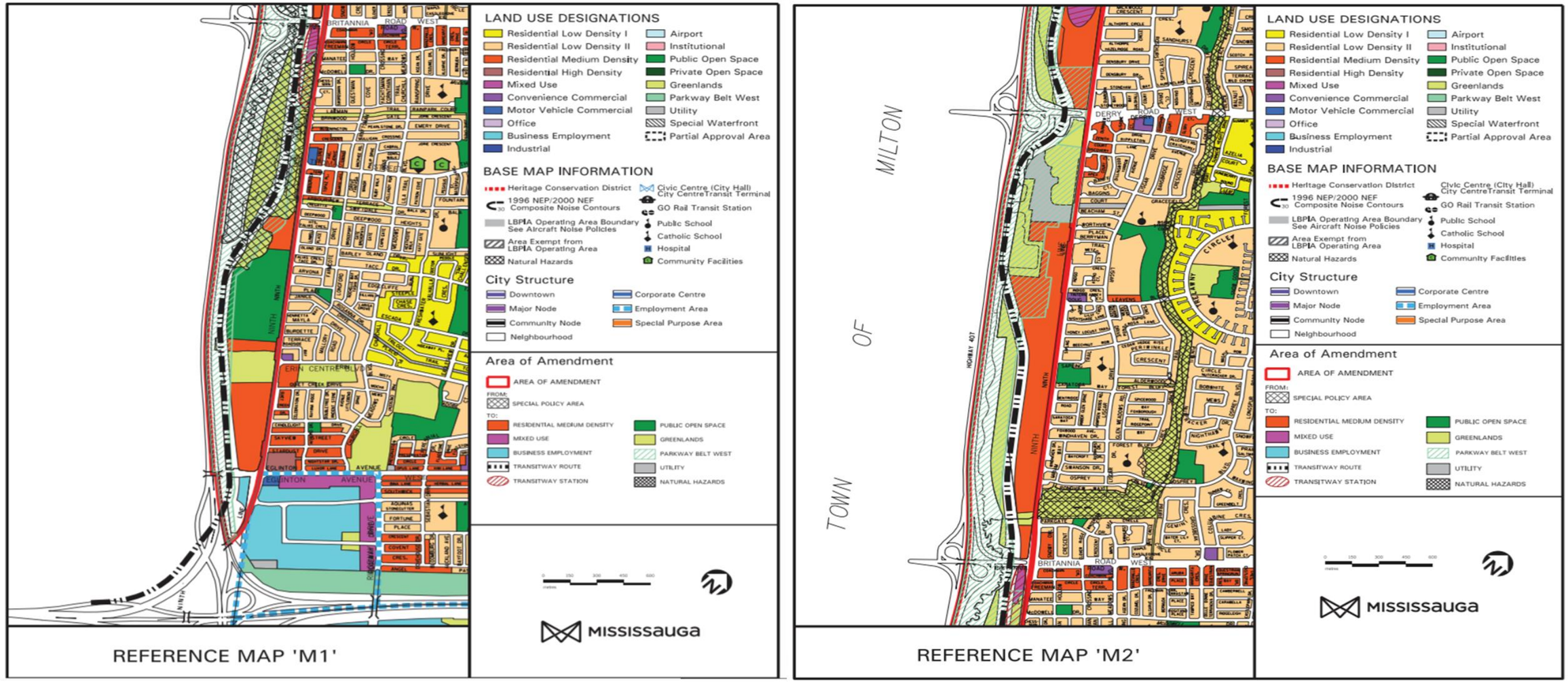


Exhibit 4-3: City of Mississauga Official Plan Land Use Maps
Source: City of Mississauga Official Plan (2019)

4.2 Future Development Context

4.2.1 Ninth Line Lands Vision

The Ninth Line Lands are Mississauga's last remaining greenfield lands. They are approximately 350 hectares (870 acres) in size and bound by Highway 407 to the west, Ninth Line to the east, Highway 401 to the north and the Highway 403/407 interchange to the south. These lands became part of the Region of Peel and the City of Mississauga on January 1, 2010 as a result of a municipal boundary realignment with Halton Region and the Town of Milton.

The plans for the Ninth Line Lands are in line with the vision of the Provincial Growth Plan and the regional and municipal Official Plans for compact, vibrant and complete communities that support healthy, active living. The development form is intended to be compact and efficient to better support walking, cycling and transit services.

The Proposed Land Use Concept shown in **Exhibit 4-4** indicates the future presence of:

- medium and high-density residential areas, comprising row houses and apartments;
- mixed use areas with residential and commercial employment opportunities;
- higher order transit (i.e. 407 Transitway);
- an overall minimum density target of 80 persons and jobs per gross hectare;
- a minimum density target of 160 persons and jobs per hectare around transit station areas;
- well-located business employment lands in proximity to 400-series highways; and
- protection for natural heritage and flood plain features.

A Natural Heritage System corridor is also being proposed and will result in a net gain in the amount and quality of natural area within the Ninth Line Lands.

At full build-out, the Ninth Line Lands would accommodate roughly 3,500 housing units, 8,500 residents and 510 jobs. The Land Use Concept developed is planned at a housing mix and density that would be more typically expected in intensification areas rather than a new greenfield area.

Because the Ninth Line Lands will be designed to encourage multi-modal transportation, the Ninth Line Class EA should also place an emphasis on active transportation improvements in the study area such as new sidewalks, multi-use paths and off-road trails.

The emerging land use concept plan can be found in the Shaping Ninth Line: Proposed Neighbourhood Character Area Policies, Zoning and Urban Design Guidelines (2018).

Proposed Land Use Concept

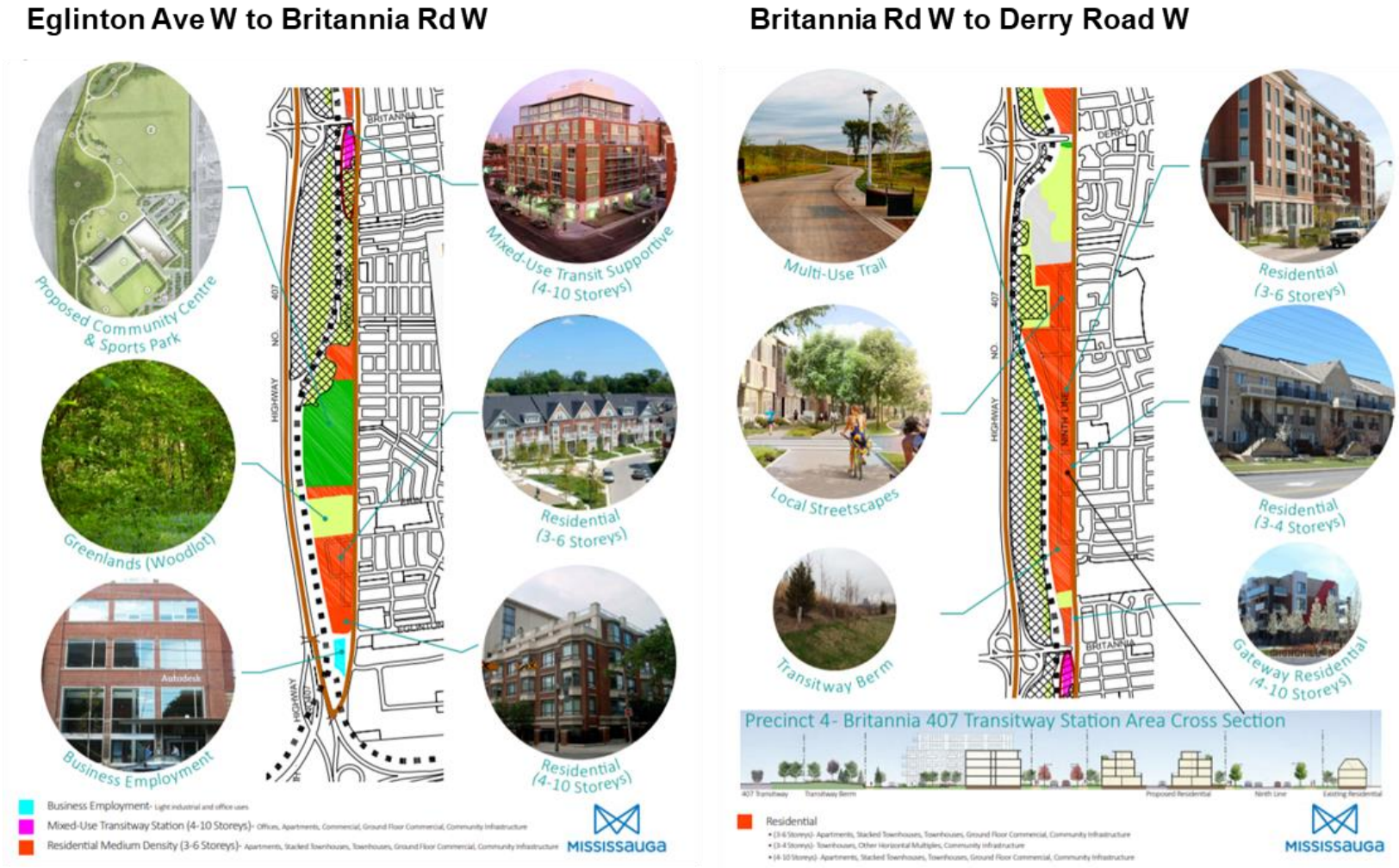


Exhibit 4-4: Shaping Ninth Line Proposed Land Use Concept

4.2.2 Churchill Meadows Community Centre

The City of Mississauga is building a new park and community centre as part of the overall Ninth Line Lands development. The Churchill Meadows Community Centre & Park will be located at 5320 Ninth Line, between Highway 407 and Sixteen Mile Creek to the West, and the Churchill Meadows community to the east. The community centre will be situated opposite Tacc Drive at its northern point and opposite Burdette Terrace toward the southern part.

The City is developing these lands as an all-season sports park with tournament-level lit sports fields, passive uses, a variety of outdoor amenities, natural areas and a community centre. In fall 2015, City Council approved a 25m pool and warm water tank for inclusion in the plans. The project is intended to serve the urban densification in the City's western boundary by providing residents with multi-use spaces for recreation.

A fitness trail system around the park will connect with a series of new and existing pedestrian trails extending into the city fabric. Given that the site is envisioned to become a destination point in the area, the recommendations for the Ninth Line Class EA must integrate with the new facilities where possible. The Churchill Meadows Community Centre is slated to open in 2021.

Exhibit 4-5: Churchill Meadows Community Centre & Park
Source: http://www.mississauga.ca/portal/residents/churchillmeadows

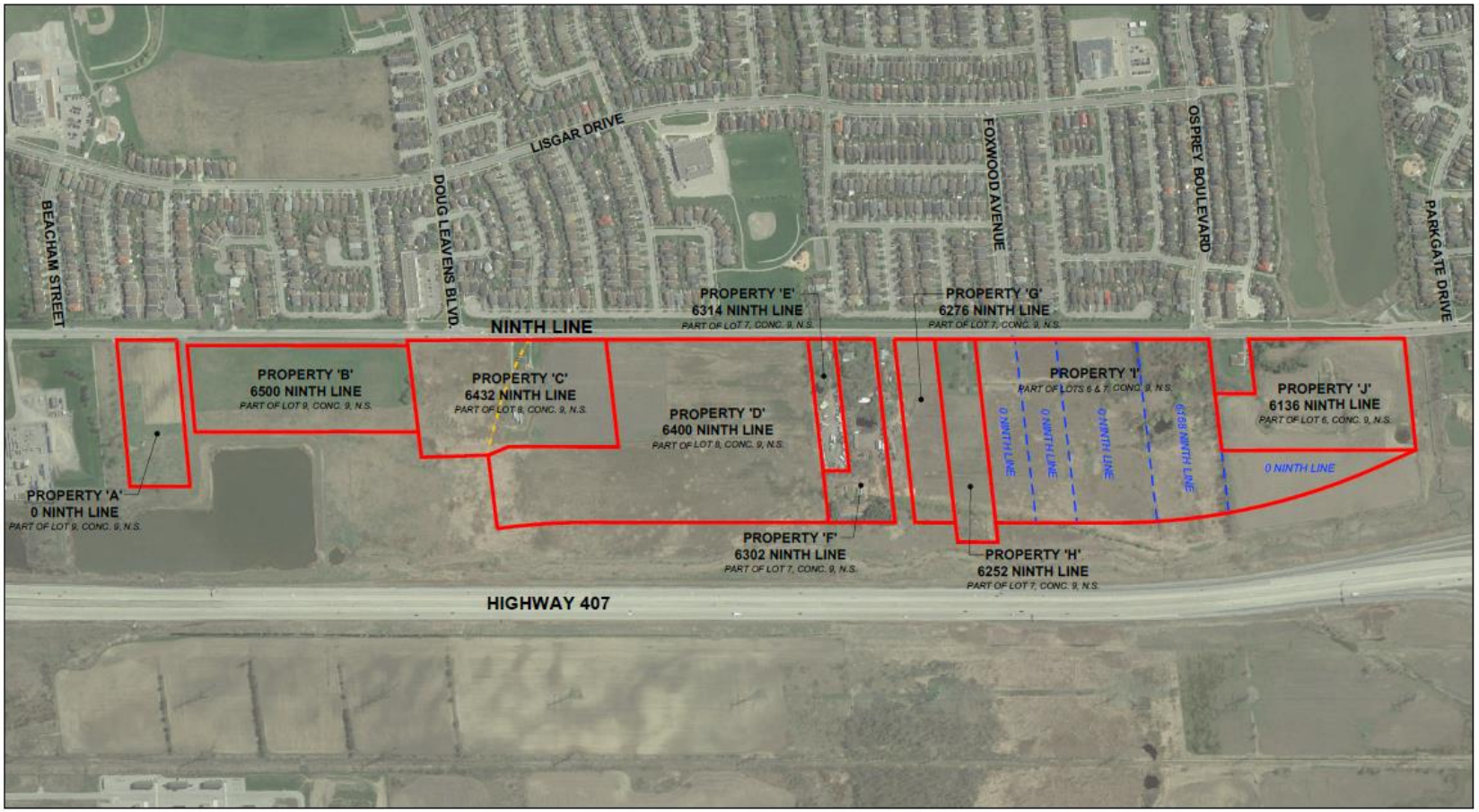
4.2.3 Development Applications

The City of Mississauga website has a dedicated page that documents development applications submitted by applicants in Mississauga for rezoning, Official Plan Amendments, and subdivision plans. This feature allows residents to stay informed about incoming projects impacting their neighbourhood and displays the studies, proposed plans and future uses associated with the development applications. **Table 4-1** synthesizes information on planned developments near the Ninth Line study area, made available to the public through the City Development Application **page**. The proposed developments, as of March 2021, are displayed in **Exhibit 4-6** and **Exhibit 4-7**.

Table 4-1: Planned Developments along the Ninth Line study area

Application ID	Address	General Location	Details
OZ 19 12 and OZ 19 13 00	0 Ninth Line (Property A))	West side of Ninth Line, south of Derry Road, from Worthview Place to Nightshade Lane (North Draft Plan)	**Gross Area:** 8.94 ha **Net developable Area:** 3.98 ha **Rear Lane Detached:** 0.62 ha / 28 units **Rear Lane Townhouse:** 0.81 ha / 69 units **Street Townhouse:** 1.7 ha / 101 units **Condos:** 0.85 ha / 140-200 units **Park:** 1.13 ha **School:** 0.43 ha
	6500 Ninth Line (Property B)		
	6432 Ninth Line (Property C)		
	6400 Ninth Line (Property D)	West side of Ninth Line, from Parkgate Drive to Nightshade Lane (South Draft Plan)	**Gross area:** 36.15 ha **Net Developable Area:** 9.25 ha **Rear Lane Townhouse:** 1.29 ha / 109 unit **Street Townhouse:** 1.73 ha / 94 units **Condominium Duplex:** 1.71 ha / 148 units **Condos:** 4.52 ha / 350-1360 units **Park:** 2.1 ha **Stormwater Pond:** 2.87 ha **School:** 0.22 ha **Greenlands:** 8.62 ha
	6302 Ninth Line (Property F)		
	6314 Ninth Line (Property E)		
	6302 Ninth Line (Property F)		
	6276 Ninth Line (Property G)		
	6252 Ninth Line (Property H)		
	6168 Ninth Line (Property I)		
	6136 Ninth Line (Property J)		
OZ 19 18 21T-M 19 6	5150 Ninth Line	North of Eglinton Avenue, east of Highway 407, west of Ninth Line	Medium density residential development that features a combination of traditional front loading, back-to-back, and dual-front / rear-lane townhouses (~135 units proposed).

Exhibit 4-6: 5150 Ninth Line Development



DERRY BRITANNIA DEVELOPMENTS LIMITED
PROPERTY ADDRESS AERIAL CONTEXT PLAN

PART OF LOTS 6,7,8 & 9, CONCESSION 9, N.S.
CITY OF MISSISSAUGA,
REGIONAL MUNICIPALITY OF PEEL

LEGEND
SUBJECT PROPERTIES
MPAC ASSESSED PROPERTY LIMITS
DELINEATION BETWEEN NORTH AND SOUTH DRAFT PLANS

SCALE NTS
AUGUST 26, 2019

GSAI
Glen Schnarr & Associates Inc.

Exhibit 4-7: 0-3500 Ninth Line, North and South Draft Plan Properties

5 Transportation Conditions

The following section summarizes the findings from the **Transportation and Traffic Analysis Report**. The report, which can be reviewed in **Appendix D,** provides a comprehensive overview of the following:

- The existing transportation system inventory
- The levels of service for pedestrians, cyclists and drivers
- Existing transit network and demand
- Existing mode share in the study area
- Collision history
- Future transportation conditions
- Conclusions and next steps

5.1 Transportation Inventory

Ninth Line is a north-south arterial two-lane roadway with a posted speed limit of 70 km/h. Within the study corridor, the majority of intersecting streets are T-intersections (east leg) as the west side of Ninth Line lands are currently undeveloped. Along its 6.2 km length, the Ninth Line study corridor is intersected by 25 streets, of which the following streets are signalized:

- Derry Road
- Doug Leavens Boulevard
- Osprey Boulevard
- Britannia Road
- Thomas Street
- Burdette Terrace (Community Centre access “Recently Constructed”)
- Henrietta Way (Community Centre access “Recently Constructed”)
- Erin Centre Boulevard
- Eglinton Avenue

The number of existing accesses along Ninth Line is minimal due to its role as an arterial road. Residences along Ninth Line’s east side predominantly face away from the street and can be accessed through roads feeding into the subdivisions. Existing access points along the study corridor are generally limited to the west side of Ninth Line, where approximately 20 ingress/egress points. Parking is prohibited on Ninth Line (both sides of the road).

Truck restriction signs on Ninth Line are north of Eglinton Avenue and south of Derry Road as well as at Thomas Street and Doug Leavens Boulevard. The Region of Peel Strategic Goods Movement Network Study (2013) identified Derry Road and Eglinton Avenue as connector truck routes. Ninth Line is also near major good movement corridors including Highways 401, 403 and 407, as well as the future proposed GTA West Corridor and Bramwest Parkway.

The Official Plan right-of-way (ROW) for Ninth Line is 35m. However, the existing ROW varies along the corridor between 22 m and 57 m as follows:

- Eglinton Avenue to Erin Centre Boulevard: 29 m to 40 m
- Erin Centre Boulevard to Britannia Road: 27 m to 40 m
- Britannia Road to Osprey Boulevard: 22 m to 57 m
- Osprey Boulevard to Doug Leavens Boulevard: 27 m to 32 m
- Doug Leavens Boulevard to Derry Road: 27 m to 38 m

5.2 Transportation Findings

Driving

The highest traffic volumes are found at Derry Road and Britannia Road, followed by Eglinton Avenue. With the exception of Derry Road, congestion on the Ninth Line corridor is concentrated in the southern half of the corridor, between Eglinton Avenue and Britannia Road. There are no existing capacity deficiencies at the minor intersections as access to the neighbourhoods is provided by a number of local and collector connections between the major roadways that distributes demand. Ninth Line is approaching its arterial capacity during some time periods, particularly during the morning and afternoon peak hours.

Future travel demand is projected to increase within the entire Ninth Line corridor. Solutions to improve vehicular mobility are required. Opportunities may include signal timing improvements and optimizations including coordination, auxiliary turning lanes, and widening for additional travel lanes.

Walking

Under existing conditions, Ninth Line within the study limits does not accommodate pedestrians adequately. Pedestrian facilities are lacking, especially on the west side of the street and travellers on foot must either tread over grass boulevards, walk on sections of paved and gravel shoulders, or share the roadway with vehicular traffic. For the short sections where pedestrian facilities are available, sidewalks are at most 1.5 m wide and are generally discontinuous. Pedestrian accessibility and visibility are a concern along Ninth Line: intersections often lack curbs at their corners which exposes pedestrians to turning vehicles, and crosswalk markings are not highly visible. Overall, the study corridor does not meet the requirements set for Accessibility for Ontarians with Disabilities Act.

Though pedestrian demand is currently low, plans for development of adjacent lands will increase pedestrian traffic along Ninth Line. Improvements to the pedestrian environment are needed on both sides of Ninth Line in anticipation of future growth but also to facilitate commuting and recreational movement for existing residents.

Cycling

Within the study limits, Ninth Line has no dedicated cycling facilities on its west side and for most of its east side. Cyclists must ride along the road shoulders or share the road with vehicles, which is less desirable due to existing traffic volumes and speed. The cycling experience has room for improvement.

There is the opportunity for future cycling infrastructure to connect with the existing sections of paved multi-use paths (MUPs) in the study area. There are opportunities for infrastructure to tie-in with cycling facilities on adjacent streets and with the larger cycling network in Mississauga. An improved cycling environment would serve existing and future study area residents and increase their level of comfort, confidence and safety in choosing to cycle.

Improved active transportation infrastructure is expected to increase the modal shares for walking and cycling.

Transit

Several transit service modifications along Ninth Line are planned by MiWay in the coming years to better serve transit users in and around the study area. However, these changes have little potential to improve transit users' experience if the existing congestion along Ninth Line is not addressed, as the resulting delays to transit service make this service unreliable and less attractive. Therefore, improvements that benefit drivers can also enhance transit service and reliability, especially during the peak periods. Moreover, opportunities to tackle deficiencies related to the interface between the roadway and the bus routes need to be considered. Enhancements to bus stops and waiting areas as well as improved connections between sidewalks and boarding / alighting zones can make transit more accessible to those with mobility issues.

Collision History

Collision history for the previous six years (2015-2019) was reviewed to identify the trends, patterns, hotspots, and opportunities to improve safety. Currently, Ninth Line is a long, undisturbed straightaway with little side friction caused by restricted sightlines, turning movements, or non-vehicle activity. There are few pedestrians and cyclists, and with the long sightlines, could give drivers the sense that the roadway is intended for higher speeds. Furthermore, there is currently no north-south signal coordination along Ninth Line, which means that north-south traffic is experiencing poor progression. These conditions combined can encourage faster driving as drivers try to make up for lost time due to unexpected, consecutive stops at signalized intersections.

There are opportunities to address current issues in the short-term through the installation of radar signs notifying drivers of the speed limit and their current travel speed, followed by monitoring and enforcement. This could be a first step to ensuring that any unintentional speeding is addressed. Signal coordination could also reduce the number of collisions and improve the corridor driving experience. The existing posted speed of 70km/h should also be reviewed. By lowering the posted speed it could help the Ninth Line corridor evolve and be consistent with the planned built form, which supports multi-modal trip choice with the provision of dedicated and continuous pedestrian and bicycle infrastructure and supports slower driving conditions.

Future Travel Demand Needs

As the last piece of greenfield in Mississauga, the majority of the Ninth Line Lands between Ninth Line and Highway 407 south of Derry Road and north of Eglinton Avenue, the area is expected to be developed by 2031, where the population is expected to increase substantially through 2041. Transportation infrastructure is already at capacity along the southern portion of the Ninth Line study area and if not addressed will be exacerbated in the future with the new developments along the corridor.

Based on the demand forecasts, if Ninth Line is not widened, the existing capacity of Ninth Line will not be able to accommodate the increased traffic in either 2031 or 2041, especially for the peak direction. Morning (AM) southbound volume approaching Eglinton Avenue would be about 50% over capacity by 2031. Afternoon (PM) northbound volumes would also be about 50% over capacity just north Eglinton Avenue. Widening of the roadway will accommodate the traffic growth and alleviate the congestion on Ninth Line.

The widening of Ninth Line would also alleviate the congestion at the screenline level. The screenline analysis indicates that the AM peak hour southbound traffic volumes and the PM peak hour northbound traffic volumes at the screenline north of Eglinton will be at or approaching capacity by 2041. Without widening of Ninth Line, northbound and southbound traffic would divert to other north/south arterials such as Tenth Line West and Winston Churchill Boulevard or local roads within the neighbourhoods.

6 Physical and Environmental Constraints

6.1 Archaeology

A Stage 1 Archaeological Assessment (AA) was conducted by Archaeological Services Inc. (ASI), to determine the potential for archaeological resources within the study area. The review of existing conditions entailed the investigation of past and present land use, the settlement history and any other relevant historical and geographical information pertaining to the study area. Findings of the desktop review are documented in the **Stage 1 Archaeological Assessment** in **Appendix E**.

The Stage 1 background study determined that 46 previously registered archaeological sites are located within one kilometre of the Study Area, four of which are within the Study Area but do not exhibit cultural heritage value or interest (CHVI). The property inspection determined that some portions of the Study Area exhibit archaeological potential and will require Stage 2 assessment.

In light of these results, the following recommendations are made:

1. Portions of the Study Area exhibit archaeological potential. If impacted, these lands require Stage 2 Archaeological Assessment by test pit/pedestrian survey at five metre intervals, where appropriate, prior to any proposed construction activities;
2. St. Peter's Catholic Cemetery is located within the Study Area. All cemetery lands should be avoided by the project designs. A Stage 3 Cemetery Investigation will be required on any lands impacted by the project within 10 metres of the cemetery property to confirm the presence or absence of unmarked graves:
    - The Stage 3 cemetery investigation entails the mechanical removal of topsoil where possible within 10 metres of the cemetery, under the supervision of a licensed archaeologist. The exposed subsoil will then be shovel-shined and thoroughly examined for the presence of burial shafts;
    - Prior to conducting any Stage 3 investigations, Stage 2 survey should be conducted within the areas of impact to locate any near-surface finds.
    - Stage 2 Archaeological Assessment should include archival research to determine if there are records associated with the cemetery that may assist with the identification of boundaries and burial locations in advance of the Stage 3 Cemetery Investigation.
    - Any proposed impacts adjacent to the cemetery should be done in consultation with the Bereavement Authority of Ontario.
3. The remainder of the Study Area does not retain archaeological potential on account of deep and extensive land disturbance, low and wet conditions, or slopes in excess of 20 degrees. These lands do not require further archaeological assessment; and,

4. Should the proposed work extend beyond the current Study Area, further Stage 1 Archaeological Assessment should be conducted to determine the archaeological potential of the surrounding lands.

A summary of the Stage 1 Archaeological Assessment results is show in **Exhibit 6-1** through **Exhibit 6-3** on the following pages. Photo numbers shown in the exhibits can be found in **Appendix E.**

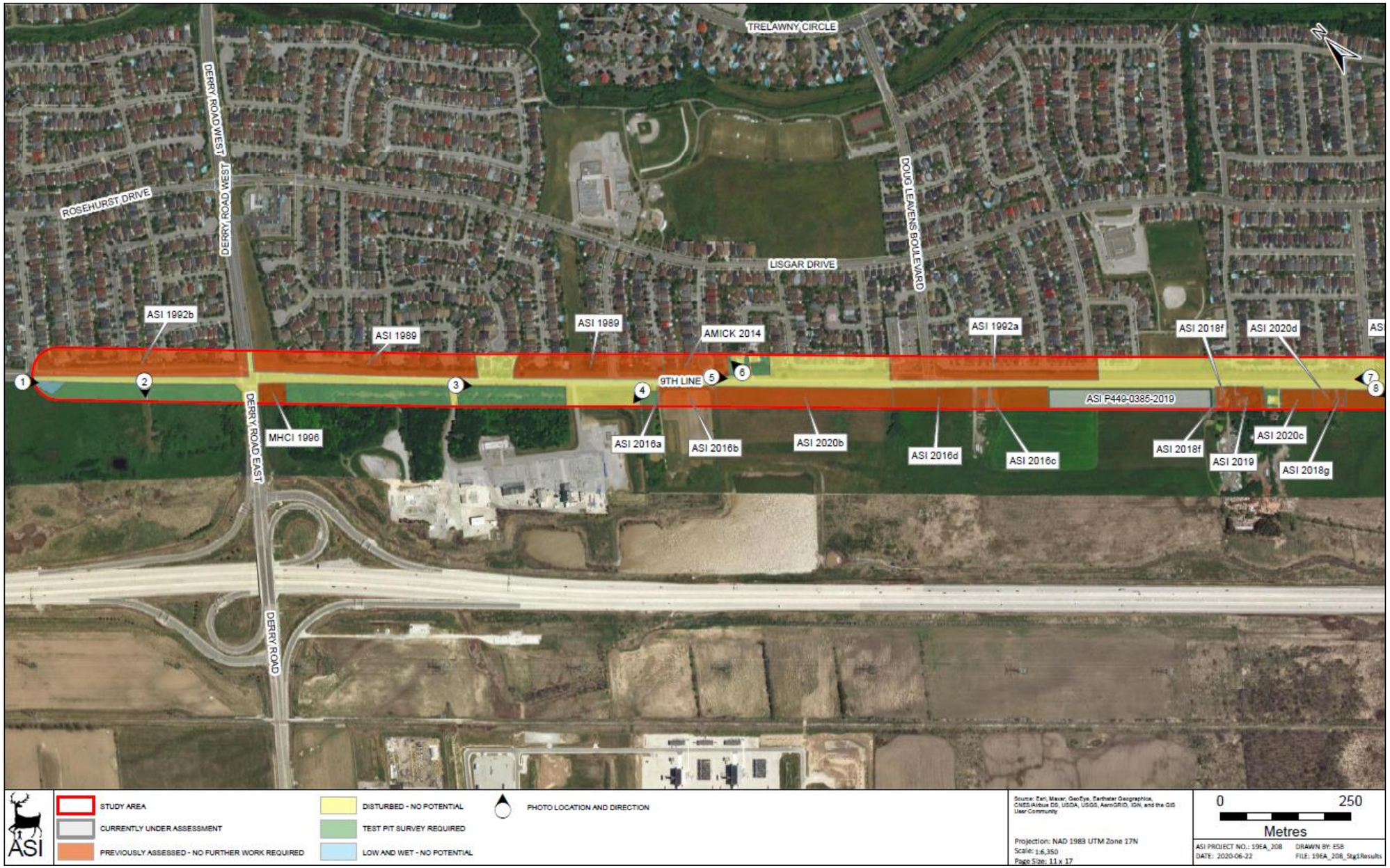


Exhibit 6-1: Results of Stage 1 AA (Sheet 1)

Source: Stage 1 Archaeological Assessment Report (ASI, 2020)

Exhibit 6-2: Results of Stage 1 AA (Sheet 2)
Source: Stage 1 Archaeological Assessment Report (ASI, 2020)

Exhibit 6-3: Results of Stage 1 AA (Sheet 3)
Source: Stage 1 Archaeological Assessment Report (ASI, 2020)

6.2 Built Heritage and Cultural Landscape

A Cultural Heritage Resource Assessment (CHRA) was prepared by ASI to identify cultural heritage resources in the study area. The purpose of the report is to inform the existing conditions review for the Ninth Line Class EA and present a built heritage and cultural landscape inventory of above-ground cultural heritage resources. The report summarizes legislation and municipal heritage policy context, the historical development within the study area including Indigenous and European land use and settlement, and reviews historical mapping and existing heritage inventories. A copy of the **Cultural Heritage Resource Assessment** is provided in **Appendix F** of this report.

The findings from background historical research and secondary source material indicate a study area with a rural land use history dating back to the late nineteenth century. One built heritage resource (BHR) and four Cultural Heritage Landscapes (CHL) were identified within and/or adjacent to the Ninth Line study area from Eglinton Avenue West to Derry Road West. A cultural heritage resource number has been assigned to each resource. An inventory of these cultural heritage resources within the study area and contributing properties is presented in **Table 6-1.**

Table 6-1: List of Cultural Heritage Resources Identified

CHR #	Location/Name	Property Type	Heritage Recognition
CHL 1	5104 Ninth Line	Farmscape	Listed by the City of Mississauga Heritage Register
CHL 2	5768 Ninth Line	Farmscape	Removed from the City of Mississauga Heritage Register
CHL 3	6056 Ninth Line	Church and Cemetery	Listed by the City of Mississauga *Cultural Landscape Inventory*
CHL 4	7044 Ninth Line	Remnant Farmscape	Listed by the City of Mississauga Heritage Register
BHR 1	6671 Ninth Line	Residence	Designated under Part IV of the Ontario Heritage Act

Three (3) cultural heritage landscape resources are listed in the Heritage Register for Mississauga and one built heritage resource (1) is designated under Part IV of the Ontario Heritage Act. The City of Mississauga confirmed that CHL 2 was removed from the Heritage Register for Mississauga as of March 21, 2021. The identified cultural heritage resources are historically, architecturally, and contextually associated with land use patterns in the City of Mississauga. Their location is shown in **Exhibit 6-4**.

Exhibit 6-4: Cultural Heritage Resources Identified on Ninth Line
Source: Cultural Heritage Resource Assessment Report (ASI, 2021)

6.3 Noise

Based on the Ontario Ministry of Transportation (MTO)/Ministry of the Environment, Conservation and Parks (MECP) Noise Protocol, where an existing roadway is proposed to be modified/widened adjacent to a Noise Sensitive Area (NSA), MECP requires that the future noise levels without the proposed improvements be compared to the future noise level with the proposed improvements. The assessment is completed at the Outdoor Living Area (typically backyards) of each NSA. The provision of noise mitigation is to be investigated should the future noise level with the proposed improvements result in a greater than 5 dBA increase over the future noise level without the proposed improvements. If noise mitigation is provided, the objective is a minimum 5 dBA reduction. Mitigation will attempt to achieve levels as close to, or lower than, the objective level as is technically, economically and administratively feasible.

The City of Mississauga has a noise policy. Noise barriers, if warranted, will be designed according to City of Mississauga policy 09-03-03 Noise Attenuation Barriers on Major Roadways. Replacement of existing noise barriers should be considered if the existing noise barriers are in poor physical condition or if the daytime sound levels with the project in place ("build" scenario) are above 60 dBA.

The Noise Assessment was conducted by SLR Consulting (Canada) Ltd., based on a selection of several private residential homes in the vicinity of the Ninth Line corridor between Eglinton Avenue and Derry Road. In total, 23 receiver locations located adjacent to Ninth Line were selected to represent the potential noise impact to noise sensitive areas in proximity to Ninth Line between Eglinton Avenue and Derry Road. The noise analysis is provided in **Appendix P**, including a table of the selected receiver locations.

Based on analysis using approved simulation techniques and software, the potential change in noise levels are predicted to be less that 5 dBA for all receiver locations on the east side of Ninth Line between Eglinton Avenue and Derry Road, as a result of the proposed improvements to Ninth Line when compared to the future without roadway improvements condition.

It should be noted that any future new residential subdivision development (west side) along the Ninth Line corridor will have to carry out noise analyses in accordance with MECP requirements as part of the development application process under the Planning Act. These studies would recommend the provision of outdoor and indoor noise attenuation measures and the inclusion of noise warning clauses on title of affected properties; these are outside the scope of the Ninth Line EA Study.

Therefore, the consideration of noise mitigation is not warranted based on MTO/MECP Noise Protocol.

6.4 Existing Streetscape

From Eglinton Avenue to Derry Road, the current corridor includes an asymmetrical arrangement of land uses and building frontages. On the east side, predominantly low-rise residential dwellings in single and semi-detached forms are present. On the west side, the lands

between Ninth Line and Highway 407 are for the most part fallow or in a state of transition waiting for redevelopment to occur. The Osprey Marsh, north of Britannia Road, on the east side of the corridor provides a departure from the residential uses and creates a unique point of interest.

The residential properties on the east side display a range of frontage conditions. In some segments, dwellings primary entrances are along Ninth Line, while in other segments, dwellings have either rear-lotted or side-lotted configurations or window streets.

There are inconsistent boulevards within the Ninth Line study area, with segments that either have an urban section, rural section, or shift from curb-and-gutter on one side to shoulder and vegetated ditch on the other. In addition, there are substantial segments of the street that have no pedestrian facilities, with large gaps in-between sidewalks where they are provided, and there is no dedicated cycling infrastructure provided within the study corridor. For most of the study corridor, high voltage hydro infrastructure currently exists on the east side of Ninth Line.

Much of the current vegetation is a remnant of the rural land uses, screening of property boundaries, or introduced as part of the more recent residential development in the form of planted berms and buffers. Osprey Marsh provides a substantial wetland frontage on the east side of Ninth Line, north of Britannia Road.

6.5 Natural Environment

A Natural Environment Assessment (NEA) was conducted by Natural Resource Solutions Inc. (NRSI) to inform the Ninth Line Class EA and preliminary design. Terrestrial and aquatic field surveys were undertaken within the study area to characterize natural features and identify those that are significant and sensitive and have potential to be adversely affected by the proposed undertaking. A total of nine site visits were completed between March and June 2020. A tree inventory was also completed and documented in the study's Tree Protection Plan (TPP), **Appendix H**. Field investigations focused on areas within and immediately adjacent to the Ninth Line Right-of-Way (ROW) that were most likely to be potentially impacted by the proposed undertaking, but included lands further removed from the road within the Ninth Line lands as could be observed from the ROW boundary. The work undertaken in the NEA Study is supplemented with the ongoing and completed studies to support the planned future development on undeveloped (west side) lands adjacent to the Ninth Line study corridor, referred to as the Ninth Line Lands. These studies are referenced in the NEA and include the Draft Ninth Line Lands Scoped Subwatershed Study, Phase 1 Background Report and Study Area Characterization (AFW 2015), Phase 2 (Impact Assessment and Mitigation Strategy) (AFW2017)), and Phase 3 (Implementation and Monitoring (Wood 2020)). The Subwatershed Study is also integrated with the on-going Class EA for the MTO Highway 407 Transitway which traverse the Ninth Line Lands parallel to Highway 407. It is noted various natural heritage features and ecological functions within the Ninth Line Lands are associated with the Ninth Line EA corridor, and the Subwatershed Study's identified impacts (e.g. removals/relocations) and planned mitigation from the Subwatershed Study are relevant to this NEA.

Conservation Halton regulates all watercourses, valleylands, wetlands, Lake Ontario and Hamilton Harbour shoreline and hazardous lands, as well as lands adjacent to these features. The study area contains tributaries of the East Lisgar Branch of Sixteen Mile Creek and the flooding and erosion hazards associated with these watercourses. The area also contains wetlands of various sizes. Conservation Halton regulates a distance of 15m from the greater of the limit of flooding or erosion hazards; 120m from the limit of wetlands that are greater than 2ha in size or that are provincially significant; and 30m from all other wetlands. Permission is required from Conservation Halton to undertake development within their regulated area. Areas of flood water "spill" that extend outside of a floodplain are also subject to Conservation Halton policies and permitting requirements.

Please refer to **Appendix G and Appendix H** for the Natural Environment Assessment Report and Tree Protection Plan (including tree inventory). The natural environmental constraints are presented in **Exhibit 6-5** and **Exhibit 6-6**.

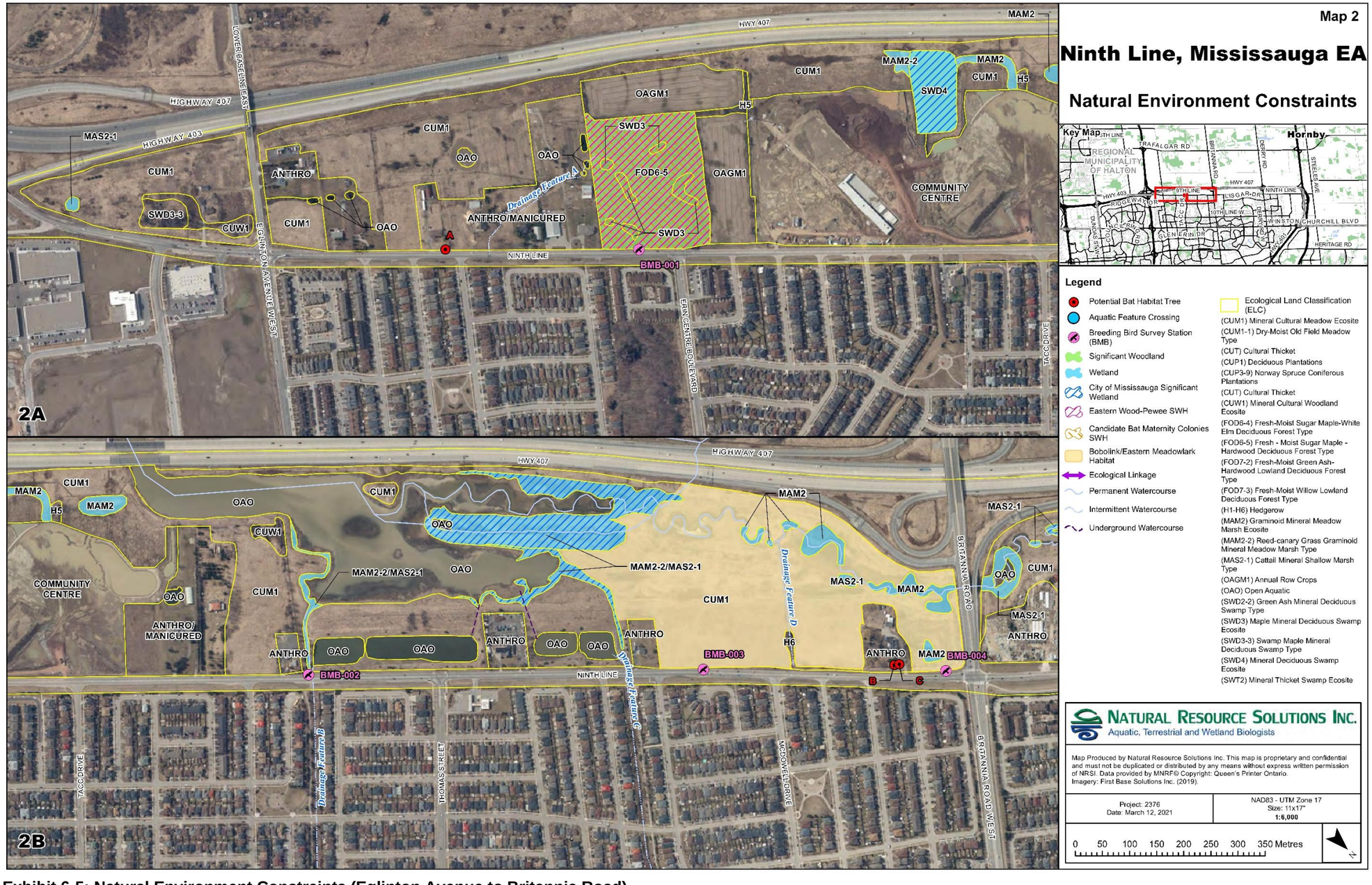


Exhibit 6-5: Natural Environment Constraints (Eglinton Avenue to Britannia Road)
Source: Natural Environment Assessment Report (NRSI, 2021)

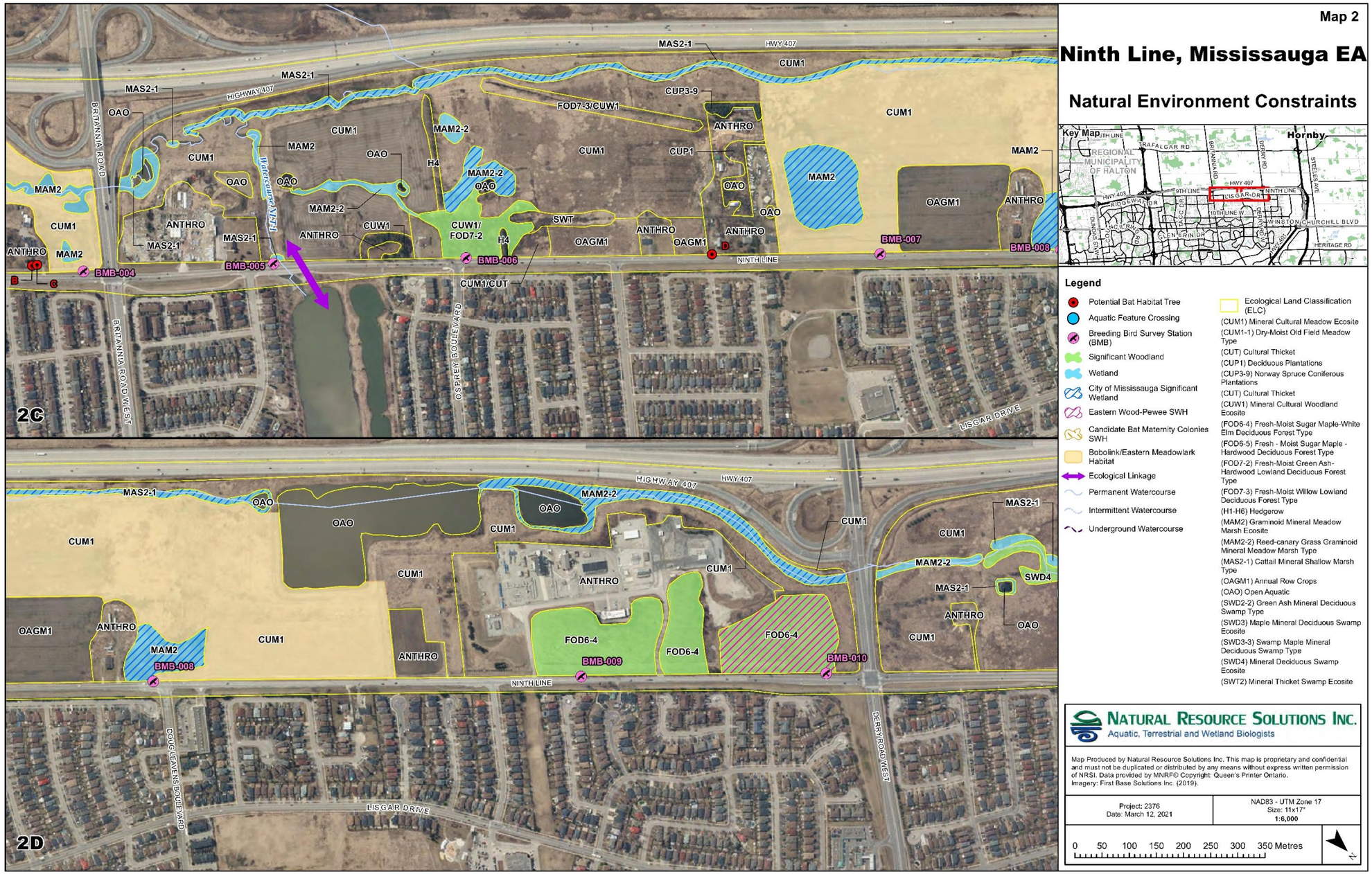


Exhibit 6-6: Natural Environment Constraints (Britannia Road to Derry Road)
Source: Natural Environment Assessment Report (NRSI, 2021)

6.5.1 Vegetation

Natural features on the west side of the Ninth Line corridor are primarily open cultural meadow, stormwater management ponds and anthropogenic land uses, with smaller areas of woodlands and wetlands. The ecological land classifications are mapped out in **Exhibit 6-5** and **Exhibit 6-6** and are classified as cultural (CUM-1, CUM1-1, CUT, CUP1, CUP3-9, CUW1, H1-H6), woodland (FOD6-4, FOD6-5, FOD7-2, FOD7-3), wetland (MAM2, MAM2-2, MAS2-1, SWD2-2, SWD3, SWD3-3, SWD3, and SWT2), open water (OAO) and agricultural (OAGM1).

The majority of plant species inventoried (174 plant species within the study area) are considered urban-tolerant and reflective of disturbed or culturally-influenced conditions.

The more mature woodland features are considered to be of relatively good ecological condition.

Nine-hundred and eighty-three (983) trees were inventoried within the EA study area comprising of 40 species. Approximately 90% of these trees are identified as public trees within the road right-of-way. The tree inventory is documented in the Tree Protection Plan in **Appendix H.**

6.5.1.1 SIGNIFICANT VEGETATION

A total of 17 regionally rare vegetation species were inventoried within the Ninth Line Lands during the Subwatershed Study and 10 regionally rare species were identified in the Ninth Line Corridor Study (NSE 2012, AFW 2015). The locations were not mapped and therefore can not be confirmed if adjacent or within the EA study area. The Subwatershed Study also identified Provincially Significant Kentucky Coffee-Tree south of Britannia however these plants were not considered significant as they were not naturally occurring.

During the EA Study area field surveys, no federally or provincially significant species were inventoried. However the EA Study area field surveys inventoried eleven regionally significant species. Of which one species, White Spruce, although listed as regionally significant, is considered non-significant where it is located within the study area. The remaining ten regionally significant species are Spotted Geranium, Common Evening-primrose, Old-field Cinquefoil, Cleavers, Blunt-leaved Bedstraw, Peach-leaved Willow, Sandbar Willow, Tuckerman's Sedge, Great Duckweed and Michigan Lily. These individuals were identified closer to the road and require consideration within the impact assessment and associated avoidance or mitigation measures.

While regionally rare vegetation species in and of themselves do not represent policy-based constraints to road design or construction, their presence renders additional significance to the features in which they are located. Measures should be taken to avoid impacts to regionally significant vegetation and to protect individual plants during construction where necessary. If impacts cannot be avoided, the individual plants should be relocated to an appropriate site, where feasible.

6.5.1.2 SIGNIFICANT WOODLANDS

Based on the criteria for woodland significance in the City of Mississauga's Natural Heritage and Urban Forest Strategy Report (AFW 2015), the following woodlands within the Ninth Line EA study area are considered significant:

- Fresh-Moist Sugar Maple Hardwood-Deciduous Forest (FOD6-5), located opposite Erin Centre Boulevard, immediately west of Ninth Line;
- Mineral Cultural Woodland/ Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest complex (CUW1/FOD7-2), located opposite Osprey Boulevard, immediately west of Ninth Line; and
- Fresh-Moist Sugar Maple-White Elm Deciduous Forest (FOD6-4), comprised of three adjacent mapped units, south of Derry Road West and immediately west of Ninth Line.

It is noted in the Subwatershed Study the CUW1/FOD7-2 woodland was not identified for removal but was not incorporated into the Natural Heritage System (NHS).

No woodlands exist on lands to the immediate east of Ninth Line that could be impacted by changes to the Ninth Line cross-section. These woodland features represent a constraint to Ninth Line ROW upgrade planning and design, and should be preserved in their entirety. If complete avoidance is not possible, direct impacts should be minimized to the extent possible.

6.5.1.3 WETLANDS

Several wetland features were mapped within the Ninth Line Lands, some of which fall within the EA study area. No Ontario Ministry of Natural Resources and Forestry (MNRF) wetlands occur within the EA study area to the east of Ninth Line. No Provincially Significant Wetlands occur within the EA study area. However, the Ninth Line Corridor Study (North-South Environmental 2012) identified all wetlands within the Ninth Line Lands to be locally significant due to the scarcity of wetland cover within Mississauga Watercourses and Fish Habitat.

According to the Mississauga Official Plan criteria for wetland significance, certain wetlands within the study area would be deemed significant due to their size being >0.5ha. Within or immediately adjacent to the ROW, this only includes the Graminoid Mineral Meadow Marsh located opposite Doug Leavens Boulevard, whereas the other City-significant wetlands are further removed from the road right-of-way and are less likely to be impacted.

Wetlands immediately west of Ninth Line that may be impacted by the undertaking comprise meadow marsh features that have originated from past land use activities, such as where they have formed along narrow agricultural drainage swales, or where surface water collects over relatively low-pervious soils in idle/former agricultural fields. These features have low levels of biological diversity and provide relatively poor quality wetland habitat. Nonetheless, it is recommended that wetland impacts be avoided in the design and construction of the planned road improvements to the extent feasible, with more emphasis on the retention of City-defined Significant Wetlands. Impacts to these wetlands, and their surrounding regulated lands, are also prohibited unless permitted by Conservation Halton or Credit Valley Conservation. If localized impacts are unavoidable, as determined through the EA, these should be minimized to the

extent possible. Appropriate mitigation measures would be required as part of future impact assessments completed during Detailed Design.

6.5.2 Wildlife

Ninety (90) bird species were recorded within 10km of the study area. Of the fourty-one (41) bird species recorded during the bird surveys, thirty-seven (37) species displayed evidence of breeding. Three bird Species At Risk (SAR) were identified during the surveys within the study area: Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), and Eastern Meadowlark (*Sturnella magna*). One bird Species, Eastern Wood-Pewee of Conservation Concern (SCC) was recorded during the surveys.

Twenty-six (26) reptile and amphibian species were recorded within 10km of the study area. No herpetofauna species were observed incidentally during site investigations.

Thirty-one (31) mammal species were recorded within 10km of the study area. Five (5) species were observed during site investigations and include Eastern Cottontail, Meadow Vole, Muskrat, Eastern Grey Squirrel and Eastern Chipmunk. Potential SAR habitat was identified for Bats in four trees. No significant mammal species were documented in the earlier survey work within the study area (AFW 215, NSE 2012, Savanta 2020, LGL 2020b).

Sixty-three (63) butterfly species and fourty-two (42) odonate species are known within 10 km of the study area. No butterfly or odonate species were recorded during the site visit. One SCC butterfly, Monarch (Danaus plexipus) was documented in the Ninth Line Lands during earlier surveys (AFW 2015, NSE 2012) and observed foraging within open meadows and considered likely breeding in areas containing milkweed. No SAR or SCC odonates were identified in earlier studies (AFW 2015, NSE 2012).

6.5.2.1 SAR - BARN SWALLOW

Barn Swallows were observed during the EA field surveys with evidence of probable breeding and possible nesting. They were observed foraging over open lands west of Ninth Line and flying over meadow, meadow marsh and agricultural fields. It is noted the house located at 6314 Ninth Line, where possible nesting was identified, has since been demolished in September 2020. However there are additional structures within the Ninth Line Lands that provide suitable nesting habitat.

In consideration of the previous field studies (AFW 2015, Savanta 2020 and LGL2020b) and the supplementary surveys for the EA, Barn Swallow habitat, although identified within the Ninth Line Lands, is not identified within the immediate EA study area. As such it not considered a constraint for the road improvements as it is not anticipated to be impacted by the road corridor. Atypical but periodic Barn Swallow nesting occurrences will require inspection for nesting prior to any works in the culverts.

6.5.2.2 SAR - BOBOLINK AND EASTERN MEADOWLARK

Bobolink and Eastern Meadowlark were observed within CUM1 during the EA field surveys. The field observations represent evidence of possible and probable breeding for Bobolink within the CUM1 feature. The field observations represent evidence of possible breeding for Eastern Meadowlark within the CUM1 feature.

In consideration of the previous field studies (AFW 2015, Savanta 2020 and LGL2020b) and the supplementary surveys for the EA, habitat for Bobolink and/ or Eastern Meadowlark is identified within CUM1 features.

6.5.2.3 SAR – CHIMNEY SWIFT

Suitable habitat for Species at Risk Chimney Swift (*Chaetura pelagica*) was confirmed within the study area based on the presence of houses with chimneys adjacent to the road right-of-way. However no Chimney Swifts were observed during the EA site visits. Road improvements are not anticipated to impact hose chimney structures and as such habitat impacts are not anticipated.

6.5.2.4 SCC - EASTERN WOOD-PEWEE

Breeding habitat for the SCC Eastern Wood-Pewee was confirmed within the Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5) during both the subwatershed studies field investigations (AFW 2015) as well as during the Ninth Line EA fieldwork. Breeding bird surveys completed for the property immediately south of the FOD6-5 woodland also recorded the presence of Eastern Wood-Pewee within this feature (Savanta 2020).These results provide strong evidence of a long-term recurring Eastern Wood-Pewee breeding territory within the woodland. Based on survey data, only one singing male has been recorded within the feature at a time. This is in line with the expectation that the FOD6-5 woodland would likely support a single breeding territory based on its size.

6.5.2.5 SAR - BAT SPECIES

Detailed surveys of potential bat roosting or maternity colony habitat have not been completed throughout the entirety of the study area to date. However, the woodlands that fall within the study area were previously noted as containing suitable habitat for bats due to the presence of several large tree snags. These woodlands may therefore provide habitat for SAR bats.

Following a conservative approach, there are four potential bat habitat trees that were identified in the EA study area, which may provide suitable bat roosting habitat. As the habitat is assumed for Species at Risk, impacts to these trees is prohibited unless permitted/authorized by MECP under the Endangered Species Act (ESA).

6.5.2.6 CANDIDATE SWH – BAT MATERNITY COLONIES

Candidate Significant Wildlife Habitat (SWH) for Bat Maternity Colonies was identified within the FOD6-5 woodland at the south end of the study area as part of the Subwatershed Study (AFW 2015). This conclusion was based on field surveys which confirmed a density of >10 snags/ha

within the woodland, which meets a criterion to render the feature Candidate SWH (MNRF 2015). Direct impacts to this feature should be avoided. If tree removals along the woodland edge are unavoidable, MECP consultation will be required to determine appropriate actions in accordance with the ESA.

6.5.2.7 ECOLOGICAL LINKAGES

The Ninth Line Corridor Study (North-South Environmental 2012) identified the potential for ecological connectivity between the Ninth Line Lands and two City of Mississauga Natural Area System features located east of Ninth Line:

- a woodland feature located south of Erin Centre Boulevard (identified in the study as CM9); and
- the Osprey Marsh SWM complex (identified as LS1)

The CM9 woodland feature is effectively isolated from the Ninth Line Lands by existing residential development that occurs immediately east of Ninth Line. However, a direct connection between the Osprey Marsh SWM complex and the Ninth Line Lands exists via a culvert that directs flow from NLT-1 westwards under Ninth Line.

The only functional ecological linkage in the corridor provides a connection between the Ninth Line lands to the east under Ninth Line via the existing watercourse culvert crossing (NLT-1). The existing linkage accommodates the passage of small to medium-sized wildlife based on openness ratio of each cell of the existing culvert. Opportunities to enhance and improve the functionality of the ecological linkage for small to medium-sized wildlife with proposed improvements can be considered during Detail Design. This may include recommendations for design features that facilitate wildlife movements (e.g., dry shelves, dedicated terrestrial passage) as part of potential replacement or retrofitting of the existing culvert and directional wildlife fencing, subject to agency consultation and site investigation during Detailed Design.

6.5.3 Aquatic Habitat

The aquatic features within the study area consist of four non-regulated drainage features (Drainage Feature A, B, C, and D) and one regulated watercourse (NLT-1). All aquatic features are highly impacted and primarily act to collect and convey stormwater from the developed lands east of Ninth Line west towards the East Lisgar Branch of Sixteen Mile Creek. The watercourse and aquatic features in the study area are not identified as SAR habitat (DFO 2019) and suitable habitat for Redside Dace habitat was not observed during field surveys.

Drainage Feature A exists as a minor drainage feature (swale) that does not connect to a waterbody within or outside of the study area. Drainage Features B and C exhibit similar form and function and both act to convey flows from the developed lands east of Ninth Line to stormwater management facilities west of Ninth Line. These ponds outlet to the East Lisgar Branch but do not appear to be connected directly to features B and C east of Ninth Line. Drainage Feature D is an outfall of a storm sewer system with an enclosed upstream end (not a crossing). This feature begins at Ninth Line at a cross culvert and does not connect to any aquatic features east of the road. These features do not provide direct fish habitat.

Watercourse NLT-1 is the only regulated aquatic feature within the study area, which provides a corridor for fish movement between the East Lisgar Branch and the Osprey Marsh SWM complex. NLT-1 is managed as warmwater fish habitat (Dunn 2006, AFW 2015, 2017) that exhibits low to moderate habitat sensitivity and provides some, but generally limited habitat function. The highly altered nature of the channel provides opportunities for enhancement (LGL 2020), which could include re-alignment to a more natural, meandering channel form that incorporates pool and riffle sequences. This has been identified as an option through the Draft Ninth Line Lands Scoped Subwatershed Study (AFW 2015, 2017) and Conceptual Fish Habitat Offsetting Plan (NRSI 2018).

As fish habitat, Watercourse NLT-1 falls under the protections of the federal Fisheries Act. Under the Act, actions that would cause the Harmful Alteration, Disruption or Destruction of fish habitat (HADD) are prohibited. Any activities that may cause HADD must be reviewed by the federal Department of Fisheries and Oceans (DFO) to determine if a Fisheries Act Authorization is required.

6.6 Geotechnical Engineering

A geotechnical investigation was carried out between August 5, 2020 and August 13, 2020 which consisted of thirty (30) boreholes advanced to depths from 4.7 to 5.2 m below existing ground surface on the existing lanes with exception of Boreholes 20-05, 20-06, 20-26, 20-29 which were terminated upon encountering shale or auger refusal at shallower depths between 3.0 and 4.0 m.

As part of the Geotechnical Investigation, groundwater conditions in the open boreholes were observed throughout the drilling operations. Standpipe piezometers (25mm diameter) were also installed in seven of the boreholes to allow for groundwater level measurements. According to the results, the groundwater was 3.0 m below the ground surface at the NLT-1 crossing and 2.5 m and 2.2 m below the ground surface at the Drainage Features C and B crossings, respectively. Throughout the entire project corridor, where groundwater was observed, the groundwater levels ranged from 1.6 m to 4.1 m below the ground surface

Selected soil samples recovered from the boreholes were submitted for analysis of selected parameters in accordance with Ont. Reg. 153/06 (O.Reg 153/04) to evaluate requirements for management and/or disposal of soil excavated during construction.

The condition of the pavement surface at the time of the investigation was considered to be good with predominant pavement distresses consisting of extensive, slight to moderate severity longitudinal cracking, with intermittent, slight to moderate severity transverse cracking. In localized poorly performing areas, pavement distresses included severe wheelpath fatigue cracking and slight to moderate pavement rutting, with cracks repaired with crack sealant. The pavement structure encountered in the boreholes drilled on Ninth Line consisted of 150 mm to 250 mm of asphalt, overlying granular base fill varying from sand and gravel to gravelly sand with some silt. The thickness of the granular fill under the asphalt pavement ranged from approximately 150 mm to 600 mm.

At the four structures in the study area the geotechnical investigations identified the following existing conditions:

- **NLT-1:** Ninth Line Over Sixteen Mile Creek Culvert (Asset ID: 056005)
    - Boreholes 20-13 and 20-14 consisted of asphalt and granular fill to a depth of 0.5m to 1.0m, overlying native firm to very stiff silty clay to a depth of 4.1m, underlain by firm to stiff silty clay till to at least 5.2m depth. The groundwater level was measured at approximated elevation 187.3m
- **Drainage Feature C:** Ninth Line Over Creek Culvert (Asset ID: 057003)
    - Borehole 20-18 consisted of asphalt and granular fill to a depth of 0.5m, underlain by stiff to very stiff silty clay till to at least 5.2m depth. The groundwater level was measured at approximated elevation 187.0m
- **Drainage Feature B:** Ninth Line Over Creek Culvert (Asset ID: 057004)
    - Borehole 20-21 consisted of asphalt and granular fill to a depth of 0.4m, underlain by firm to hard silty clay till to at least 5.2m depth. The groundwater level was measured at approximated elevation 187.0m
- **Drainage Feature D:** Ninth Line Over Sixteen Mile Creek Tributary Culvert (Asset ID: 057005)
    - Borehole 20-17 consisted of asphalt, granular fill and sand fill to a depth of 1.5m, underlain by firm to stiff silty clay to 3.0m and very stiff to stiff silty clay till to at least 5.2m depth. The groundwater level was measured at approximated elevation 187.2m

The Preliminary Geotechnical Investigations Report is provided in **Appendix I.**

6.7 Stormwater, Drainage and Hydrology

There is one (1) regulated watercourse crossing and two (2) unregulated crossings within the study limits, all located within the Conservation Halton Sixteen Mile Creek Watershed. The watercourse and the two drainage features are tributaries to the East Lisgar Branch of Sixteen Mile Creek. The Sixteen Mile Creek Watershed encompasses approximately 357 km^2 of land area. There is also a storm sewer system outfall with an enclosed upstream end that discharges to an open channel 330 m south of Britannia Road, referred to as Drainage Feature D, which is not classified as a crossing.

Conservation Halton (CH) has jurisdiction with respect to drainage and stormwater management of the Sixteen Mile Creek Watershed within the Ninth Line Class EA project limits. A small portion of the study corridor is located within the Credit Valley Conservation's (CVC) Sawmill Creek Subwatershed; however, since there are no watercourses/tributaries to Sawmill Creek within this portion, the CH criteria for stormwater management is applied to the entire study corridor. The

study area also falls under the jurisdiction of the Ministry of Natural Resources and Forestry (MNRF) Aurora District.

6.7.1 Traverse Drainage Crossings

The size, type, and location of the existing culvert structures for the one (1) regulated watercourse crossing and two (2) unregulated crossings within the Ninth Line study corridor are summarized in **Table 6-2** . Drainage Feature D is not included in the assessment as it is classified as a crossing that is an outfall of a storm sewer system with an enclosed upstream end.

Table 6-2: Summary of Transverse Crossings

Crossing (Watercourse)	Crossing Location	Culvert Dimensions (Span x Rise, m)	Culvert Description	Culvert Length (m)
C-1 (Drainage Feature B)	1.2 km south of Britannia Road West	2 - 2.4 x 1.8	Twin Concrete Box Culvert	45.0
C-2 (Drainage Feature C)	630 m south of Britannia Road West	2 - 2.4 x 1.8	Twin Concrete Box Culvert	45.0
C-3 (NLT-1)	335 m north of Britannia Road West	3 - 7.0 x 2.4	Triple Cell Cast-In-Place Concrete Box Culvert	22.6

A hydraulic assessment of the existing crossings was conducted to determine the hydraulic performance under existing conditions and were undertaken in accordance to City of Mississauga Storm Drainage Design Requirements (2020). A HY-8 hydraulic model was developed based on the available record drawings and survey data.

The tailwater elevations under the 100 year and Regional storm events were obtained from the Churchill Meadows Stormwater Management Facilities Design Report (Rand Engineering Corporation, December 1997) for Crossings C-1 and C-2 (SWM ponds water levels) and from the HEC-RAS hydraulic model of the East Lisgar Branch (Draft Ninth Line Lands Scoped Subwatershed Study Phase 1 Background Report, Amec Foster Wheeler, April 2020) for Crossing C-3.

The culvert capacities were assessed based on the 100 year and Regional design storm as per the City of Mississauga Storm Drainage Design Requirements. **Table 6-3** summarizes the hydraulic analysis results for the crossings along the study corridor. The results indicate that the 100 year and Regional Storm events do not overtop the road at Crossings C-1 and C-2. The Regional Storm event overtops the roadway at Crossing C-3 by 0.68 m, because of the large flows from NLT-1 and the high tailwater levels at the downstream East Lisgar Branch.

Table 6-3: Hydraulic Analysis Results for the Transverse Culvert (Existing Condition)

Crossing	Type	U/S Invert (m)	D/S Invert (m)	Length (m)	Road Elev. (m)	Water Surface Elev. (m)			Remarks
						50 Yr	100 Yr	Reg.	
C-1 (Drainage Feature B)	Culvert	186.54	186.47	45.0	190.07	-	189.38	189.65	100 year and Regional flows do not overtop road
C-2 (Drainage Feature C)	Culvert	186.79	186.62	45.0	190.20	-	189.24	189.68	100 year and Regional flows do not overtop road
C-3 (NLT-1)	Culvert	187.35	187.25	22.6	190.67	189.56	189.72	191.35	Regional flow overtops road.

6.7.1.1 HYDRAULIC ASSESSMENT OF EAST LISGAR BRANCH

Under existing conditions, the Ninth Line roadway is overtopped by the East Lisgar Branch of Sixteen Miles Creek at several locations, as indicated in the Draft Ninth Line Lands Scoped Subwatershed Study Phase 1 Background Report. There are four locations within the study corridor where the Regional floodplain spills beyond the Subwatershed Study model extent. The existing floodplain extent, as well as the spill locations, are shown in Appendix K and Appendix M. A summary of the existing roadway overtopping and description of the spill locations is provided in **Table 6-4**.

Table 6-4: Existing Roadway Overtopping and Spill Locations

Overtopping Location	Description	Spill Location
Sta. 11+830 to Sta. 12+800	From Deepwood Heights to McDowell Drive	Sta. 11+950, Sta. 12+530, and Sta. 12+590.
Sta. 13+180 to Sta. 14+460	From Britannia Road to 360 m north of Foxwood Avenue	from Sta. 13+460 Sta. 13+810

Additional details are documented in the **Drainage and Stormwater Management Report** including the Drainage Plans are provided in **Appendix J**.

6.8 Structural Assessment

A structural assessment was completed based on a visual inspection of four (4) culverts within the Ninth Line study corridor. A site visit was conducted by HDR on October 1, 2020. The preliminary structural assessment presented in this section is based on the review of the available materials and visual observation of existing culverts. The structures located along Ninth Line between Eglinton Avenue West and Derry Road West include the following:

- **NLT-1:** Ninth Line Over Sixteen Mile Creek Culvert (Asset ID: 056005);
- **Drainage Feature C:** Ninth Line Over Creek Culvert (Asset ID: 057003);
- **Drainage Feature B:** Ninth Line Over Creek Culvert (Asset ID: 057004); and
- **Drainage Feature D:** Ninth Line Over Sixteen Mile Creek Tributary Culvert (Asset ID: 057005).

A summary of the existing structures can be found below. Further details can be found in **Appendix K**.

6.8.1 Ninth Line Over Sixteen Mile Creek Culvert (Asset ID: 056005)

The structure at **NLT-1** crossing is referred to as Culvert 056005 and is 100% owned by the City of Mississauga.

6.8.1.1 LOCATION

Culvert 056005 is located approximately 335m north of Britannia Road West, in the City of Mississauga. It currently extends across the northbound and southbound lanes of Ninth Line over Sixteen Mile Creek. The culvert is crossing the Osprey Marsh located at the east side of the structure.

6.8.1.2 EXISTING STRUCTURE

Culvert 056005 is a triple cell cast-in-place concrete box culvert that was constructed in 1996. The structure is 27.26m in length and it has an overall span length of 23.20m. The size of each culvert opening is approximately 8.44m in width and 2.40m in height.

Parapet walls with single railing were noted above the east and west headwalls. Four (4) retaining walls and two (2) approach slabs were also noted. The Biennial Inspection Report dated May 27, 2019 notes that the culvert was found to be in generally good condition with the exception of the following:

- Spall, delamination and narrow to medium transverse cracks on concrete sidewalks;
- Medium to wide longitudinal, transverse and map cracks on the asphalt wearing surface. Cracks were recently sealed after the last inspection;
- Narrow to medium cracks on parapet walls; and
- Efflorescence stained cracks inside culvert barrels soffit and walls.

Minor rehabilitation work may be required for the structure including the following:

- Repave asphalt wearing surface;
- Seal concrete cracks; and
- Concrete patch repair.

The site investigation carried out by HDR on October 1, 2020 confirmed that the 2019 inspection report findings are consistent with the current site conditions.

6.8.2 Ninth Line Over Creek Culvert (Asset ID: 057003);

The structure at **Drainage Feature C** is referred to as Culvert 057003 and is 100% owned by the City of Mississauga.

6.8.2.1 LOCATION

Culvert 057003 is located approximately 630m south of Britannia Road West, in the City of Mississauga. It currently extends across northbound and southbound lanes of Ninth Line over a creek.

6.8.2.2 EXISTING STRUCTURE

Culvert 057003 consists of two concrete pre-cast box culverts and four (4) armor stone retaining walls. The culvert was constructed in 1998 and it is approximately 45.00m in length. The culvert opening is 1.80m in height and 2.40m in width for each cell.

The Biennial Inspection Report dated September 14, 2019, notes that the culvert was found to be in generally good condition with the exception of localized spalls at the exterior faces of the culvert.

Rehabilitation work is not required for this culvert structure.

The site investigation carried out by HDR staff on October 1, 2020 confirmed that the 2019 inspection report findings are consistent with the current site conditions.

6.8.3 Ninth Line Over Creek Culvert (Asset ID: 057004)

The structure at **Drainage Feature B** is referred to as Culvert 057004.

6.8.3.1 LOCATION

Culvert 057004 is located approximately 1.23km south of Britannia Road West, in the City of Mississauga. It currently extends across northbound and southbound lanes of Ninth Line over Crossing B (Tributary 2).

6.8.3.2 EXISTING STRUCTURE

Culvert 057004 consists of two pre-cast concrete box culverts and four (4) armor stone retaining walls. The culvert was constructed in 1998 and it is approximately 45.00m in length. The culvert opening is 1.80m in height and 2.40m in width for each cell.

The Biennial Inspection Report dated September 12, 2019 notes that the culvert was found to be in generally good condition with no significant structural deterioration noted.

The site investigation carried out by HDR on October 1, 2020 confirmed that the 2019 inspection report findings are consistent with the current site conditions.

6.8.4 Ninth Line Over Sixteen Mile Creek Tributary Culvert (Asset ID: 057005)

The structure at **Drainage Feature D** is referred to as Culvert 057005.

6.8.4.1 LOCATION

Culvert 057005 is located approximately 333m south of Britannia Road West, in the City of Mississauga. It currently extends across northbound and southbound lanes of Ninth Line over a Sixteen Mile Tributary Creek.

6.8.4.2 EXISTING STRUCTURE

Culvert 057005 consists of a single cell cast-in-place box culvert and two (2) concrete retaining walls located at the west end. The culvert was constructed in 1998 and it is approximately 18.60m in length. The culvert opening is 1.45m in height and 2.45m in width.

The Biennial Inspection Report dated September 14, 2019, notes that the culvert was found to be in generally good condition with no significant structural deterioration noted.

The site investigation carried out by HDR on October 1, 2020 confirmed that the 2019 inspection report findings are consistent with the current site conditions.

The existing condition Structural Assessment Report can be found in **Appendix K**.

6.9 Contamination

A Phase One Environmental Site Assessment (ESA) was conducted by Thurber Engineering Ltd in April 2020 to identify evidence of actual and/or potential contamination along the study area in support of a Class EA process. The Phase One ESA consisted of a desktop review and summary of available historical records and a reconnaissance of the study area from publicly accessible locations. The collective information was used to assess and evaluate past and present uses, conditions and activities within the study area to identify properties with potentially contaminating activities (PCAs) on the site and the surrounding properties that may be contributors to areas of potential environmental concern (APECs) within the study area.

The findings of the Phase One ESA identified both on-site PCAs and off-site PCAs that may contribute to APECs within the site limits. On this basis, one on-site PCA and 14 off-site PCA's were identified. Of the off-site PCA's 11 were evaluated as possible contributors to the 10 APECs were identified in the Phase One study area, determined by a 250 m buffer around Ninth Line between Eglinton Avenue and Derry Road. The on-site PCAs included roadway associated activities such as fill materials, vehicle fluid spills and de-icing salt applications. The identified off-site PCAs that contribute to APECs included dry cleaners, gas stations, a release from a private fuel storage tank, an excavation and landscaping contractor, a pesticides operator, a pesticides vendor, and a natural gas compressor station.

Exhibit 6-7 summarizes the identified PCAs and the APECs within the study area.

A review of water well records was also undertaken to inform the Phase One ESA. The well records were obtained from the EcoLog ERIS report and the MECP well database. The review indicated that the hydrogeological units in the Phase One ESA study area generally comprise of an artesian aquifer between a relatively impermeable clay layer. The aquifer may consist of sand, gravel and water-bearing zones within the shale bedrock at different geographic locations within the Phase1 ESA study area. Water is present at relatively higher depths of approx. 4.0 to 6.0m in the north and south portions. It is unknown whether or not the wells are currently in-use.

A subsurface investigation (i.e. Phase Two ESA) involving sampling and analysis of soil and groundwater within the excavation depths for the proposed construction works would be required to confirm or refute the potential for contamination from the identified PCAs and associated APECs on the Site that may impose implications on the management of materials generated during construction of the proposed works.

For more information about the locations of PCAs and APECs, please refer to the **Phase One Environmental Site Assessment Report** in **Appendix K**.

3955 Erin Centre Blvd
Operation of Dry-Cleaning Equipment

3965 Thomas St
Gasoline and Associated Products Storage in Fixed Tanks

5644 Ninth Line
Gasoline and Associated Products Storage in Fixed Tanks

6000 Ninth Line
Pesticides, Processing and Bulk Storage

6302 Ninth Line
Pesticides, Manufacturing, Processing and Bulk Storage

6543 Ninth Line
Gasoline Storage in Fixed Tanks (private)

6626 Ninth Line
Natural Gas Compressor Station

6970-6980 Lisgar Dr
Gasoline and Associated Products, Operation of Dry Cleaning Equipment

APEC10

Entire Site
Activities Associated with the Use of Roadways, potential presence of fill materials, vehicle fluid releases and de-icing salt application

Exhibit 6-7: Areas of Potential Environmental Concerns along the Ninth Line Study Area
Phase 1 ESA Report (Thurber, 2020)

6.10 Source Water Protection

The Ninth Line EA corridor falls within both the Credit Valley Conservation (CVC) and the Conservation Halton (CH) Source Protection Areas (SPA). Information provided by CVC indicates that there are highly vulnerable aquifer (HVA) and significant groundwater recharge area (SGRA) policies that may apply, closer to Eglinton Avenue West, however, the threats to these areas are not significant (refer to **Appendix B**). Therefore, no associated policies are applicable.

Additionally, according to correspondence provided by CH, found in **Appendix B**, the Halton-Hamilton source protection plan policies for the protected area only applies to projects that involve the conveyance of oil in pipelines. Therefore, no associated policies are applicable.

6.11 Utilities and Other Services

The following utilities were identified within the study area as per the topographic file provided by the City of Mississauga. Utility companies were also contacted to obtain existing and planned utilities within the study area. Utilities that have been identified within the study area are outlined in the following sections. During Detailed Design the location and alignment of existing utilities and municipal services are to be confirmed.

6.11.1 Hydro

Overhead hydro lines are located along the east side of Ninth Line between Eglinton Avenue and Derry Road for most of the study area. Approximately 250 m north of Doug Leavens Boulevard, the hydro corridor crosses over Ninth Line to the west side for a short segment before reverting back to the east side of the street, as depicted in **Exhibit 6-8.**

Exhibit 6-8: Hydro Corridor Crossover
Source: Google Aerial

The east side hydro poles are generally set back approximately 12 to 13 metres from the paved roadway surface while those on the west side are much closer to the paved roadway surface (approximately 3 metres).

There are a few secondary buried conduits servicing properties on the west side from Eglinton Avenue West to Britannia Road West.

6.11.2 Gas

There are two pressure gas mains crossing Ninth Line between Beacham Street and Baggins Court.

Additionally, a pipeline runs in the north-south direction in the study area as follows:

- Between Derry Road West to Eglinton Avenue West, pipeline runs along the west side of Ninth Line
- Between Doug Leavens Boulevard to 30m south of Foxwood Avenue, pipeline runs along the west side of Ninth Line
- Between Britannia Road West to 160m south of Tacc Drive, pipeline runs along the east side of Ninth Line

There are some service gas mains crossing Ninth Line as follows:

- Crossing to Banff Court
- Between Worthview Place to Berryman Trail

- 40m and 100m south of Berryman Trail
- Crossing to Parkgate Drive
- 105m south of Tacc Drive
- Crossing to Burdette Terrace

6.11.3 Telecom

There are existing buried telecom conduits and aerial lines that run along the east and west side of Ninth Line.

6.11.4 Watermain

Peel Region operates an extensive and mature water distribution system in northwestern Mississauga. It is anticipated that the existing watermain will also serve as the main supply to the future development within the Ninth Line Lands.

The existing watermain facilities that run along the Ninth Line corridor include:

- 400mm watermain along Ninth Line between Eglinton Avenue West and Britannia Road West (east side)
- 300mm watermain along Ninth Line between Parkgate Drive and Foxwood Avenue (east side)
- 300mm watermain along Ninth Line between Beacham Street and 100m north of Beacham Street (east side)

There is one 50mm watermain crossing that is located north of Beacham Street that services the Enbridge/Union Gas/TransCanada Joint Operating Facility.

6.11.5 Wastewater

The existing wastewater facilities that run along Ninth Line corridor include:

- 1050mm sanitary sewer along Ninth Line between Erin Centre Boulevard and Britannia Road West
- 900mm sanitary sewer along Ninth Line between Britannia Road West and Parkgate Drive
- 450mm sanitary sewer along Ninth Line between 30m south of Foxwood Avenue to 65m north of Foxwood Avenue

6.11.6 Stormwater

A single-storm sewer pipe runs along Ninth Line from Eglinton Avenue West to Erin Centre Boulevard and 300m north of Foxwood Avenue to Derry Road West.

A two-storm sewer system runs along Ninth Line from Erin Centre Boulevard to 300m north of Foxwood Avenue.

6.11.7 Illumination

Ninth Line is illuminated on the west side with a conventional streetlight system throughout the study area. From Derry Road West to Britannia Road West, lighting is mounted onto hydro poles that are serviced through aerial cables. From Britannia Road West to Eglinton Avenue West, standalone light poles (not mounted onto hydro poles) are serviced by buried secondary conductors. The light poles are spaced between approximately 48 and 50 metres apart and are set back a minimum of approximately 2 metres from the adjacent roadway. Currently, the east side of Ninth Line does not have illumination poles.

6.11.8 Sun Canadian Pipeline

Sun Canadian Pipeline operates two existing high-pressure oil pipelines that are 200mm and 300mm in size, crossing Ninth Line 50m north of Janice Drive.

7 Problem and Opportunity Statement

There are opportunities to improve Ninth Line between Eglinton Avenue and Derry Road for all travel modes – cyclists, pedestrians, transit users, and motorists as summarized in **Table 7-1**.

Table 7-1: Summary of Problem and Opportunities within the Study Corridor

Existing road and intersections cannot accommodate future traffic volumes	Improve Ninth Line's capacity to accommodate projected traffic demand and maximize person carrying capacity
Lack of continuous pedestrian and cycling facilities creates unfavourable conditions for non-drivers	Providing enhanced active transportation infrastructure to improve pedestrian and cycling conditions and encourage travel choices that can reduce reliance on the single occupant automobile
Transit service is impacted by congestion resulting in delays, especially during peak periods	Improve the efficiency and reliability of transit through increased roadway capacity and intersection improvements
Inconsistent roadway typology and transitions from urban to rural cross-section	Consider a continuous urban roadway to create a corridor with consistent drainage infrastructure
Under existing conditions, Ninth Line is unable to service future growth, does not recognize its role as a gateway to the City and is not consistent with the future vision for the area and adjacent developments	Design Ninth Line as a complete street to serve study area residents and visitors alike, people of all ages and abilities and commuting and recreational users. Acknowledging Ninth Line's role as a gateway to the City of Mississauga

8 Alternative Solutions

8.1 Development of Alternative Solutions

Alternative Solutions are functionally different solutions for approaching and addressing a problem or opportunity. The Class EA process requires documentation and examination of all reasonable alternatives to address the problem; referred to as Alternative Solutions. The development of these alternative solutions explored the need to accommodate numerous uses and users such as pedestrians, cyclists, transit, autos, goods movement, access, streetscaping, and other public realm elements. The alternative solutions also considered, not only for their transportation functional needs, but also their broader social, economic, environmental, and placemaking contributions to provide opportunities for the alternative solutions to be compatible with, and supportive of, existing and planned land uses.

A variety of Alternative Solutions were developed for the study area. These alternatives vary in complexity, construction cost, and their potential ability to address the study area issues. **Table 8-1** presents the list of alternative solutions considered to address the problems and opportunities identified for the Ninth Line study corridor.

Table 8-1: List of Alternative Solutions Considered

Alternative Solution	Description
1. Do Nothing	Existing conditions will be maintained, and the study area (Ninth Line) remains unchanged.
2. Limit Development	Limit land development within and adjacent to the study area to curb growth and transportation demand in the study area.
3. Improve Other Roads	Improve other roads outside of the study area to address future transportation demand. No changes would be made to the study area (Ninth Line).
4. Operational Improvements (including localized intersections)	Localized improvements within the study area, for example at intersections, where dedicated turn-lanes are provided to improve traffic operations.
5. Multimodal Improvements including improved streetscaping opportunities	Implement improvements for transit, cyclists, and pedestrians only. No road widening to Ninth Line corridor to be implemented for this stand-alone alternative.
6. Widen from 2 Lanes to 4 Lanes	Widen Ninth Line from 2 lanes to 4 lanes. No cycling or pedestrian improvements to be implemented for this stand-alone alternative.

8.2 Evaluation of Alternative Solutions

To determine the most appropriate solution for the Ninth Line corridor, an evaluation framework was developed to evaluate each alternative solution using information collected from the existing conditions assessment. This framework includes criteria that addresses the transportation needs

and the broader social, economic, environmental, and placemaking contributions to ensure the alternative solutions are compatible with, and supportive of, existing and planned land uses. A list of criteria to compare alternatives was developed; the measure of the alternative's success was its ability to correct, minimize or mitigate impacts and/or meet the study goals. The evaluation criteria are shown in **Table 8-2**.

Table 8-2: Evaluation Criteria for Alternative Solutions

Evaluation Criteria	Sub-Criteria
Transportation and Transit Accessibility	• Addresses Congestion and Improves Corridor Capacity and Vehicular Level of Service to Accommodate Future Travel Demand • Accommodates All Road Users, Including Pedestrians, Cyclists and Transit Users • Enhanced Road Safety and Comfort for All Road Users • Accommodates Commercial Goods Movement • Improved Access to / from Ninth Line • Addresses Problem / Opportunity Statement • Improves Network Connectivity • Improves Emergency Response Time
City Building	• Consistency with The City's Strategic Priorities Pursuant to the City's Strategic Plan "Our Future Mississauga", Official Plan Policy Objectives, the Cycling Master Plan, Shaping Ninth Line, and Other Relevant Planning Documents • Accommodates Existing and Planned Development
Natural Heritage	• Minimizes Impacts to and Enhances Provincially Significant Wetlands (PSWs), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs) • Minimizes Impacts to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk • Provides Drainage and Stormwater Management Improvements and Mitigates Erosion • Minimizes Effects on Climate Change
Socio-Economic Environment	• Improves Attractiveness/Aesthetics • Minimizes Business Impacts and Enhances Business and Place-Making Opportunities • Minimizes Property Acquisition • Minimizes Noise Impacts • Improves Air Quality • Provides or Improves Streetscape Amenities and Urban Design Elements
Cultural Heritage	• Minimizes Impacts to Archaeological Features • Minimizes Impacts to Cultural Heritage Resources
Engineering Considerations, Construction Complexity and Implementation	• Minimizes Utility Relocation • Addresses Drainage or Contamination Concerns • Minimizes Construction Complexity, Including Staging and Traffic Disruption During Construction • Optimizes Capital Costs • Optimizes Operation/Maintenance Costs • Minimizes Property Acquisition Costs

An evaluation was conducted using the evaluation criteria to compare the proposed alternative solutions to determine a preferred solution for the Ninth Line corridor and was evaluated on a scale from Preferred to Not Preferred. The detailed evaluation is presented in **Table 8-3** and a summary is included in **Table 8-4**.

Table 8-3: Detailed Evaluation of Alternative Solutions

Evaluation Criteria	Alternative 1 (Do Nothing)	Alternative 2 (Limit Development)	Alternative 3 (Improve Other Roads)	Alternative 4 (Operational Improvements)	Alternative 5 (Multimodal Improvements)	Alternative 6 (Widen from 2 to 4 lanes)
Transportation and Transit, Accessibility						
Addresses Congestion and Improves Corridor Capacity and Vehicular Level of Service to Accommodate Future Travel Demand	Traffic congestion will continue to increase on Ninth Line with insufficient capacity to meet future demands, causing longer delays.	Potential to marginally limit increase in traffic congestion by limiting growth in trip making; however, does not address existing congestion.	Does not accommodate future travel demand on Ninth Line, causing increased congestion and longer delays	Minor localized capacity improvements only	Minor capacity improvements as mode choice improvements result in a lower reliance on single occupancy vehicles	Improves corridor capacity and reduces delays and queuing
Accommodates All Road Users, Including Pedestrians, Cyclists and Transit Users	Lack of continuous facilities does not accommodate all road users	Does not accommodate all road users as there is no improvement to the existing facilities	Does not accommodate all road users along Ninth Line	Potential for minor localized improvements only	Improvements focus on accommodating all road users, including pedestrians, cyclists and transit users	Accommodates motorized vehicles only
Enhanced Road Safety and Comfort for All Road Users	Does not address existing or potential safety concerns. Higher potential for collisions as congestion increases	Does not address existing or potential safety concerns.	Does not address existing or potential safety concerns along Ninth Line	Potential for minor localized improvements only	Moderate improvements to safety and comfort, in particular for cyclists and pedestrians if dedicated facilities are provided, as they minimize conflicts with motorized vehicles	Potential improvements to vehicular safety and comfort as a result of reduced congestion.
Accommodates Commercial Goods Movement	No improvements to commercial goods movement	No improvements to commercial goods movement	No improvements to commercial goods movement along Ninth Line	May accommodate for localized improvements to commercial goods movement	No anticipated improvements to commercial goods movement	Increased capacity accommodates commercial goods movement by reducing delays and queuing
Improved Access to / from Ninth Line	Does not improve access to/from Ninth Line from driveways and signalized intersections due to increased roadway congestion	Does not improve access to/from Ninth Line from driveways and signalized intersections due to increased roadway congestion	Does not improve access to/from Ninth Line from driveways and signalized intersections due to increased roadway congestion	May improve access to/from Ninth Line at some locations	Improves transit, pedestrian and cycling access to/from Ninth Line	Potential to improve access to/from Ninth Line at some locations due to reduced roadway congestion
Addresses Problem / Opportunity Statement	Does not address problem / opportunity statement	Does not address problem / opportunity statement	Does not address problem / opportunity statement	Partially addresses problem / opportunity statement	Partially addresses problem / opportunity statement	Partially addresses problem / opportunity statement
Improves Network Connectivity	Does not improve network connectivity	Does not improve network connectivity	May improve network connectivity with other roads	May improve network connectivity at some locations	Improves connectivity of transit, cyclist and pedestrian facilities	Improves vehicular connectivity by reducing delays and queuing
Improves Emergency Response Time	Does not improve emergency response time due to increased roadway congestion and associated travel time	Does not improve emergency response time due to increased roadway congestion and associated travel time	May improve emergency response time for other roads, but not for Ninth Line	May improve emergency response time at some locations	Minor potential for improvements to emergency response time at some locations as a result of lower reliance on single occupancy vehicles	Highest potential to improve emergency response time as increased capacity reduces delays and queuing

LEGEND

Preferred	Less Preferred	Not Preferred

Evaluation Criteria	Alternative 1 (Do Nothing)	Alternative 2 (Limit Development)	Alternative 3 (Improve Other Roads)	Alternative 4 (Operational Improvements)	Alternative 5 (Multimodal Improvements)	Alternative 6 (Widen from 2 to 4 lanes)
Summary of Transportation and Transit, Accessibility	**Not Preferred**	**Not Preferred**	**Not Preferred**	**Less Preferred**	**Preferred**	**Preferred**
City Building						
Consistency With The City's Strategic Priorities Pursuant to the City's Strategic Plan "Our Future Mississauga", Official Plan Policy Objectives, the Cycling Master Plan, Shaping Ninth Line, and Other Relevant Planning Documents	Does not comply with the City's plans and policies	Does not comply with the City's plans and policies	Does not comply with the City's plans and policies	Partially complies with the City's plans and policies	Complies with the City's plans and policies	Complies with the City's plans and policies
Accommodates Existing and Planned Development	Does not accommodate existing and planned development, as roadway capacity is not sufficient	Does not accommodate existing and planned development, as it would limit the development that can be supported	Does not accommodate existing and planned development, as roadway capacity along Ninth Line is not sufficient	May support existing and planned development at some locations by improving localized conditions	Supports existing and planned development by promoting active transportation, but does not provide sufficient roadway capacity to accommodate planned development	Accommodates existing and planned development by providing additional roadway capacity
Summary of City Building	**Not Preferred**	**Not Preferred**	**Not Preferred**	**Less Preferred**	**Preferred**	**Preferred**
Natural Heritage						
Minimizes Impacts to and Enhances Provincially Significant Wetlands (PSWs), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs)	No anticipated impacts However, no opportunities to enhance natural environment	No anticipated impacts However, no opportunities to enhance natural environment	Potential impacts on other roads No opportunities to enhance natural environment along Ninth Line	Potential for localized impacts to environmentally sensitive areas However, these areas are likely already disturbed and there are opportunities for localized enhancements to the natural environment as part of the localized improvements	Potential for minor impacts to environmentally sensitive areas along Ninth Line However, these areas are likely already disturbed and there are opportunities to enhance the natural environment as part of the improvements	Potential for moderate impacts to environmentally sensitive areas adjacent to Ninth Line as a result of widening However, these areas are likely already disturbed and there are opportunities to enhance natural environment through Ninth Line widening

LEGEND

Preferred	Less Preferred	Not Preferred

Evaluation Criteria	Alternative 1 (Do Nothing)	Alternative 2 (Limit Development)	Alternative 3 (Improve Other Roads)	Alternative 4 (Operational Improvements)	Alternative 5 (Multimodal Improvements)	Alternative 6 (Widen from 2 to 4 lanes)
Minimizes Impacts to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk	No anticipated impacts	No anticipated impacts	No anticipated impacts on Ninth Line, but potential impacts on other roads	Potential minor impacts specifically at intersections where Headwater Drainage Features run perpendicularly to Ninth Line and out to the East Lisgar Branch of Sixteen Mile Creek, but could be mitigated by design	Potential minor impacts when providing active transportation infrastructures in the boulevard where Headwater Drainage Features run perpendicularly to Ninth Line and out to the East Lisgar Branch of Sixteen Mile Creek, but could be mitigated by design	Potential moderate impacts if road is widened from two to four lanes where the existing Ninth Line crossing at outlet of Osprey Marsh (south towards Britannia Road), will require realignment and enhancement. However, could be mitigated by design.
Provides Drainage and Stormwater Management Improvements and Mitigates Erosion	No improvements to stormwater management / erosion	No improvements to stormwater management / erosion	No improvements to stormwater management / erosion along Ninth Line	Potential for localized improvements to stormwater management / erosion only	Potential for some improvements to stormwater management / erosion at multi-modal improvement locations only	Opportunity to improve stormwater management and minimize erosion through replacement of rural cross-section (ditches) with continuous urban cross-section (curb and gutter)
Minimizes Effects on Climate Change:						
a) **Climate Change Mitigation: Minimizes the Generation of Greenhouse Gas Emissions and Carbon Sinks**	High reliance on automobiles and increased congestion will result in increased GHG emissions and worsen effects on climate change	High reliance on automobiles and increased congestion will result in increased GHG emissions and worsen effects on climate change	High reliance on automobiles and increased congestion along Ninth Line will result in increased GHG emissions and worsen effects on climate change	Potential for decreased congestion as a result of operational improvements can marginally reduce GHG emissions and reduce effects on climate change	Multi-modal improvements can marginally reduce dependence on automobile, increased non-auto mode share and provide minor improvements to effects on climate change	Additional capacity and decreased congestion can reduce GHG emissions and reduce effects on climate change, however additional vehicular capacity will encourage auto mode reliance.
b) **Climate Change Adaptation: Resiliency or Vulnerability of the Project to Changing Climatic Conditions**	No improvements to study corridor resiliency to climate change	No improvements to study corridor resiliency to climate change	No improvements to Ninth Line study corridor resiliency to climate change	Limited localized opportunities for implementation of tree plantings and Low Impact Development stormwater management strategies as part of road improvements can marginally improve the study corridor resiliency to climate change	Opportunities for implementation of tree plantings and Low Impact Development stormwater management strategies as part of multi-modal improvements can improve the study corridor resiliency to climate change	Opportunities for implementation of tree plantings and Low Impact Development stormwater management strategies as part of road improvements can improve the study corridor resiliency to climate change
c) **Minimizes the Impact on the Environment's Adaptive Capacity**	No improvements to relieve vehicle congestion, does not minimize the impact on the environment's adaptive capacity	No improvements to relieve vehicle congestion, does not minimize the impact on the environment's adaptive capacity	No improvements to relieve vehicle congestion along Ninth Line, does not minimize the impact on the environment's adaptive capacity	Marginally minimizes the impact on the environment's adaptive capacity at localized improvement areas	Marginally minimizes the impact on the environment's adaptive capacity by providing facilities for non-auto modes	Moderately minimizes the impact on the environment's adaptive capacity by providing additional road capacity to decrease congestion

LEGEND

Preferred	Less Preferred	Not Preferred

Evaluation Criteria	Alternative 1 (Do Nothing)	Alternative 2 (Limit Development)	Alternative 3 (Improve Other Roads)	Alternative 4 (Operational Improvements)	Alternative 5 (Multimodal Improvements)	Alternative 6 (Widen from 2 to 4 lanes)
Summary of Natural Environment	**Less Preferred**	**Less Preferred**	**Not Preferred**	**Less Preferred**	**Preferred**	**Less Preferred**
Socio-Economic Environment						
Improves Attractiveness/Aesthetics	No change to the visual aesthetics; however, no opportunities for improvements	No change to the visual aesthetics; however, no opportunities for improvements	No change to the visual aesthetics on Ninth Line; however, no opportunities for improvements	Limited opportunity for localized aesthetic improvements	Moderate opportunity for aesthetic improvements	Moderate opportunity for aesthetic improvements
Minimizes Business Impacts and Enhances Business and Place-Making Opportunities	Negative impact to nearby existing and future businesses due to increased congestion	Negative impact to nearby existing and future businesses due to increased congestion	Potential impacts or improvements to nearby existing and future businesses on other roads; however, no impacts or improvements along Ninth Line	Potential for moderate localized improvements to nearby existing and future businesses	Improved multimodal access provides high potential for improvements to nearby and future businesses	Increased road capacity to relieve congestion improves access to nearby and future businesses
Minimizes Property Acquisition	No property acquisition	No property acquisition	No Property acquisition along Ninth Line	Potential for localized property acquisition only	Minor potential for property acquisition if additional ROW width is required for multi-modal improvements	Highest potential for property acquisition due to additional ROW width required for road widening
Minimizes Noise	Anticipated increase in noise levels with future traffic growth and increased congestion	Anticipated increase in noise levels with future traffic growth and increased congestion	Anticipated increase in noise levels with future traffic growth and increased congestion along Ninth Line	Potential for marginal localized reductions in noise levels. Where warranted, feasible, and effective, noise mitigation would be implemented.	Potential for some reductions in noise levels from reduced reliance on automobiles. Where warranted, feasible, and effective, noise mitigation would be implemented	Anticipated increase in noise levels with future traffic growth and lanes in closer proximity to properties on the east side of Ninth Line. Where warranted, feasible, and effective, noise mitigation would be implemented.
Improves Air Quality	No improvements; reliance on automobile deteriorates air quality	No improvements; reliance on automobile deteriorates air quality	No improvements to Ninth Line; reliance on automobile deteriorates air quality	Marginal localized improvements; continued reliance on automobile deteriorates air quality	Multimodal improvements discourage reliance on automobile and thus promotes improvements to air quality; improved streetscaping can further improve air quality along the corridor.	Additional travel lanes may encourage reliance on automobile and traffic demand on Ninth Line, deteriorating air quality due to increased emissions

LEGEND

Preferred	Less Preferred	Not Preferred

Provides or Improves Streetscape Amenities and Urban Design Elements	No opportunities to provide or improve streetscape and urban design elements	No opportunities to provide or improve streetscape and urban design elements	No opportunities to provide or improve streetscape and urban design elements along Ninth Line	Minimal opportunity to provide streetscape and urban design elements at localized areas only	Highest opportunity to provide streetscape and urban design elements as part of multi-modal improvements	Minimal opportunity to provide streetscape and urban design elements as part of road widening
Evaluation Criteria	**Alternative 1 (Do Nothing)**	**Alternative 2 (Limit Development)**	**Alternative 3 (Improve Other Roads)**	**Alternative 4 (Operational Improvements)**	**Alternative 5 (Multimodal Improvements)**	**Alternative 6 (Widen from 2 to 4 lanes)**
Summary of Socio-Economic Environment	**Not Preferred**	**Not Preferred**	**Not Preferred**	**Less Preferred**	**Preferred**	**Less Preferred**
Cultural Heritage						
Minimizes Impacts to Archaeological Resources	No anticipated impacts	No anticipated impacts	No anticipated impacts along Ninth Line; potential impacts to archaeological resources on other roads	Potential for minor impacts to archaeological resources due to possibly wider roadway platform at intersections to accommodate dedicated turning lanes or other localized improvements; however, areas adjacent to the existing road are likely already disturbed and impacts can be minimized/mitigated through design	Potential for minor impacts to archaeological resources on the east side of Ninth Line to accommodate multi-modal facilities; however, areas adjacent to the existing road are likely already disturbed, and impacts can be minimized/mitigated through design Potential for moderate impacts on the west side of Ninth Line due to higher potential for undisturbed lands (i.e. agricultural fields, wooded areas, lawns) to exhibit archaeological potential	Potential for minor impacts to archaeological resources on the east side of Ninth Line to accommodate widened roadway; however, areas adjacent to the existing road are likely already disturbed, and impacts can be minimized/mitigated through design Potential for moderate impacts on the west side of Ninth Line due to higher potential for undisturbed lands (i.e. agricultural fields, wooded areas, lawns) to exhibit archaeological potential
Minimizes Impacts to Cultural Heritage Resources	No impact to existing cultural heritage resources	No impact to existing cultural heritage resources	No anticipated impacts along Ninth Line; potential impacts to cultural heritage resource to other roads	Potential for minor impacts to cultural heritage resources at localized intersections based on findings from Cultural Heritage Assessment	Potential for moderate impacts to cultural heritage resources based on findings from Cultural Heritage Assessment; however, impacts can be minimized/mitigated through design	Potential for moderate impacts to heritage resources based on findings from Cultural Heritage Assessment; however, impacts can be minimized/mitigated through design
Summary of Cultural Heritage	**Preferred**	**Preferred**	**Less Preferred**	**Less Preferred**	**Not Preferred**	**Not Preferred**

LEGEND

Preferred	Less Preferred	Not Preferred

Engineering Considerations, Construction Complexity and Implementation						
Minimizes Utility Relocation	No change in road infrastructure, therefore no anticipated utility relocations required	No change in road infrastructure, therefore no anticipated utility relocations required	No change in road infrastructure, therefore no anticipated utility relocations required along Ninth Line	Potential for localized utility relocations required	Minor potential for utility relocations required	Highest potential for utility relocations required due to road widening
Evaluation Criteria	**Alternative 1 (Do Nothing)**	**Alternative 2 (Limit Development)**	**Alternative 3 (Improve Other Roads)**	**Alternative 4 (Operational Improvements)**	**Alternative 5 (Multimodal Improvements)**	**Alternative 6 (Widen from 2 to 4 lanes)**
Addresses Drainage or Contamination Concerns	No impact to stormwater discharge or contamination concerns; however, no opportunities for improvements	No impact to stormwater discharge or contamination concerns; however, no opportunities for improvements	No impact to stormwater discharge or contamination concerns along Ninth Line; however, no opportunities for improvements	Minor increase in surface runoff due to localized improvements Minimal opportunity to improve stormwater management or contamination concerns	Moderate increase in surface runoff due to multi-modal facilities Moderate opportunity to improve stormwater management or contamination concerns	Significant increase in surface runoff due to the addition of two vehicle lanes, however, it can be mitigated by the replacement of rural cross-section (ditches) with continuous urban cross-section (curb and gutter) on both sides of Ninth Line; contamination concerns can be addressed through design
Minimizes Construction Complexity, Including Staging and Traffic Disruption During Construction	No construction complexity	No construction complexity	No construction complexity along Ninth Line; however, potential for construction complexity on other roads	Moderate construction complexity at localized areas; however, can be addressed through design	Minor construction complexity	Highest construction complexity; however, can be addressed through design
Optimizes Capital Costs	No capital costs; however, no improvements to any modes	No capital costs; however, no improvements to any modes	No capital costs along Ninth Line with no improvements to any modes; potential for high capital costs for improvements to other roads	Moderate capital costs while providing improvements at some locations only	Moderate capital costs with improvements to multiple modes	High capital costs; however, has greatest improvements to vehicular traffic
Optimizes Operation/Maintenance Costs	Moderate increase in operating/maintenance costs; as traffic volumes accelerate road deterioration, City would need to resurface road more often	Moderate increase in operating/maintenance costs; as traffic volumes accelerate road deterioration, City would need to resurface road more often	Moderate increase in operating/maintenance costs along Ninth Line; as traffic volumes accelerate road deterioration, City would need to resurface road more often	Minor increase in operating cost at some locations only	Moderate increase in operation cost for additional multimodal facilities, especially if active transportation facilities are to be maintained in the winter	Highest increase in road maintenance and snow clearing costs due to addition of two travel lanes; however, road deterioration would be reduced because of newly widen road and resurfaced pavement structure
Minimizes Property Acquisition Costs	No property acquisition cost anticipated	No property acquisition cost anticipated	No property acquisition cost anticipated along Ninth Line	Potential for minor property acquisition cost at some locations	Potential moderate property acquisition to accommodate for continuous multimodal	Potential for highest property acquisition cost due to the wider cross-section footprint

LEGEND

Preferred	Less Preferred	Not Preferred

					improvements along the corridor	associated with the addition of two additional lanes
Summary of Engineering Considerations, Construction Complexity and Implementation	**Preferred**	**Preferred**	**Less Preferred**	**Less Preferred**	**Preferred**	**Less Preferred**
OVERALL EVALUATION	**Not Recommended**	**Not Recommended**	**Not Recommended**	**Recommended in combination with Alternatives 5 and 6 to supplement other improvements**	**Recommended in combination with Alternatives 4 and 6**	**Recommended in combination with Alternatives 4 and 5**

LEGEND

Preferred	Less Preferred	Not Preferred

Table 8-4: Summary of Evaluation of Alternative Solutions

	Alternative 1 Do Nothing	Alternative 2 Limit Development	Alternative 3 Improve other Roads	Alternative 4 Operational Improvements	Alternative 5 Multimodal Improvements	Alternative 6 Widen from 2 to 4 lanes
Transportation and Transit, Accessibility	Not Preferred	Not Preferred	Not Preferred	Less Preferred	Preferred	Preferred
City Building	Not Preferred	Not Preferred	Not Preferred	Less Preferred	Preferred	Preferred
Natural Heritage	Less Preferred	Less Preferred	Not Preferred	Less Preferred	Preferred	Less Preferred
Socio-Economic Environment	Not Preferred	Not Preferred	Not Preferred	Less Preferred	Preferred	Less Preferred
Cultural Heritage	Preferred	Preferred	Less Preferred	Less Preferred	Not Preferred	Not Preferred
Engineering Considerations, Construction Complexity, and Implementation	Preferred	Preferred	Less Preferred	Less Preferred	Preferred	Less Preferred
				Recommended in Combination		
Overall Evaluation	Not Recommended	Not Recommended	Not Recommended	Recommended in combination with Alt. 5 and 6 to supplement other improvement	Recommended in combination with Alt. 4 and 6	Recommended in combination with Alt. 4 and 5

LEGEND

Preferred	Less Preferred	Not Preferred

8.3 Selection of the Preferred Solution

Based on the evaluation presented above, Alternatives 1, 2, and 3 are not recommended to be carried forward as they do not address the current and future transportation needs of the corridor. A combination of Alternatives 4 – Operational Improvements (including localized intersections), Alternative 5 – Multimodal Improvements (including improved streetscaping), and Alternative 6 – Widen from 2 Lanes to 4 Lanes, was recommended to be carried forward to address the needs of all travel modes while also considering the contextual aspect of the Ninth Line corridor.

The preferred solution, presented in **Exhibit 8-1**, is consistent with the City of Mississauga Transportation Master Plan and the Shaping Ninth Line Study and will help manage growth and facilitate the transportation system's essential role in city-building.

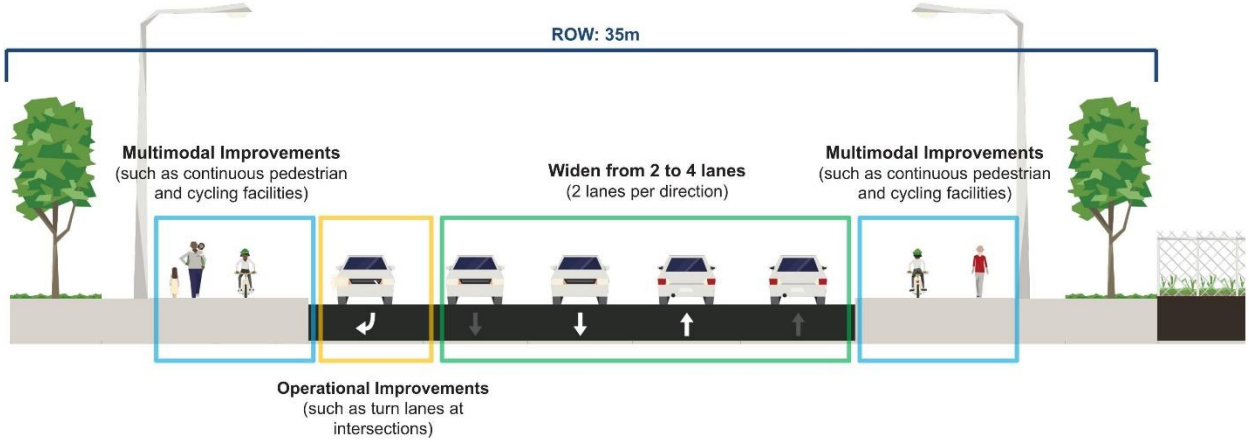


Exhibit 8-1: Summary of Preferred Alternative Solution

9 Alternative Design Concepts

The Preferred Solution as determined in Phase 2 of the Ninth Line Class EA Study includes continuous cycling and pedestrian facilities along the study corridor, widening the road from two to four lanes and streetscaping. The following documents the alternative design concepts developed and assessed to address the Preferred Solution.

9.1 Development of Alternative Design Concepts

9.1.1 Design Parameters

The following design parameters were used as a starting point to guide the development of the Alternative Design Concepts. It is noted that theses design parameters were presented, reviewed and revised as applicable to inform the Project Design Criteria established later in the study to inform the development of the Preferred Design as documented in **Section 10.1.1**:

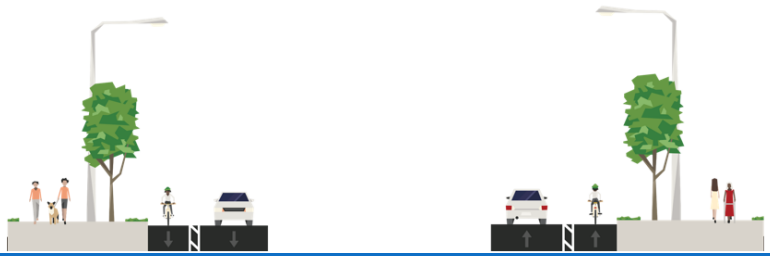
- **Designated Official Plan Right-of-Way:** 35.0m
- **Active Transportation Facility Types:**
  - **Multi-Use Path:** 2.4 – 3.0 m
  - **Boulevard Cycle Track:** 1.8m (with 1.0m buffer)
  - **On-Street Bike Lanes:** 1.8m
  - **Sidewalk:** 1.8 – 2.0m
- **Through Lane:** 3.30m
- **Curb Lane:** 3.50m (inclusive of gutter dimension of 0.3m)

9.1.2 Identification of Alternative Design Concepts

The following alternative design concepts were developed to address the preferred solution to provide continuous and dedicated active transportation (AT) facilities and accommodate a 4-lane roadway. Separate alternatives were designed to address active transportation and widening. The recommended design concept will consist of a combination of the recommended alternative for active transportation and the recommended widening alternative. The alternatives for active transportation are shown in **Table 9-1** and the alternatives for road widening are shown in

Table 9-2.

Table 9-1: Active Transportation Alternatives

Alternative	Typical Cross Section
Alternative 1 • **On-Street Bike Lanes with buffer on** both sides; cyclists travel in one direction (in the same direction as vehicle traffic) • **Sidewalk** on both sides	

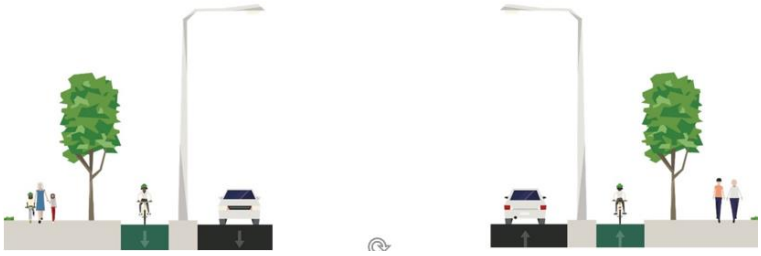
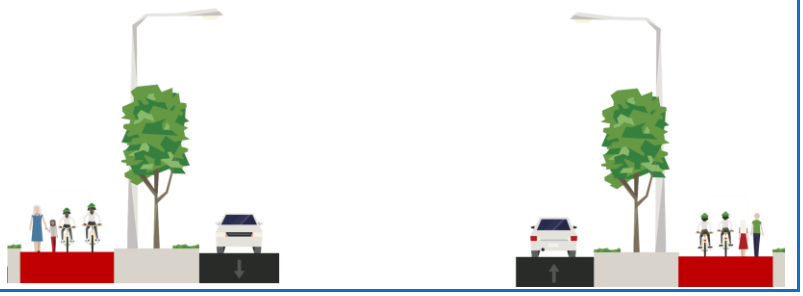
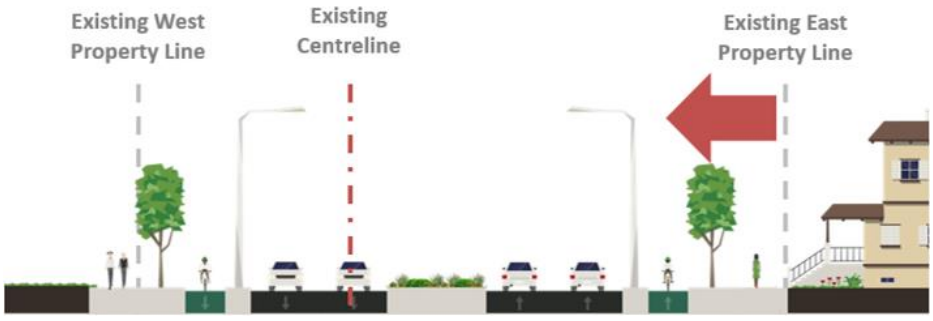
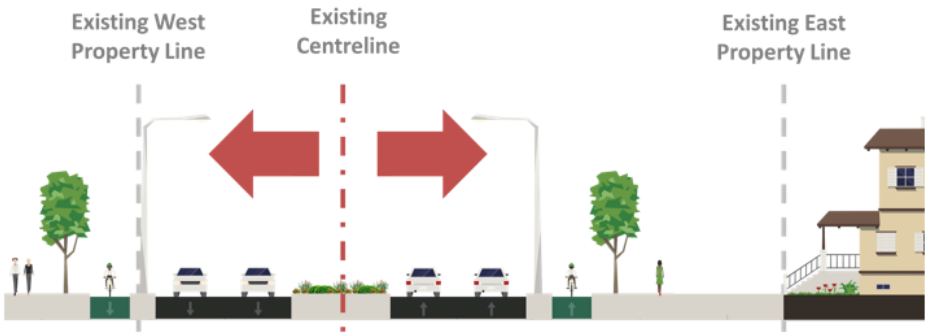
Alternative	Typical Cross Section
• Opportunities for **landscaping** in the boulevard	
Alternative 2 • **Separated Boulevard Cycle Tracks** on both sides; cyclists travel in one direction (in the same direction as vehicle traffic) • **Sidewalk** on both sides • Opportunities for **landscaping** in the boulevard	
Alternative 3 • **Multi-use Paths (MUP)** on both sides provide shared space for pedestrians and cyclists to travel in both directions • Opportunities for **landscaping** in the boulevard	

Table 9-2: Widening Alternatives

Alternative	Typical Cross Section
Alternative 1 – Widen to West • Widen from two (2) to four (4) lanes from the existing east property line so associated impacts occur on the west side	

Alternative	Typical Cross Section
Alternative 2 – Widen about the Centreline • Widen from two (2) to four (4) lanes from the existing centreline	
Alternative 3 – Widen to East • Widen from two (2) to four (4) lanes from the existing west property line so associated impacts occur on the east side	

9.2 Evaluation of Alternative Design Concepts

9.2.1 Evaluation Criteria

To determine the most appropriate design concept for the Ninth Line corridor, the same evaluation framework used for evaluating the alternative solutions was used to evaluate the alternative designs. This framework includes criteria that addresses the transportation needs and the broader social, economic, environmental, and placemaking contributions to ensure the alternative designs are compatible with, and supportive of, existing and planned land uses. The list of criteria was used to compare alternatives and the measure the alternative's success was its ability to correct, minimize or mitigate impacts and / or meet the study goals. The evaluation criteria are shown in **Table 9-3**.

Table 9-3: Design Criteria: for Alternative Design

Evaluation Criteria	Sub-Criteria
Transportation and Transit Accessibility	• Addresses Congestion and Improves Corridor Capacity and Vehicular Level of Service to Accommodate Future Travel Demand • Accommodates All Road Users, Including Pedestrians, Cyclists and Transit Users • Enhanced Road Safety and Comfort for All Road Users • Accommodates Commercial Goods Movement

Evaluation Criteria	Sub-Criteria
	• Improved Access to / from Ninth Line • Addresses Problem / Opportunity Statement • Improves Network Connectivity • Improves Emergency Response Time
City Building	• Consistency with The City's Strategic Priorities Pursuant to the City's Strategic Plan "Our Future Mississauga", Official Plan Policy Objectives, the Cycling Master Plan, Shaping Ninth Line, and Other Relevant Planning Documents • Accommodates Existing and Planned Development
Natural Heritage	• Minimizes Impacts to and Enhances Provincially Significant Wetlands (PSWs), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs) • Minimizes Impacts to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk • Provides Drainage and Stormwater Management Improvements and Mitigates Erosion • Minimizes Effects on Climate Change
Socio-Economic Environment	• Improves Attractiveness/Aesthetics • Minimizes Business Impacts and Enhances Business and Place-Making Opportunities • Minimizes Property Acquisition • Minimizes Noise Impacts • Improves Air Quality • Provides or Improves Streetscape Amenities and Urban Design Elements
Cultural Heritage	• Minimizes Impacts to Archaeological Features • Minimizes Impacts to Cultural Heritage Resources
Engineering Considerations, Construction Complexity and Implementation	• Minimizes Utility Relocation • Addresses Drainage or Contamination Concerns • Minimizes Construction Complexity, Including Staging and Traffic Disruption During Construction • Optimizes Capital Costs • Optimizes Operation/Maintenance Costs • Minimizes Property Acquisition Costs

9.2.2 Active Transportation Evaluation

The detailed evaluation for the Active Transportation Alternatives is presented in **Table 9-4** using the evaluation criteria identified in **Table 9-3.** Each category that was evaluated was summarized using the following rankings from Not Preferred to Preferred:

Not Preferred	Less Preferred	Preferred
(Does not meet objectives)	(Partially meets objectives)	(Meets objectives)

Table 9-4: Evaluation of Active Transportation Alternatives

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
Transportation and Transit, Accessibility			
Addresses Congestion and Improves Corridor Capacity and Vehicular Level of Service to Accommodate Future Travel Demand	• Medium - additional cycling capacity can support mode shift from auto to cycling by providing continuous and convenient connections, contributing to a reduction in road congestion. Usage will be dependent on cyclist comfort level to use on-street facilities.	• High – separated boulevard cycle tracks can support mode shift from auto to cycling by providing a safe, continuous and convenient connections that are attractive to cyclists of all ages and abilities, contributing to a reduction in road congestion	• High – a multi-use path can support mode shift from auto to cycling by providing a safe, continuous and convenient connections that are attractive to cyclists of all ages and abilities, contributing to a reduction in road congestion
Accommodates All Road Users, Including Pedestrians, Cyclists and Transit Users	• Low – On-street bike lanes poses some risk to safety (real and perceived) for cyclists, as cyclists are in close proximity to vehicular lanes with a buffer in between. Usage will be dependent on cyclist comfort level to use on-street facilities.	• High – boulevard cycle tracks, separated from vehicle traffic offers a high degree of separation from vehicle traffic, offering a safer environment to accommodate cyclists of all ages and abilities.	• High – a multi-use path separated from vehicle traffic offers a high degree of separation from vehicle traffic, offering a safer environment to accommodate all AT road users.
Enhanced Road Safety and Comfort for All Road Users	• Low – On-street bike lanes poses greater risk to safety (real and perceived) for cyclists of lower ability (i.e. skill and age), as cyclists are in close proximity to vehicular lanes with a buffer in between. Separates pedestrians from cyclists.	• High – a boulevard cycle track and sidewalk provide a high degree of separation between all modes, supporting a safe environment to accommodate AT users of all ages and abilities.	• Medium – a multi-use path separated from vehicle traffic offers a high degree of separation from vehicle traffic, supporting a safe environment to accommodate AT road users. However, a multi-use path may create a conflicting environment amongst pedestrians, cyclists, and other non-motorized recreational activities such as in-line skating and skateboarding.
Accommodates Commercial Goods Movement	• No impact		
Improved Access to / from Ninth Line	• High – additional cycling and pedestrian access to / from Ninth Line		
Addresses Problem / Opportunity Statement	Yes – all alternatives: ○ Improves Ninth Line's capacity to accommodate projected traffic demand and transit reliability by supporting mode shift from auto to cycling by providing continuous and convenient AT connections. ○ Provide enhanced active transportation infrastructure to improve pedestrian and cycling conditions ○ Support Ninth Line as a complete street to serve visitors and residents of all ages and abilities, as well as commuting and recreational uses.		
Improves Network Connectivity	Yes – all alternatives provide a link between existing multi-use trail on Britannia Rd, Derry Rd (leading to trail system), and bike lanes on Erin Centre Blvd. Yes – all alternatives improve pedestrian connectivity as it provides additional pedestrian facility on the west side of 9th Line		
Improves Emergency Response Time	All alternatives provide some improvements to emergency response time as there is mode choice for users to prefer active transportation facilities to auto dependency.		

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
Summary of Transportation and Transit, Accessibility	**Not Preferred**	**Preferred**	**Not Preferred**
City Building			
Consistency with The City's Strategic Priorities Pursuant to the City's Strategic Plan "Our Future Mississauga", Official Plan Policy Objectives, the Cycling Master Plan, Shaping Ninth Line, and Other Relevant Planning Documents	• All alternatives are consistent with the City's vision and goals as outlined in "Our Future Mississauga", the Cycling Master Plan, City of Mississauga Official Plan, and Shaping Ninth Line, including ability to provide additional capacity to meet future demands and improve the cyclist and pedestrian experience.		
Accommodates Existing and Planned Development	• No difference in alternatives as all alternatives provide active transportation facilities to both boulevards and have the potential to accommodate planned development and growth by supporting trips through additional modes of transportation.		
Summary of City Building	**Preferred**	**Preferred**	**Preferred**
Natural Heritage			
Minimizes Impacts to and Enhances Provincially Significant Wetlands (PSWs), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs)	• No Provincially Significant Wetlands (PSWs) occur within the study area • No Areas of Natural and Scientific Interest (ANSIs) within the study area • All woodlands within the Ninth Line Lands were considered significant • No difference in alternatives as all alternatives are anticipated to have the same level of impact with 35m right-of-way		
Minimizes Impacts to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Less potential to reduce impacts with minimum 3.5m facility width (1.5m sidewalk and 1.5m bike lane) where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Less potential to reduce impacts with minimum 3.5m facility width (1.5m sidewalk and 1.5m bike lane) where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Greater potential to reduce impacts with minimum 3.0m MUP width (or 2.4 m in highly constrained areas) where there are limited opportunities to acquire additional property.
Provides Drainage and Stormwater Management Improvements and Mitigates Erosion	• All alternative designs are urbanized roadways with curb and gutter to provide appropriate stormwater management within the road pavement. • Increased width of hard surface from AT facilities are anticipated to be similar between Alternative 1 and 2 (3.5m), which will result in additional run-off and	• All alternative designs are urbanized roadways with curb and gutter to provide appropriate stormwater management within the road pavement. • Increased width of hard surface from AT facilities are anticipated to be similar between Alternative 1 and 2 (3.5m), which will result in additional run-off and	• All alternative designs are urbanized roadways with curb and gutter to provide appropriate stormwater management within the road pavement. • Increased width of hard surface from AT facilities are anticipated to be slightly less with Alternative 3 (3.6m over Alternative 1 and 2, which will result in slightly less

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
	increased impervious area requiring quantity and quality treatment and road salt.	increased impervious area requiring quantity and quality treatment and road salt	additional run-off and increased impervious area requiring quantity and quality treatment and road salt.
Minimizes Effects on Climate Change:			
a) Climate Change Mitigation: Minimizes the Generation of Greenhouse Gas Emissions and Carbon Sinks	• All alternative designs minimize the generation of greenhouse gas and carbon sinks by improving AT facilities to reduce auto dependency • Reduction in road congestion helps decrease the amount of travel time for vehicles spent on the road • Accommodate tree planting within the boulevard where space permits		
b) Climate Change Adaptation: Resiliency or Vulnerability of the Project to Changing Climatic Conditions	• All alternative designs have the same resiliency/vulnerability of the project to changing climatic conditions • Potential for users to rely heavily on auto if users are exposed to weather events and patterns that affect the use of AT facilities		
c) Minimizes the Impact on the Environment's Adaptive Capacity (GUIDE)	• All alternative designs have the same environment's adaptive capacity for changing climatic conditions that affect the corridor		
Summary of Natural Environment	**Preferred**	**Preferred**	**Preferred**
Socio-Economic Environment			
Improves Attractiveness/Aesthetics	• No difference in alternatives as introduction of active transportation facility and streetscaping opportunities enhance visual aesthetics.		
Minimizes Business Impacts and Enhances Business and Place-Making Opportunities	• On-street bike lanes and sidewalks provide direct access for pedestrians and cyclists to existing and planned businesses on both boulevards. On-street bike lanes are one-directional resulting in potentially longer cyclist travel distance (depending on origin and destination) to access businesses due to the inability to travel in opposing directions	• Cycle tracks and sidewalks provide direct access for pedestrians and cyclists to existing and planned businesses on both boulevards. Cycle tracks are one-directional resulting in potentially longer cyclist travel distance (depending on origin and destination) to access businesses due to the inability to travel in opposing directions	• MUPs provide direct access for pedestrians and cyclists to existing and planned businesses on both boulevards. MUPs allow for two-way travel which minimize cyclist travel distance to access businesses on either boulevard
Minimizes Property Acquisition	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones and MUP width to 2.4m minimum in constrained locations only, where there are limited opportunities to acquire additional property

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
Minimizes Noise Impacts	• No difference in alternatives as all alternatives encourage active modes of transportation, including walking, cycling and transit thus reducing traffic noise.		
Improves Air Quality	• No difference in alternatives as all alternatives encourage safer and more comfortable pedestrian and cycling facilities, encouraging a more sustainable mode of transportation and reducing congestion.		
Provides or Improves Streetscape Amenities and Urban Design Elements	• All alternatives provide an opportunity to implement landscaping and improve streetscape amenities and urban design elements.		
Summary of Socio-Economic Environment	**Less Preferred**	**Less Preferred**	**Preferred**
Cultural Heritage			
Minimizes Impacts to Archaeological Resources	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones and MUP width to 2.4m minimum, where there are limited opportunities to acquire additional property.
Minimizes Impacts to Cultural Heritage Resources	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones and MUP width to 2.4m minimum, where there are limited opportunities to acquire additional property.
Summary of Cultural Heritage	**Preferred**	**Preferred**	**Preferred**
Engineering Considerations, Construction Complexity and Implementation			
Minimizes Utility Relocation	• No difference in alternatives as all alternatives are anticipated to have the same utility relocation requirements and require similar construction techniques and level of disruption.		
Addresses Drainage or Contamination Concerns	• All alternative designs are urbanized roadways with curb and gutter to provide appropriate stormwater management within the road pavement.		

Evaluation Criteria	**Alternative 1** **On-street bike lanes with buffers, and sidewalks on both sides**	**Alternative 2** **Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides**	**Alternative 3** **Multi-use path (no additional bike lanes/cycle tracks or sidewalks)**
Minimizes Construction Complexity, Including Staging and Traffic Disruption During Construction	• Low construction complexity due to preparing wider pavement width to accommodate on-street bike lanes and additional pavement markings.	• Higher construction complexity due to constructing separate facilities for pedestrians and cyclists that consist of different construction materials	• Moderate construction complexity due to preparing one type of infrastructure (paved multi-use path) for both pedestrians and cyclists.
Optimizes Capital Costs	• Comparable capital cost for structure modification to accommodate on-street bike lanes and sidewalks through structure widening/ replacement/ extension • Potential for slightly increased capital costs for varying materials required for on-street bike lane and sidewalk (asphalt vs concrete) and pavement markings and signage to delineate facility types	• Comparable capital cost for structure modification to accommodate sidewalks and cycle tracks on both boulevards through structure widening/ replacement/ extension • Potential for slightly increased capital costs if varying materials are required for sidewalk and cycle track (asphalt vs concrete) and if pavement markings and signage to delineate facility types and direction is required	• Comparable capital cost for structure modification to accommodate sidewalks and cycle tracks on both boulevards through structure widening/ replacement/ extension • Potential for slightly lower capital costs due to creating only one AT facility type
Optimizes Operation/Maintenance Costs	• Moderate operating and maintenance costs to maintain two AT facility types on road and in boulevard. On-street bike lanes would be maintained with road snow maintenance operations.	• Moderate operating and maintenance costs to maintain two AT facility types in both boulevards	• Lower maintenance cost due to pedestrian and cyclists sharing the same facility.
Minimizes Property Acquisition Costs	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones and MUP width to 2.4m minimum, in constrained areas where there are limited opportunities to acquire additional property.
Summary of Engineering Considerations, Construction Complexity and Implementation	**Less Preferred**	**Less Preferred**	**Preferred**
OVERALL RECOMMENDATION	**Not Recommended**	**Recommended**	**Less Recommended**

9.2.3 Widening Evaluation

The detailed evaluation for the widening alternatives is identified in **Table 9-5** using the evaluation criteria identified in **Table 9-3.** Each category that was evaluated was summarized using the following rankings from Not Preferred to Preferred:

Not Preferred (Does not meet objectives)	**Less Preferred** (Partially meets objectives)	**Preferred** (Meets objectives)

Table 9-5: Evaluation of Widening Alternatives

Evaluation Criteria	Alternative 1 Widen to the West	Alternative 2 Widen about the Centreline	Alternative 3 Widen to the East
Transportation and Transit, Accessibility			
Addresses Congestion and Improves Corridor Capacity and Vehicular Level of Service to Accommodate Future Travel Demand	• All alternative designs increase capacity to meet future demands and have the same potential reduce traffic congestion and delays		
Accommodates All Road Users, Including Pedestrians, Cyclists and Transit Users	• All alternative designs accommodate all road users by increasing road capacity, providing dedicated AT facilities, and improving transit reliance along the corridor		
Enhanced Road Safety and Comfort for All Road Users	• All alternative designs provide enhanced road safety and comfort for all road users by reducing collision potential through reduced traffic congestion • High potential for improving cyclist and pedestrian safety due to provision of dedicated active transportation facilities, which reduces potential conflict with vehicles		
Accommodates Commercial Goods Movement	• All alternative designs accommodate commercial goods movements		
Improved Access to / from Ninth Line	• All alternative designs reduce traffic congestion and provide greater gaps in traffic to improve access to/from Ninth Line at cross-streets and driveways		
Addresses Problem / Opportunity Statement	• All alternative designs address the problem and opportunity statement by improving Ninth Line's capacity to accommodate future traffic demands, providing AT facilities to encourage travel choices to reduce driving, improving transit efficiency and reliability, providing a continuous urban roadway with consistent drainage infrastructure, and designing Ninth Line as a complete street to serve people of all ages		
Improves Network Connectivity	• All alternative designs improve network connectivity by providing continuous 4-lane roadway and dedicated AT facilities for pedestrians and cyclists.		
Improves Emergency Response Time	• All alternative designs provide additional lanes to improve emergency vehicle access and response time along the corridor		
Summary of Transportation and Transit, Accessibility	**Preferred**	**Preferred**	**Preferred**
City Building			
Consistency With The City's Strategic Priorities Pursuant to the City's Strategic Plan "Our Future Mississauga", Official Plan Policy Objectives, the Cycling Master Plan, Shaping Ninth Line, and Other Relevant Planning Documents	• All alternative designs are aligned with the City's plans and policies as these designs provide additional capacity to meet future demands and improve the cyclist and pedestrian experience		
Accommodates Existing and Planned Development	• Minor impacts to existing and planned developments on the west side of Ninth Line with marginal property impacts • Planned developments on the west can accommodate property impacts through development applications	• Moderate impacts to existing and planned developments on the west side of Ninth Line with moderate property impacts	• Minor impacts to existing and planned developments on the west side of Ninth Line by maintaining existing right-of-way (ROW) boundary on the west side • Moderate impacts to potential future developments on the east side of Ninth Line
Summary of City Building	**Preferred**	**Less Preferred**	**Not Preferred**
Natural Heritage			

Evaluation Criteria	**Alternative 1** **Widen to the West**	**Alternative 2** **Widen about the Centreline**	**Alternative 3** **Widen to the East**
Minimizes Impacts to and Enhances Provincially Significant Wetlands (PSWs), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs)	• No Provincially Significant Wetlands (PSWs) occur within the study area • No Areas of Natural and Scientific Interest (ANSIs) within the study area • All woodlands within the Ninth Line Lands ae considered significant		
Minimizes Impacts to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk	• Minor impacts to significant woodlands on the west side where there are significant woodland habitats (FOD5) for Bat Maternity Colonies. • Minor impacts to significant woodland (FOD5) and Mineral Cultural Meadow (CUM1) that are habitats for hawks, kestrel, owls, and bald eagles.	• Moderate impacts to significant woodlands on the west side where there are significant woodland habitats (FOD5) for Bat Maternity Colonies. • Moderate impacts to significant woodland (FOD5) and Mineral Cultural Meadow (CUM1) that are habitats for hawks, kestrel, owls, and bald eagles.	• No impacts to significant woodlands on the west side where there are significant woodland habitats (FOD5) for Bat Maternity Colonies. • No impacts to significant woodland (FOD5) and Mineral Cultural Meadow (CUM1) that are habitats for hawks, kestrel, owls, and bald eagles.
Provides Drainage and Stormwater Management Improvements and Mitigates Erosion	• All alternative designs are urbanized roadways with curb and gutter to provide appropriate stormwater management within the road pavement.		
Minimizes Effects on Climate Change: *Climate Change Mitigation: Minimizes the Generation of Greenhouse Gas Emissions and Carbon Sinks* *Climate Change Adaptation: Resiliency or Vulnerability of the Project to Changing Climatic Conditions* *Minimizes the Impact on the Environment's Adaptive Capacity (GUIDE)*	• All alternative designs minimize the generation of greenhouse gas and carbon sinks by improving AT facilities to reduce auto dependency • Reduction in road congestion helps decrease the amount of travel time for vehicles spent on the road • Accommodate tree planting within the boulevard where space permits • All alternative designs have the same resiliency/vulnerability of the project to changing climatic conditions • Potential for users to rely heavily on auto if users are exposed to weather events and patterns that affect the use of AT facilities • All alternative designs have the same environment's adaptive capacity for changing climatic conditions that affect the corridor		
Summary of Natural Environment	**Less Preferred**	**Less Preferred**	**Preferred**
Socio-Economic Environment			
Improves Attractiveness/Aesthetics	• Visual aesthetics will be moderately reduced due to increased pavement width from 2 to 4 lanes and the addition of active transportation facilities • Visual aesthetics can be improved through localized tree plantings and other boulevard treatments wherever possible within ROW		
Minimizes Business Impacts and Enhances Business and Place-Making Opportunities	• Improves access at commercial driveways, employment areas and cross-streets due to reduced traffic congestion • Improves pedestrian, cycling, and transit access through improved infrastructures on all designs		
Minimizes Property Acquisition	• Minor impacts to existing and future development and/or residential properties on the west side • No displacements anticipated to residential properties, but potential for property acquisition of residential properties on the west side	• Moderate impacts existing and future development and/or residential properties on the west side • No displacements anticipated to residential properties, but potential for property acquisition of residential properties	• No impacts existing and future development and/or residential properties on the west side • Potential displacements anticipated to residential properties on the east side
Minimizes Noise and Impacts	• Noise levels are anticipated to increase with future traffic growth and lanes in closer proximity to properties		

Evaluation Criteria	**Alternative 1** **Widen to the West**	**Alternative 2** **Widen about the Centreline**	**Alternative 3** **Widen to the East**
Improves Air Quality	• Moderate improvement to air quality through increased transit use and reduced congestion • Active transportation and transit service improvements (through the reduced traffic congestion) can reduce dependence on automobile and provide air quality improvements		
Provides or Improves Streetscape Amenities and Urban Design Elements	• Improves streetscape amenities by provide tree plantings where space allows within the ROW • Improves urban design by accommodating dedicated AT facilities for pedestrians and cyclists		
Summary of Socio-Economic Environment	**Preferred**	**Less Preferred**	**Not Preferred**
Cultural Heritage			
Minimizes Impacts to Archaeological Resources	• Minor impacts to archaeological potentials on the west side to be minimized through design • Stage 2 archaeological assessment will be required for the study corridor • Anticipated minor impacts to existing St. Peter's Catholic Cemetery to be minimized through design, but will require Stage 3 Cemetery Investigation	• Moderate to significant impacts to archaeological potentials on the west side of the corridor • Minor impact to archaeological potential at Montessori School located on the east side of the corridor (6553 Ninth Line) • Stage 2 archaeological assessment will be required for the study corridor • Moderate to significant impacts to existing St. Peter's Catholic Cemetery. Stage 3 Cemetery Investigation required.	• Moderate impact to archaeological potential at Montessori School located on the east side of the corridor (6553 Ninth Line) • Stage 2 archaeological assessment will be required for the study corridor
Minimizes Impacts to Cultural Heritage Resources	• Potential impacts to properties listed as heritage by the City of Mississauga: 5104 Ninth Line (CH1), 5768 Ninth Line (CH2), 6056 Ninth Line (CH3), and 7044 Ninth Line (CH4)	• Potential impacts to properties listed as heritage by the City of Mississauga or designated as part of the Ontario Heritage Act: 5104 Ninth Line (CH1), 5768 Ninth Line (CH2), 6056 Ninth Line (CH3), 7044 Ninth Line (CH4) and 6671 Ninth Line (BHR1)	• Potential impact to property designated as part of the Ontario Heritage Act: 6671 Ninth Line (BHR1)
Summary of Cultural Heritage	**Less Preferred**	**Not Preferred**	**Preferred**
Engineering Considerations, Construction Complexity and Implementation			
Minimizes Utility Relocation	• Moderate to significant utility relocation to accommodate additional lanes and AT facilities. Utility relocations required for all alternatives		
Addresses Drainage or Contamination Concerns	• All alternative designs will provide urbanized roadways with curb and gutter to improve drainage patterns along the corridor		
Minimizes Construction Complexity, Including Staging and Traffic Disruption During Construction	• Moderate construction complexity due to realignment of Ninth Line to the east	• Minor construction complexity as the road alignment will generally remain the same for Ninth Line	• Moderate construction complexity due to realignment of Ninth Line to the west
Optimizes Capital Costs	• All alternative designs provide improvements to all modes • Significant capital construction costs are anticipated due to the combination of utility relocation, culvert and/or structural expansions and shifting the road alignment to the west	• All alternative designs provide improvements to all modes • Moderate capital construction costs are anticipated because centerline widening will maintain roadway crown but results in significant utility relocations	• All alternative designs provide improvements to all modes • Significant capital construction costs are anticipated due to the combination of utility relocation, culvert and/or structural expansions and shifting the road alignment to the east

Evaluation Criteria	**Alternative 1** **Widen to the West**	**Alternative 2** **Widen about the Centreline**	**Alternative 3** **Widen to the East**
Optimizes Operation/Maintenance Costs	• Moderate increase in operating costs with additional roadway width (additional lanes) to maintain • Moderate increase in operating costs to maintain active transportation facilities		
Minimizes Property Acquisition Costs	• Potential minor property acquisition for existing and planned developments on the west side • Potential minor residential property acquisition on the west side	• Potential moderate property acquisition for existing and planned developments on the west side • Potential minor residential property acquisition on the west side	• Moderate to significant residential property acquisition on the east side
Summary of Engineering Considerations, Construction Complexity and Implementation	**Less Preferred**	**Preferred**	**Not Preferred**
OVERALL RECOMMENDATION	**Recommended**		

9.2.4 Traffic Control

9.2.4.1 ROUNDABOUT SCREENING

The suitability of potential roundabout designs along the Ninth Line corridor were considered for all signalized intersections between Derry Road West and Eglinton Avenue West (inclusive), including the proposed signalized intersections at Tacc Drive, McDowell Drive and Beacham Street. Roundabouts have been demonstrated to be safer than other forms of at-grade intersections. Vehicles travel in the same direction, eliminating left-turn conflicts from traditional intersections. Speed control is also provided by geometric designs (circle), with traffic control devices, thus speed control is achieved throughout the day. However, it is important to understand all considerations as there are both advantages and disadvantages of roundabouts.

The evaluation framework followed in the roundabout assessment began with the screening phase, where the general objectives and context for roundabout installation were clarified and considered. If the preliminary screening criteria for suitability and feasibility are both met, an initial roundabout configuration is developed for more detailed review in the assessment phase. If the roundabout option is deemed both suitable and feasible in the assessment phase, the concept is carried forward for more detailed evaluation and ultimately design if deemed the most appropriate solution.

Based on the preliminary screening criteria completed, both the suitability and feasibility criteria were not met for all signalized intersections (except for Britannia Road and Derry Road) along Ninth Line. There are potential property impacts based on a minimum 2-lane roundabout ranging from 50m to 67m on either side of Ninth Line. There are closely spaced signalized and unsignalized intersections (< 300m) along Ninth Line that would make it difficult for vehicles to access Ninth Line. Larger roundabouts (> 2 lanes) require higher construction cost due to a larger intersection footprint, complexity in traffic management through construction staging, and complexity of retrofit construction. Larger roundabouts may be more challenging for pedestrians with vision impairment or mobility challenges and can create discomfort for cyclists.

The intersections of Britannia Road and Derry Road were carried forward for additional review using the Peel Region Roundabout Assessment. It was found that roundabouts at both Britannia Road and Derry Road intersections are not recommended as they each would require a three (3) lane roundabout. The multi-lane roundabout introduces larger crossing distances, multiple lane crossing and additional conflict points through the intersection for pedestrians and cyclists that require waiting for gaps to cross. In addition, the nearest intersections (signalized and unsignalized) are less than 300m away which may reduce the available gaps for vehicles departing from those adjacent side roads onto Ninth Line. The roundabout footprint would require additional property, with potential to impact MTO lands, and the approaches to the roundabouts may have potential conflict with the 407ETR interchanges and result in impacts to on-ramps.

The findings of the assessment concluded that roundabouts are **not recommended** along the Ninth Line corridor.

9.2.4.2 TRAFFIC OPERATIONS AND SIGNALIZATION

Signal warrant analyses were conducted for several locations along Ninth Line, including all unsignalized intersections of major collectors and access driveways for new developments. The warrant followed the criteria outlined in *Ontario Traffic Manual – Book 12 Traffic Signals, March 2012* (OTM Book 12). Ninth Line at Beacham Street and Tacc Drive both met the signalization warrant, based on 4-hour volumes. The McDowell Drive intersection did not warrant signalization based on OTM Book 12 methodology; however, signalization is recommended due to high volumes and delays experienced on side streets during the PM peak hour. In terms of phasing, it is noted that the signalization at Tacc Drive is required by 2031 whereas the signalization at McDowell Drive is required by 2041.

Additional analysis for the segment of Ninth Line between Eglinton Avenue and Erin Centre Boulevard was conducted to address potential operational issues from future active development in the area. The key concern was to investigate intersection spacing and any queuing impacts due to the closely spaced intersections. Based on a desktop review, analysis for the 2041 horizon was conducted to assess the best option for access to the development through either Stardust Drive or Skyview Street. Traffic volumes generated by the developments access was provided by the City. The following options were assessed, with no changes to the other intersections between Eglinton Avenue and Erin Centre Boulevard:

- Option A: Signalized intersection at the proposed development/Stardust Drive
- Option B: Signalized intersection at the proposed development/Skyview Street
- Option C: Two-way stop-control at the proposed development/Skyview Street

Based on the analysis, Option B signalized intersection at Skyview Street was determined to be the best option to serve the proposed development and was carried forward. Option A required northbound left-turn storage lanes at Stardust Drive and southbound left-turn storage lanes at Eglinton Avenue that exceeded the available space. Option C resulted in high delays on the side streets at Skyview Street.

As Option B is preferred, it will change the traffic operations at Stardust Drive from full-movements to a Right-In/Right-Out. The assessment recommendations are provided in **Appendix D**.

9.3 Overall Design Recommendation

Based on the findings of the Active Transportation Alternatives Evaluation, **Alternative 2- Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides of the road** is recommended as the preferred active transportation alternative. Based on the findings of the Roadway Widening Evaluation, **Alternative 1- Widening to the West** was the recommended widening alternative. No roundabouts are recommended, and **new traffic signals are recommended** at Beacham Street, Tacc Drive, McDowell Drive and Skyview

Street (due to future development). To change the traffic operations at Stardust Drive from full-movements to a Right-In/Right-Out.

10 Recommended Design Concept

10.1 Description of the Recommended Design Concept

The recommended design for Ninth Line Improvements includes the following elements:

- Four general purpose lanes (two in each direction). Through lanes will be 3.35m and curb lanes will be 3.5m
- Separated 2.0m boulevard cycle tracks (traveling in the same direction as the road) and 2.0m sidewalks on both sides of the road
- 5.0m centre median (either painted or raised with landscaping). The median width also accommodates left turns at intersections
- 0.5m curb and gutter with 0.5m rounding buffer
- Accessibility for Ontarians with Disabilities (AODA) compliant intersections
- New traffic signals proposed at Skyview Street, Tacc Drive, McDowell Drive and Beacham Street
- Extension of Osprey Marsh culvert
- Illumination along the corridor
- Opportunities for streetscaping
- Property requirements with grading generally contained within the proposed right-of-way on the east side where feasible. Temporary and permanent easements for construction, maintenance, and grading purposes
- Utility relocations

10.1.1 Design Criteria

The geometric design for this road project was designed in accordance with the approved design criteria, standards and manuals. If there is any difference between the approved design criteria and standards and manuals, the following shall apply in descending order of precedence:

1. The approved design criteria for this road design;
2. Alternative Design Stakeholder Workshop #1 (August 27, 2020);
3. City of Mississauga (CoM) T&W Standard Drawings (August 12, 2020);
4. TAC Geometric Design Guidelines (June 2017);
5. OTM Book 18 (2015); and
6. MTO Design Supplement for TAC Geometric Design Guidelines (June 2017).

A stakeholder workshop with internal City Staff was held in August 2020 to determine the typical section. This feedback was used to review and update the design parameters identified in **Section 9.1.1** where applicable and establish the EA Study identified design criteria presented in the following tables. Key discussions from the workshop used to inform the design criteria for the study include:

- The Ninth Line preferred alternative design should start with a proposed 35m ROW as identified in the City of Mississauga Official Plan.
- To facilitate the movement of all users, a design speed of 60km/h should be considered. Since Ninth Line is a linear corridor, speeding would be anticipated with a lower posted speed.
- The ideal minimum lane width is 3.50m curb lanes (to accommodate transit vehicles) and 3.35m thru lanes. Turning lane widths should be 3.35m as a minimum to accommodate for transit vehicles turning, however, if transit vehicles are not required to turn at a specific intersection, then a minimum 3.0m turn lane is sufficient.
- Pedestrian refuge (if any) should be a minimum 2.0m to accommodate for the length of a single bicycle.
- The minimum width of the centre median to provide target soil volumes and protect from roadside salt spray for canopy trees is 5.0m. The full 5.0m at mid-blocks can be used for tree plantings which at intersections can become a 3.0m turn lane and a 2.0m refuge. Where there are transit vehicles that require turns at intersections, the adjacent lane widths can be slightly reduced to meet the minimum 3.35m turning lane width.
- The proposed property line clearance from the sidewalk should be 0.5m. The minimum width for a sidewalk should be 2.0m.
- The location of the tree corridor should be between the cycle track and sidewalk to provide shading for AT facility users.
- The cycle track facility should be placed behind the transit bus pads/shelters and adjacent to the sidewalk at intersections to reduce conflicts and minimize property requirements.
- Based on the consultation feedback from PIC #1, most of the public prefers a separated cycle track and sidewalk on Ninth Line which the City is strongly supportive of.

The design decisions made in this workshop were documented and circulated for review and approval. Guidance from the workshop was incorporated in the project Design Criteria as applicable. The following tables present the approved Design Criteria developed for the project.

Table 10-1: Road Design Criteria

Road Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
Design Classification	2-Lane Arterial	4-Lane Arterial (Divided)	4-Lane Arterial (Divided)	City OP (2010) Schedule 5 Long Term Road Network
R.O.W. Width	(varies) 20 – 60 m	35 m	35 m	City OP (2010) Schedule 8 Designated ROW Widths

Road Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
				Alternative Design Stakeholder Workshop #1
Design Speed	N/A	CoM Standards 90 km/h Workshop 70 km/h	Workshop 70 km/h	CoM Standards (2211.010) Alternative Design Stakeholder Workshop #1
Posted Speed	70 km/h	CoM Standards N/A Workshop 60 km/h	Workshop 60 km/h	Alternative Design Stakeholder Workshop #1
Minimum Stopping Sight Distance	356 m	105 m	105 m	TAC 2017 (Table 3.3.2 Pg, 59)
Equivalent Minimum 'K' Factor	21	17 (Crest) 10 – 12 (Sag)	17 (Crest) 10 – 12 (Sag)	TAC 2017 (Table 3.3.2 Pg. 59 & Table 3.3.4 Pg. 62)
Grades Maximum	2.4%	6.0% (max) 0.5% (min)	6.0% (max) 0.5% (min)	CoM Standards (2211.010)
Maximum Grade through an intersection	0.55%	2.0%	2.0%	CoM Standards (2211.010)
Minimum Intersection Angle	80 degrees	80-90 degrees	80-90 degrees	CoM Standards (2211.010)
Minimum Length Of Tangent At Intersection Approach	66 m	75 m	66 m [A]	CoM Standards (2211.010)

Road Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
Radius Minimum	1680 m	Min R = 200 m Min R for NC = 1680 m Min R for RC = 290 m	Min R for NC = 1680 m	TAC 2017 (Table 3.2.8 Pg.23)
Maximum Grade Breaks at intersection	N/A	DS ≥ 70 0.5 – 2.0%	DS ≥ 70 0.5 – 2.0%	TAC 2017 (Section 9.7.3.3, Pg.49)
Maximum Rate of Superelevation (4% Max)	N/A	0.04 m/m	N/A	TAC 2017 (Section 3.2.2.4, Pg.8)
Pavement Width* (Urban Design)	Varies (7.0 m – 14.5 m)	CoM Standards Thru-Lane = 4.0 m Curb Lane = 4.0 m Workshop Thru-Lane = 3.35 m Curb Lane = 3.50 m (includes 0.30 m gutter)	Thru-Lane = 3.35 m Curb Lane = 3.50 m (includes 0.30 m gutter)	CoM Standards (2211.050) Alternative Design Stakeholder Workshop #1
Median Width	N/A	CoM Standards Mid-block = 7.0 m Intersection = 1.5 m Workshop Mid-block = 5.0 m Intersection = 1.65 m	Mid-block = 5.0 m Intersection = 1.65 m	CoM Standards (2211.050 & 2211.210) Alternative Design Stakeholder Workshop #1
Concrete Curb	0.5 m	0.5 m	0.5 m	CoM Standards (2230.010)
Concrete Splash Pad (from BOC)	Varies (0.5 – 0.9 m)	CoM Standards 0.75 m Workshop	1.0 m	CoM Standards (2211.120) Alternative Design

Road Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
		1.0 m (integrated with utility poles)		Stakeholder Workshop #1
Intersection Curb Radius	Varies (13 – 18m)	Channelization R = 20 m	13 – 22m	CoM Standards (2211.210) Alternative Design Stakeholder Workshop #1
Property Line Buffer / Rounding	Varies	<u>CoM Standards</u> 0.4 m <u>Workshop</u> 0.5 m	0.5 m	CoM Standards (2211.120) Alternative Design Stakeholder Workshop #1
Minimum Planting Zone	Varies	<u>Workshop</u> 2.45 m	<u>Workshop</u> 2.45 m	Alternative Design Stakeholder Workshop #1
Bus Shelter Pad and Platform	N/A	4.0 x 7.0 m Pad 2.0 x 15 m Platform	2.1 x 7.0 m Pad[B] 2.0 x 15 m Platform	Mi-Way Standards 2240.086 2240.087 2240.092
Concrete Bus Stop Platform	Varies (2.4 x 9.7 m to 1.4 x 15.3 m)	2.0 x 8.0 m Platform	2.0 x 15 m Platform[B]	Mi-Way Standards 2240.086 2240.087 2240.092
Street Light/Utility Pole Diameter	N/A	0.6 x 0.6 m “Box Out for Utility Poles”	TBD during Design Phase	CoM Standards

Road Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
				(2240.010)
Signals & Illumination	Existing Traffic Signals at: • Eglinton Ave W • Erin Centre Blvd • Thomas St • Britannia Rd W • Osprey Blvd • Doug Leavens Blvd • Derry Rd One sided illumination	Existing Traffic Signals at: • Eglinton Ave W • Erin Centre Blvd • Thomas St • Britannia Rd W • Osprey Blvd • Doug Leavens Blvd • Derry Rd Illumination to be provided on both sides of Ninth Line Signal Warrant Analysis to be conducted at unsignalized intersections	Proposed Traffic Signals at • Tacc Drive • McDowell Drive • Beacham Street • Skyview Street (due to future development) Illumination to be provided on both sides of Ninth Line	

Notes:

- *City of Mississauga measures pavement width from Edge of Pavement (EOP) to EOP. Road Width is measured from Face of Curb (FOC) to FOC.

Table 10-2: Turning lane design criteria

Turning Lane		Present Conditions	Design Standards	Proposed Standards	Source
Right Turn Lane	Width	3.5 m	CoM Standards 3.5 m Workshop 3.0m (min) at non-transit turning intersections 3.35m (min) at transit turning intersections	3.35m (min)	CoM Standards (2211.210) Alternative Design Stakeholder Workshop #1
	Storage	(Varies) 25 - 110 m (Storage + Decel)	Refer to Transportation Report	Refer to Transportation Report	TAC 2017 (Section 9.17.4.3 Pg.128)
	Taper	Varies 35 - 97 m	17:1 – 20:1	17:1	TAC 2017 (Table 9.14.2 Pg.101)
	Parallel Lane (Deceleration)	Varies	105	105	TAC 2017 (Table 9.14.2 Pg.101)
Left Turn Lane	Width	Varies (3.2 – 3.6 m)	CoM Standards 3.5 m Workshop 3.0m (min) at non-transit turning intersections 3.35m (min) at transit turning intersections	3.35m (min)	CoM Standards (2211.210) Alternative Design Stakeholder Workshop #1
	Storage	Varies 50 – 90 m (Storage + Decel)	Refer to Transportation Report	Refer to Transportation Report	TAC 2017 (Section 9.17.4.3 Pg.128)
	Taper	Varies 20 – 124 m	15:1 – 42:1	15:1	TAC 2017 (Table 9.17.1 Pg.123)
	Parallel Lane (Deceleration)	Varies	105	105	TAC 2017 (Table 2.5.2 Pg.38)

Table 10-3: Roadside design parameters

Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
Clear Zone	Varies (6.4 – 25.7 m) from edge-of-pavement to centre-of-pole	<u>TAC Standards</u> ADT > 6000 6:1 or flatter Fill = 6.5 – 7.5 m Cut = 6.0 – 6.5 m	*Clear Zone Standard Not Achievable* *Refer to Lateral Clearance Concept*	TAC 2017 (Table 7.3.1 Pg.12) Alternative Design Stakeholder Workshop #1
Lateral Clearance Concept	Varies (1.3 – 12.5 m) from face-of-curb to centre-of-pole	Min. Lateral Clearance = 0.5 m from face-of-curb to face-of-pole	0.5 m from face-of-curb to face-of-pole	TAC 2017 (Chapter 7.7.1 – 7.7.2 Pg. 76-77)
Bridge Clearance (Horizontal)	N/A	<u>Short Overpass</u> Right Clearance = 1.7 m Left Clearance = 1.5 m <u>Long Overpass > 50m</u> Right Clearance = 1.4 m Left Clearance = 1.0 m	<u>Short Overpass</u> Right Clearance 1.7 m	TAC 2017 (Table 4.10.3 Pg.57)

Table 10-4: Cycling and pedestrian design parameters

Cycling And Pedestrian Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
Cycling Facility Type And Width	N/A	<u>One-Way In-Boulevard Bicycle Facilities</u> Desired = 2.0 m Suggested = 1.8 m	<u>One-Way In-Boulevard Bicycle Facilities</u> 2.0m	OTM Book 18 (Table 4.7) Alternative Design Stakeholder Workshop #1

Cycling And Pedestrian Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
Multi-Use Path	Varies (1.5 – 3.2 m)	3.0 m (Recommended Minimum) 2.4 m (Absolute Minimum)	3.0 m (Recommended Minimum)	TAC 2017 (Table 5.3.5) TAC 2017 (Section 5.3.1.4 pg.21) (Superseded)
Minimum Boulevard Width (Between FOC Curb And Edge of Sidewalk/Cycle track/MUP)	N/A	<u>TAC Standards</u> 2.0 m – 3.0 m* 1.5 m* (Minimum) (*from FOC to edge of AT facility) <u>Workshop</u> 1.2 m	1.2 m	TAC 2017 (Figure 4.6.1) Alternative Design Stakeholder Workshop #1
Sidewalk Width	1.5 m	1.5 m	2.0m	CoM Standards (2240.010) Alternative Design Stakeholder Workshop #1
Signalized Intersection Crossing (for pedestrians and cyclists)	Varies (2.3 - 3.1 m)	Separated Crossride = 5.5 m (min) Combined Crossride = 5.0 m min	Combined Crossride = 5.0 m min	OTM Book 18 (Figure 4.101 and 4.102 Pg.122)

Cycling And Pedestrian Design Parameters	Present Conditions	Design Standards	Proposed Standards	Source
Unsignalized Intersection Crossing (for pedestrians and cyclists)	N/A	Mixed Crossride = 4.0 m min	Mixed Crossride = 5.0 m min	OTM Book 18 (Figure 4.103 Pg.124)

A – Maintained existing horizontal alignment at intersections, therefore not changing the existing tangent at intersection approaches

B – City of Mississauga design standards were not used, as MiWay provided their updated transit design standards

As per TAC standards, a clear zone of 6.0m to 7.5m from back-of-curb is required along Ninth Line. However, to conform with the clear zone requirements from TAC, there would result in property impacts and limit the desired design elements of the urbanized corridor such as active transportation facilities and boulevard features. As such, achieving the clear zone design criteria may be impractical in such urban environments and that a lateral clearance criterion of 0.5 from face-of-curb to face-of-pole was identified as per TAC 2017 Section 7.7.1. Given the corridor characteristics and community, the City provided direction on the agreement of moving forward with the lateral clearance criterion of 0.5m from face-of-curb to face-of-pole. Opportunities to install utility poles within the planting zone and/or in grading slopes to be considered and finalized during detailed design.

10.1.2 Road Geometry

Horizontal Alignment

The horizontal alignment for the preferred design (with a 70km/h design speed) generally follows the existing centreline of Ninth Line. However, there are locations where the centreline is shifted slightly to the east or west to provide a ‘best fit’ for the ultimate design of Ninth Line within the existing and proposed right-of-way and minimize impacts to adjacent properties and features. Minor adjustments in the horizontal alignment are proposed at some locations in order to address geometric deficiencies and ensure that minimum design standards are met. The proposed horizontal alignment is illustrated on the preliminary design drawings in **Appendix M**.

Vertical Alignment

The proposed vertical alignment accommodates a 70 km/h design speed. This vertical alignment was chosen to match the existing road profile where possible, with minor adjustments proposed at some locations to address geometric deficiencies and meet the geometric standards required for the class of the road, as per the design criteria identified in **Section 10.1.1**.

The vertical alignment aims to minimize impacts to existing entrances and driveways, minimize impacts on watercourse crossings, and reduce grading impacts to adjacent properties and features. The proposed vertical alignment is illustrated on the preliminary design drawings in **Appendix M.**

During Detailed Design, when additional drainage and hydraulic information is available, opportunities to raise the proposed roadway profile at the Osprey Marsh structure to mitigate / reduce / eliminate overtopping of Ninth Line will be considered. Additional discussion is outlined in **Section 10.1.12**.

10.1.3 Typical Cross-Section

Using the Official Plan ROW of 35m for the study corridor, the EA Study approved design criteria, feedback from the City of Mississauga staff during the stakeholder workshop, and feedback from the public, the following midblock typical section was developed for the preferred design as presented in **Exhibit 10-1.**

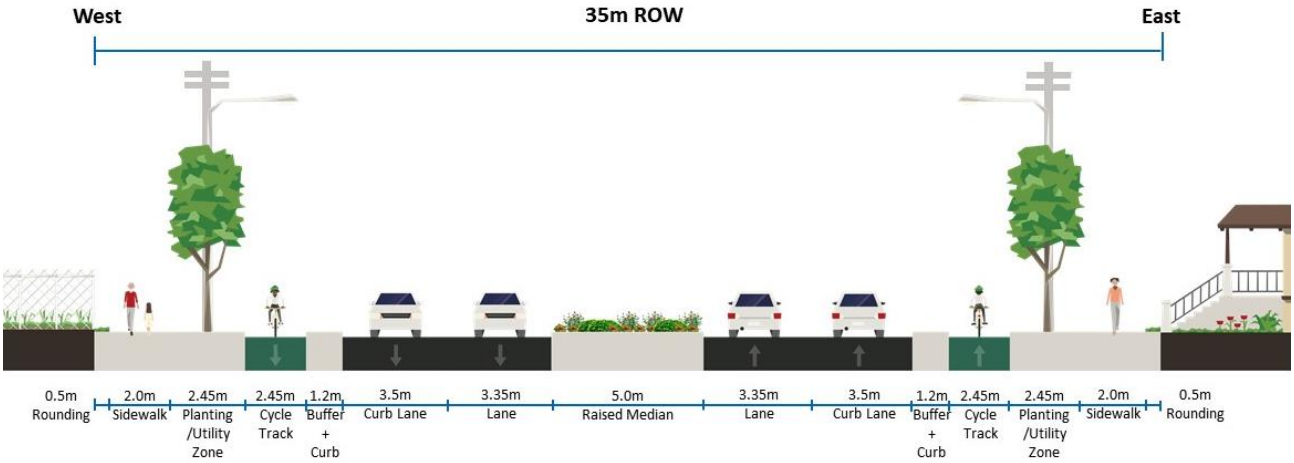


Exhibit 10-1: Typical cross-section

Key features of the cross-section include:

- Four general purpose lanes, two lanes in each direction (3.35m inner lanes and 3.5m curb lanes)
- 2.0m Boulevard Cycle Tracks, both sides of the road
- 2.0m Sidewalks on both sides
- 5.0m raised / painted centre median where feasible (the median width also accommodates left-turn lanes at intersections)
- Landscaping within the boulevards (where feasible), generally allocated between the sidewalk and cycle track where available right-of-way exists. A minimum tree planting opportunity is shown in the boulevard where 2.45m planting zone is available
- Landscaping within the median as feasible
- Utility zones for overhead utilities (streetlights and hydro poles) designated either between the cycle track and curb or within the planting zone between the cycle track and sidewalk, and underground utility corridors

- Fully urbanized and corridor illumination
- 0.5m curb and gutter
- 0.5m grading buffer

Grading will be contained within the proposed right-of-way (where feasible). In areas where grading extends beyond the proposed right-of-way, grading easements or property acquisition may be required as discussed in **Section 10.1.8.**

The following conceptual renderings were prepared to illustrate the preferred preliminary design recommended for the Ninth Line corridor at three different locations. It is noted these renderings are conceptual only, and exact locations of proposed street trees and streetlights / hydro poles etc. will be confirmed in Detail Design.

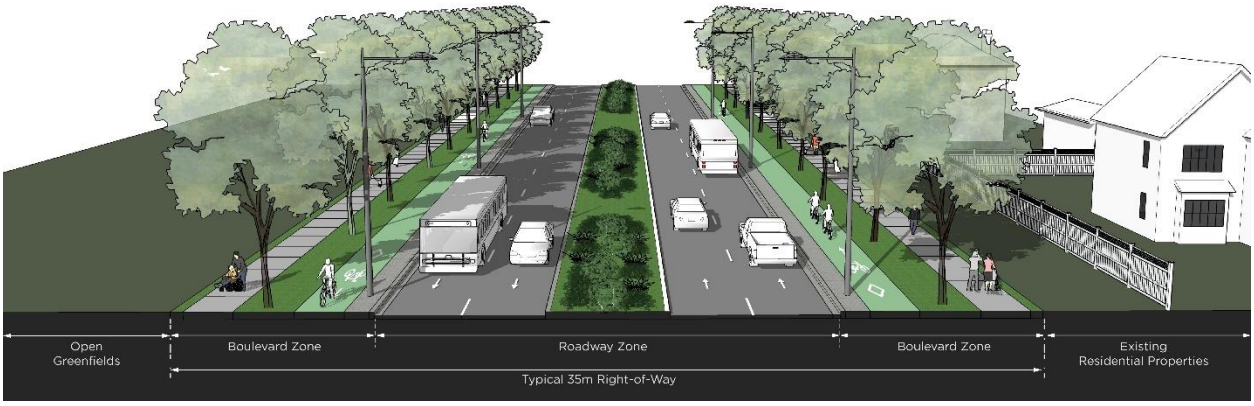


Exhibit 10-2: Rendering A – Ninth Line, between Deepwood Heights to Brinwood Gate (Looking North)

Rendering A includes:

- Four lanes (two lanes in each direction)
- Raised centre median with low-lying shrubs and/or grass
- Separated boulevard cycle tracks and sidewalks on both sides
- Landscaping between cycle tracks and sidewalks on both sides

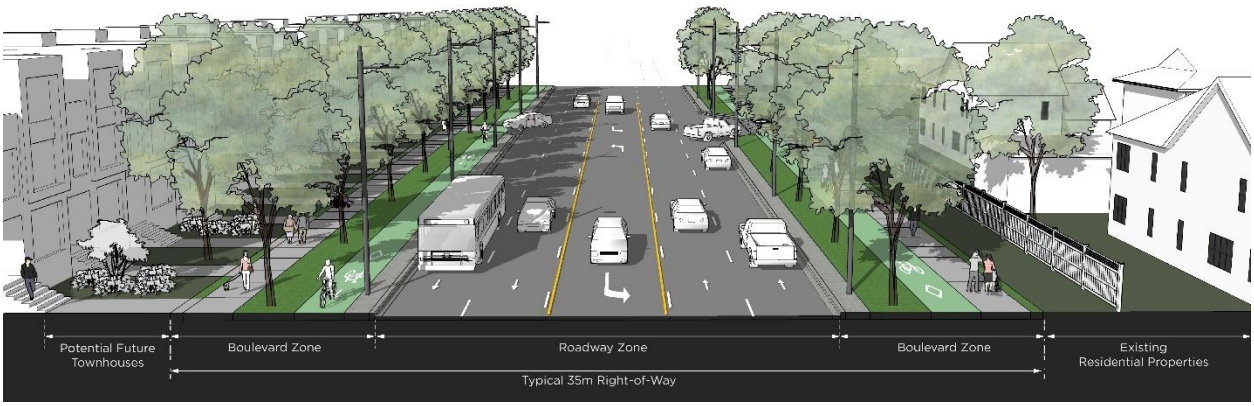


Exhibit 10-3: Rendering B – Ninth Line, between Manatee Way and Freeman Terrace (Looking North)

Rendering B includes:

- Four lanes (two lanes in each direction)
- Centre left-turn lane to maintain access to side streets and driveways
- Separated boulevard cycle tracks and sidewalks on both sides
- Landscaping between vehicular lane and boulevard cycle tracks on the east side
- Landscaping between cycle tracks and sidewalks on the west side

Exhibit 10-4: Rendering C – Ninth Line, between Osprey Boulevard and Foxwood Avenue (Looking North)

Rendering C includes:

- Four lanes (two lanes in each direction) and a dedicated left-turn lane
- Raised concrete median beside the left-turn lane transitioning into a raised centre median with low-lying shrubs and/or grass
- Separated boulevard cycle tracks and sidewalks on both sides
- Landscaping between cycle tracks and sidewalks on both sides

10.1.3.1 HALTON REGION NINTH LINE IMPROVEMENTS (DUNDAS STREET TO 407 EXPRESS TOLL ROUTE

Halton Region completed a Schedule 'C' Municipal Class Environmental Assessment (Class EA) Study on Ninth Line from Dundas Street to 407 Express Toll Route (ETR) in December 2020, which is approximately 500m south of Eglinton Avenue West. The preliminary design of the Ninth Line EA from Dundas Street to 407 ETR ("Halton Region Ninth Line EA") has been incorporated into the City of Mississauga's Ninth Line EA where the west side multi-use path from the Halton Region's Ninth Line EA design were extended up to the Eglinton Avenue West and Ninth Line intersection. The typical section for the Halton Region's Ninth Line EA is presented in **Exhibit 10-5**.

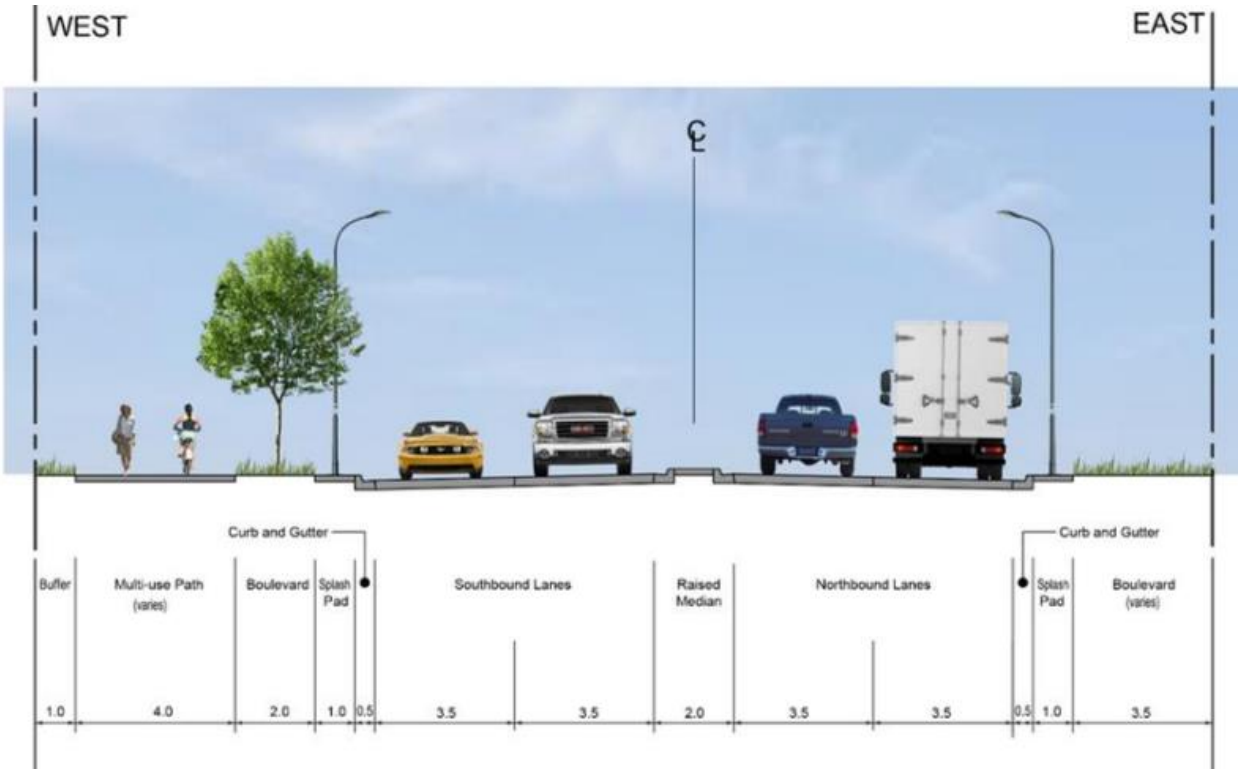


Exhibit 10-5: Halton Region Ninth Line EA Typical Section North of 407 ETR

10.1.4 Cycling and Pedestrian Facilities

Continuous pedestrian and cycling facilities, consisting of 2.0m boulevard cycle tracks (in the same direction of travel as vehicles) and 2.0m sidewalks on both sides of Ninth Line are proposed between Eglinton Avenue West and Derry Road West. Crossride Treatments to provide increased visibility and dedicated space to accommodate pedestrians and cyclists are proposed at all signalized and unsignalized intersections.

A multi-use path (MUP) is introduced for a small segment along Ninth Line on the west side, adjacent to 6056 Ninth Line (St. Peter's Church and Cemetery) to mitigate grading impacts into the existing cemetery lands / property line.

Under existing conditions, active transportation connections from local roads adjacent to Ninth Line are present. These active transportation connections to be maintained. Location details to be confirmed during detailed design in consultation with Mississauga staff.

10.1.5 Transit Provisions

The study area is currently serviced by existing bus routes with additional future bus routes to be implemented by MiWay. Proposed bus stop locations were identified in the preferred design in consultation with MiWay. The transit amenities (bus stops/pads) conform to MiWay Standard Drawing 2240.085. However, in constrained locations, these amenities conform to Standard

Drawing 2240.083 and 2240.092. Stop locations and transit infrastructure should be re-confirmed during detailed design in consultation with MiWay.

Intersection radii at locations where existing and proposed bus routes were identified by MiWay were determined based on MiWay's design vehicle specifications of both 40' and 60' buses. In consultation with MiWay, bus encroachments, either partially or fully, into the second receiving lane is not recommended and should be avoided as it poses operational safety concerns. Thus, proposed curb radii are designed to accommodate such recommendation.

At locations where the cycle track intersects with the bus platform, the passenger standing area with shelter is proposed behind the cycle track. At signalized intersections, nearside bus platforms and shelters are located adjacent to the curb, where the cycle track transitions behind the bus shelter as per MiWay Standard Drawing 2240.085. Bus platform/shelter configuration identified on the preferred design are site specific based on the available property and site constraints.

The locations of the proposed bus stops/pads are illustrated on the preliminary design drawings in **Appendix M**.

10.1.6 Streetscaping and Landscaping

A context-sensitive and thoughtful streetscape is integral to promote high-quality urban design, serve as community entrances, and encourage pedestrian-friendly and transit-oriented neighbourhoods. Opportunities for streetscaping are identified on the preliminary design of Ninth Line and may include elements such as plantings in boulevards, street furnishings, and public art.

Furnishing Zones, Pavements and Street furniture

To provide continuous, unimpeded sidewalks and bike lanes, furnishing zones are proposed to accommodate street lighting, transit shelters, site furnishings, street trees and utilities. These furnishing zones, in most cases, also serve as buffers between cycling infrastructure and the pedestrian clearway to one side and the roadway to the other.

Street furnishings, including benches, planters, waste receptacles and other amenities should be constructed of durable and high-quality materials, and placed along the length of the corridor, with increased concentrations in the segments with more urban cross-sections, where pedestrian volumes are greater, and people are more likely to congregate.

Street Trees

Street trees are proposed on both sides of the corridor, mostly along the entire length of Ninth Line. Space for tree planting is constrained at a few segments due to limited availability of space within the right-of-way. Additionally, no tree plantings are included within the boulevard, which is adjacent to the natural heritage features to reduce impacts to these sensitive areas.

Trees on Ninth Line should be large, high branching species that are suited for urban conditions, hardy, drought and salt-tolerant, selected from the City of Mississauga list of recommended street trees. Trees should be planted in groupings of no more than 25 trees of a single species in a row to minimize the spread of disease and pests, planted a minimum of 8 metres apart to ensure long-term canopy development. The roadway median should be planted with low-lying shrubs, grasses and herbaceous plants. Examples of median planting are identified in **Exhibit 10-6.**

In the more urban cross-sections around the transitway station and mixed-use development, trees will be planted in furnishing zones, with the potential for below-grade soil cells to ensure the provision of adequate volumes of uncompacted soil. In the more transitional cross-sections, there is ample space to plant trees in sodded boulevards and achieve the minimum recommended 30m3 of soil volume per tree, or a minimum of 20m^3 if planted in shared tree planting trenches. Street trees planting plan including individual tree planting locations and tree protection zones is to be developed during Detailed Design.

Safety and Accessibility

The streetscape for Ninth Line should be designed according to current best practices for accessibility and compliance with the City of Mississauga's Facility Accessibility Design Standards and the accessibility for Ontarians with disabilities Act (AODA).

The preferred cross-sections for Ninth Line ensure safe, separated, and continuous facilities for pedestrians and cyclists along the entire length of the corridor. The streetscape should also contribute to the safety and accessibility of the street through lighting, sufficient seating and rest areas, intuitive wayfinding and barrier-free access in every segment along the corridor.

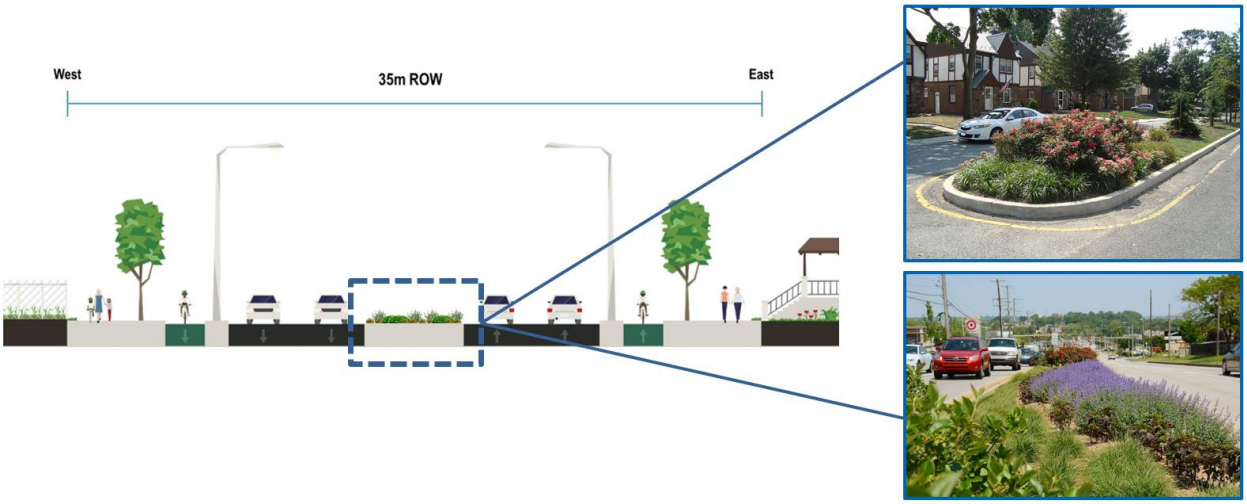


Exhibit 10-6: Example of median planting areas

10.1.7 Intersection Design and Traffic Signals

New traffic signals are proposed at Tacc Drive, McDowell Drive, Beacham Street and Starview Street. Crossrides are proposed at all signalized and unsignalized intersections to accommodate pedestrians and cyclists crossings. Intersections will be designed in accordance with Accessibility for Ontarians with Disabilities (AODA) standards and to facilitate the movement of all road users, including pedestrians and cyclists. Details regarding intersection designs are to be developed during Detailed Design

Ninth Line corridor improvements will include protected crossings at all signalized intersections for pedestrians and cyclists by way of crossrides. In the northern portion of the corridor between Foxwood Avenue and Doug Leavens Boulevard, there is approximately 1.1km's between signalized intersections. Therefore, the need for a mid-block pedestrian signal was considered. A midblock pedestrian signal would reduce pedestrian/cyclist travel distance and provide access to the proposed transit stops. A midblock pedestrian signal would also provide a connection to existing Cordingley Park and serve to connect to the proposed future park on the west side of Ninth Line. A midblock pedestrian signal is proposed at this location. A mid-block pedestrian signal warrant to review and confirm the need for the pedestrian signal will be undertaken during Detailed Design in consultation with City of Mississauga staff.

10.1.8 Access

The preferred design incorporates a 5.0m centre Two-Way Left-Turn Lane (TWLTL) along Ninth Line between Eglinton Avenue West and Derry Road West where the Project Team used the premise that all existing side roads and driveway accesses are to be maintained. Where there are no side roads or driveway accesses, a 5.0m raised centre median was either considered or incorporated. The centre TWLTL and centre raised median are shown on the preliminary design drawing in **Appendix M**.

Some driveways along the corridor will need to be re-graded to accommodate the proposed road improvements. Details will be confirmed during detailed design. Property owners will be notified of any temporary impacts to driveway access prior to construction and/or in advance of work related to their access.

10.1.9 Property Requirements

Based on the City's Official Plan, the City of Mississauga may acquire up to 35m right-of-way for improvements to the Ninth Line corridor. Additional land may be acquired to accommodate intersection requirements, culvert crossings, etc. The proposed design attempts to minimize property requirements.

Proposed property acquisition resulting from the proposed design is summarized in **Table 10-5**. In general, grading will be contained within the proposed right-of-way on the east side where feasible. Temporary and permanent easements will be considered for construction, maintenance, and grading purposes. During detailed design, opportunities to reduce property requirements and for the use of temporary or permanent grading easements instead of permanent property takings should be reviewed where feasible.

Property requirements summarized below are preliminary and will be finalized during Detailed Design.

Table 10-5: Property Acquisition Requirements

Property Address	Side	Property Area Required (m^2)
4087 E Lower Base Line	West	400
5034 – 5054 Ninth Line (development)	West	200
5080 Ninth Line (development)	West	930
5104 Ninth Line (cultural heritage)	West	480
5150 Ninth Line (development)	West	540
Churchill Meadow Community Centre	West	1710
Churchill Meadow Community Centre	West	1620
5368 Ninth Line	West	730
5400 Ninth Line	West	830
5476 Ninth Line	West	220

Property Address	Side	Property Area Required (m^2)
5578 Ninth Line	West	400
5644 Ninth Line	West	220
Open Field (future 407 Transitway Station)	West	980
6136 Ninth Line (development)	West	1150
6150 Ninth Line	West	310
6168 Ninth Line (development)	West	1900
6252 Ninth Line (development)	West	350
6276 Ninth Line (development)	West	360
6288 Ninth Line (development)	West	180
6302 Ninth Line (development)	West	370
6314 Ninth Line (development)	West	250
6400 Ninth Line (development)	West	1820
6432 Ninth Line (development)	West	1670
6578 Ninth Line (development)	West	470
6543 Ninth Line	East	70
6980 Ninth Line	West	615

10.1.10 Structures

Ninth Line is proposed to be widened to accommodate two traffic lanes in each direction, including boulevard cycle tracks and sidewalks for Active Transportation. The existing structural culvert (Asset ID: 056005, NLT-1) located approximately 335m north of Britannia Road West is recommended to be extended to accommodate the proposed widening. The existing structural culvert (Asset ID 057005, Drainage Feature D) located approximately 333m south of Britannia Road West is recommended to be extended to accommodate the proposed widening. The

existing structural culverts (Asset ID: 057003, Drainage Feature C and 057004, Drainage Feature B), located 630m and 1.23km south of Britannia Road West respectively, will not require widening as the existing length of these two culverts can accommodate the widening of Ninth Line.

10.1.10.1 OSPREY MARSH CULVERT STRUCTURE WIDENING

The existing structural culvert over Sixteen Mile Creek (Asset ID: 056005) is a crossing over Osprey Marsh. The preferred design (recommended) at this crossing consists two (2) 3.5m wide traffic lanes (one in each direction), two (2) 3.35m wide traffic lanes (one in each direction) and one (1) 3.35m wide left turn lane in the centre of Ninth Line. Two (2) 2.0m wide boulevard cycle tracks and two (2) 2.0m sidewalks will be located on either side of Ninth Line. There are 1.0m buffers on both sides of the active transportation facilities, pedestrian/cyclist railings, 1.7m shoulders on each side of Ninth Line and one (1) 1.65m centre median provided on the structure.

The existing 3 cell reinforced concrete box culverts will be extended to accommodate the widening of Ninth Line at the Osprey Marsh crossing. Three reinforced concrete box culvert cells will be added on each of the east and west side of the culvert for a total culvert width of 32.1m. The existing retaining walls will be removed, and 4 new retaining walls will be constructed at the end of the culvert. A portion of the existing concrete slope will be removed to facilitate the new culvert extension construction, the concrete slope will then be reinstated after construction of the new culvert extension.

Habitat connectivity and movement functions will be maintained, as the culvert sizing will not be reduced, and physical barriers will not be introduced (e.g., perched culverts, trash racks at culvert openings). The planned culvert extensions for NLT-1 will incorporate an openness ratio of 0.38 for each of the three cells, exceeding the minimum value of 0.1 to convey wildlife passage up to medium-sized mammals. The extended culvert cells will each feature dimensions of 7.0m and 2.4m in width and height, respectively, which exceed the minimum values of 1.0m for each to allow passage for up to medium-sized mammals (Conservation Halton 2018). However, the proposed works provide the opportunity to improve the design of the watercourse channel and culvert infrastructure within the ROW such that fish and terrestrial wildlife movement opportunities are improved.

As part of the culvert extension works, this culvert will be retrofitted to incorporate a dry shelf to allow terrestrial wildlife movement opportunities for at least the majority of the year. A dry shelf/dry bench has been incorporated into the Structural Design Report and General Arrangement Drawing under **Appendix N** for the culvert extension works. Other opportunities for enhancement of the watercourse channel and culvert infrastructure should be explored during the Detailed Design to improve their functionality for wildlife movements and to improve fish habitat, in consultation with the Conservation Halton.

The foundation, design bedding and subgrade preparation recommendations to accommodate the culvert extension are provided in the Preliminary Geotechnical Investigations Report in

Appendix I. Additional deeper boreholes should be advanced during detailed design to confirm founding soil conditions to accommodate the extension.

10.1.10.2 NINTH LINE OVER SIXTEEN MILE CREEK TRIBUTARY CULVERT (ASSET ID: 057005)

The existing structural culvert (Asset ID 057005) located approximately 333m south of Britannia Road West is an outfall of a storm sewer system with an enclosed upstream end (not a crossing). This culvert is required to be extended by approximately 4.0m to accommodate the proposed widening that includes the proposed sidewalk and cycle track, to be confirmed during detailed design.

10.1.11 Pavement Design

The preliminary pavement investigation recommendations are detailed in **Appendix I** and are provided for both rehabilitation and widening designs.

Based on the expected pavement condition at the time of the proposed widening, the most practical and cost-effective rehabilitation strategy to address the functional and structural pavement capacity includes full-depth removal of the existing asphalt and placement of a new granular base and Hot Mix Asphalt (HMA) layers. The existing granular material should be graded to permit the placement of the new granular base and asphalt layers. The thickness of the new pavement layers should match the design in the pavement widening area.

This rehabilitation strategy will provide a uniform granular base and asphalt thickness across the entire new pavement platform, which is expected to maintain a consistent performance over the pavement service life.

Pavement design recommendations need to be confirmed during detailed design by a geotechnical engineer.

10.1.11.1 NINTH LINE REHABILITATION

Preliminary recommendations for the pavement rehabilitation of Ninth Line consist of full depth removal of the existing asphalt, with the exposed granular material graded as required for the placement of new Granular Base and HMA. The recommended pavement lift types and thicknesses shall consist of:

40 mm HL1
50 mm HDBC
50 mm HDBC
50 mm HDBC
150 mm Granular ‘A’ Base

The recommended rehabilitation strategy for the existing travel lanes permits the placement of a consistent granular base and asphalt layer thickness across the entire new pavement platform.

10.1.11.2 PAVEMENT WIDENING AREAS

In all pavement widening areas (beyond existing shoulder rounding or curb and gutters), the surficial topsoil should be removed with the underlying subgrade graded as required. As detailed in **Appendix I**, topsoil thickness ranges from 25 to 150 mm.

The preliminary recommended pavement structure for widening of Ninth Line shall consist of:

40 mm HL1
50 mm HDBC
50 mm HDBC
50 mm HDBC
150 mm Granular 'A' Base
300 mm Granular 'B' Type II Subbase

As per City of Mississauga standards (Standard No. 2220.010), the thickness of the granular subbase layer should be increased by 150 mm when placed within 15 m of an intersection.

Final grades in all pavement widening areas will need to match the expected elevation of the new curb and gutters. The top of subgrade in pavement widening areas must be no higher than the top of subgrade in the adjacent existing pavement to maintain lateral drainage at the top of subgrade. The total thickness of the new pavement should be sufficient to maintain subsurface drainage across the widening for most of the project limits; however, localized thickening of the granular subbase will be required.

10.1.12 Drainage / Stormwater Management Plan

10.1.12.1 ROADWAY DRAINAGE

The preferred alternative design concept for Ninth Line from Eglinton Avenue West to Derry Road West recommends widening the road from two to four lanes, urbanization, as well as the addition of in-boulevard cycle tracks and sidewalks on both sides of the road. The design concept also includes intersection improvements at all signalized intersections, including streetscaping opportunities along the corridor. As part of the proposed roadway design, localized high points and low points are introduced in the roadway profile. Overall, the existing drainage patterns and discharge locations will not be altered as per the proposed roadway improvements, with the exception of minor localized changes as a result of the proposed roadway profile. Additional details are included in **Drainage and Stormwater Management Report** in **Appendix J**.

The proposed recommendations to the Ninth Line corridor include urbanization and installation of storm sewers along Ninth Line as part of the roadway improvements. The excavations and control of groundwater for the sewer upsizing, and details regarding the upsizing installation (trenching / pipe bedding) are outlined in the **Preliminary Geotechnical Investigations Report** in **Appendix I**.

10.1.12.2 MINOR DRAINAGE SYSTEM

The overall drainage pattern will generally be consistent with the existing conditions. To accommodate the proposed roadway widening, storm sewer upsizing and catchbasin relocations are anticipated, as well as additional catchbasins are proposed as a result of the proposed urbanized cross-section. The storm sewer system for the ultimate roadway configuration is to be designed for a 10-year storm event as per the City of Mississauga Storm Drainage Design Requirements. Proposed roadway drainage will be collected by a series of catchbasins and will be conveyed by storm sewers to the existing storm outlet locations. There are a number of existing outlets for the runoff from Ninth Line within the study corridor.

10.1.12.3 MAJOR DRAINAGE SYSTEM

The roadway design should ensure that the major system runoff up to the 100 year storm event can be safely conveyed to outfall locations, and the depth of water shall not exceed the crown of the road, as per City of Mississauga Storm Drainage Design Requirements. At these locations, major system inlets will capture the 100 year flow and direct it to the appropriate outfalls. A spread analysis should be completed at the detailed design stage to ensure that the ponding at low points does not exceed the crown of the road.

10.1.12.4 HYDRAULIC ASSESSMENT OF EAST LISGAR BRANCH

Under existing conditions, the Ninth Line roadway is overtopped by the East Lisgar Branch of Sixteen Miles Creek at several locations as discussed in **Section 6.7**. A more detailed analysis using a HEC-RAS model will be required in Detailed Design to assess the impact along the upstream reach. During Detailed Design, opportunities to eliminate or reduce the flood hazards to the greatest extent possible will be explored, and the model to be used in the hydraulic assessment will be confirmed with CH. The flood depth, flood velocity, and depth-velocity product will be evaluated during Detailed Design when additional floodplain modelling information is available, based on the Ministry of Natural Resources and Forestry (MNRF) Technical Guide on River and Stream Systems Erosion Hazard Limit (2002).

10.1.12.5 HYDRAULIC ASSESSMENT OF PROPOSED TRANSVERSE CROSSING

Under proposed conditions, the drainage boundary and design peak flow values for the transverse crossings are considered to remain unchanged compared to existing conditions. The increase in pavement area as a result of the corridor improvements is negligible in comparison to the large external drainage areas contributing to each watercourse crossing location. Therefore, the design peak flows based on the current land use conditions (obtained from the Churchill Meadows Stormwater Management Design Report HEC-2 output and the Draft Ninth Line Lands Scoped Subwatershed Study Phase 1 Background Report) were used to assess the hydraulic performance of the proposed crossings.

The preliminary hydraulic assessment for the proposed crossings is based on the preliminary proposed horizontal road design and vertical centreline profile design. Note that the proposed inverts of the crossing culverts are to be confirmed during detailed design to accommodate the road design and the roadside ditch grading.

Crossing C-1

Under proposed conditions, no upgrades to the culvert are required to accommodate the proposed roadway widening. Therefore, the hydraulic capacity of this crossing will remain unchanged compared to the existing condition.

Crossing C-2

Under proposed conditions, no upgrades to the culvert are required to accommodate the proposed roadway widening. Therefore, the hydraulic capacity of this crossing will remain unchanged compared to the existing condition.

Crossing C-3 (NLT-1)

Under proposed conditions, the existing triple cell concrete box culvert is recommended to be extended to accommodate the proposed roadway widening. Under existing conditions, the current culvert crossing over NLT-1 is overtopped by the Regional Storm event by approximately 0.68 m at the crossing. Under proposed conditions, the culvert crossing is overtopped by approximately 0.64 m. Extending the length of the culvert to accommodate the proposed road widening will result in a negligible increase of 0.02 m in the upstream Regional storm water level as shown in **Table 10-6.**

Table 10-6: Hydraulic Analysis Results for the Transverse Crossings (Proposed Condition)

Crossing	Type	U/S Invert (m)	D/S Invert (m)	Length (m)	Road Elev. (m)	Water Surface Elev. (m)			Remarks
						50 Yr	100 Yr	Reg.	
C-3 (NLT-1)	Culvert	187.37	187.23	32.6	190.73	189.56	189.72	191.37	Regional flow overtops road.

The roadway overtopping is attributed to the large flows from NLT-1 and the high tailwater conditions of the downstream East Lisgar Branch under Regional Storm conditions. To reduce the Regional flood depth over Ninth Line, one option (1A) would be to raise the roadway profile at this location above the Regional tailwater elevation. A preliminary hydraulic assessment showed that this option will result in an increase of approximately 0.08 m in the upstream Regional flood as documented in **Table 10-7**. If the roadway profile is raised further to eliminate overtopping at the crossing (Option 3A), this will result in an increase of approximately 0.09 m in the upstream Regional flood level. This approach would require major grading adjustments along the roadway.

A preliminary hydraulic assessment was completed to consider an increase in the hydraulic capacity at this crossing by adding a cell to the culvert. If the current design profile is maintained and the hydraulic capacity is increased (Option 2), the overtopping depth would be reduced to 0.55 m and there would be no increase in the upstream Regional flood level. If the roadway

profile is raised above the Regional tailwater elevation and the hydraulic capacity is increased (Option 1B), the overtopping would be reduced to 0.15 m without increasing the upstream flood elevation. If the roadway profile is raised to eliminate the overtopping and the hydraulic capacity is increased (Option 3B), there would be no increase in the upstream flood elevation. This approach would require major rehabilitation or full replacement of the structure, major grading adjustments along the roadway, and channel realignment to accommodate the increased flow area.

The preliminary hydraulic assessment results for alternate scenarios to reduce or mitigate the overtopping during the Regional storm event are provided in **Table 10-7**. Note that the preliminary hydraulic assessment completed using the HY-8 model only shows the water levels immediately upstream of the crossing. A more detailed analysis using a HEC-RAS model will be required in the detail design stage to assess the impact along the upstream reach.

Table 10-7: Hydraulic Analysis Results for Alternative Scenarios at C-3 Crossing

Scenario	Description	Road Elev. (m)	U/S Regional Water Surface Elevation (m)	U/S Regional Water Surface Elevation (m)	Overtopping Depth (m)
1A	Raise roadway profile to Regional tailwater elevation, no increase in hydraulic capacity	191.15	191.43	0.08	0.28
1B	Raise roadway profile to Regional tailwater elevation and increase hydraulic capacity	191.15	191.30	0	0.15
2	Maintain current design profile, increase hydraulic capacity	190.73	191.28	0	0.55
3A	Raising roadway profile to eliminate overtopping, no increase in hydraulic capacity	191.45	191.44	0.09	0
3B	Raise roadway profile to eliminate overtopping and increase hydraulic capacity	191.35	191.30	0	0

Additional coordination with both the City of Mississauga and Conservation Halton shall be carried out to finalize the detail design of the culvert and to minimize impacts to the watercourse

and surrounding wetlands. The selected alternative will be confirmed during detailed design by completing additional supporting modelling and analysis, using the information available at that time. Updates to the hydraulic modelling, floodplain assessment and revisions to Conservation Halton floodplain mapping shall be completed during detailed design to reflect the final design and grading footprint of the crossing.

10.1.12.6 WATER QUALITY CONTROL

Watercourses within CH's jurisdiction are classified as requiring an "Enhanced" level of protection, which equates to 80% Total Suspended Solids (TSS) removal.

Stormwater management (water quality) measures within the study limits will be designed to provide "Enhanced" water quality treatment, as a minimum, for the increased pavement area as a result of roadway widening/improvements, as per the MECP Response to Notice of Commencement Letter dated April 30, 2020.

10.1.12.7 WATER QUANTITY CONTROL

Storm Sewer Systems

Within the project limits, the stormwater runoff from Ninth Line discharges either into the existing storm sewer systems or outlets at the watercourse crossings. For locations where the runoff discharges into an existing system, the minor system design storm (10 year storm) peak flows must be controlled to the existing peak flows, for which the receiving system was designed. The receiving storm sewer systems within the project limits are City of Mississauga municipal systems, which would have been designed based on a 10 year design storm.

Watercourse Crossing

CH requires post-development peak flows to be controlled to pre-development levels for the full range of storm events. This criteria is applicable to NLT-1, which is regulated by CH. The Draft Ninth Line Lands Scoped Subwatershed Study Phase 3 Report (Wood, 2020) provides unitary storage and discharge criteria to mitigate flooding impacts at key locations within, and downstream of, the Ninth Line Lands. Due to the limited area available for stormwater management facilities within the Ninth Line roadway right-of-way, the cumulative unitary storage volumes cannot be met. The proposed stormwater management strategy for quantity control of the roadway will be to control post-development flows to pre-development levels for the full range of design storm events. As the roadway corridor is located within the Ninth Line Lands, the additional storage required to meet the cumulative unitary storage volumes for the full range of storm events should be accommodated within the stormwater management facilities to be provided within the future Ninth Line Lands development. Further investigation shall be conducted during detailed design and/or under separate study.

10.1.12.8 PAVEMENT AREA ANALYSIS

A pavement area analysis was performed to determine the increase in impervious surface, which will result from the roadway widening from 2 to 4 lanes and the construction of new in-boulevard cycle tracks and sidewalks.

As a Low Impact Development (LID) measure, it is recommended that the boulevard and median areas outside of the active transportation facilities be covered with permeable material (e.g. grass, permeable pavement, etc.) to minimize the overall increase in impervious area along the Ninth Line corridor. Since these are not load bearing surfaces, the use of permeable material will not impact the functionality of the proposed design but will provide water quality and quantity control benefits through runoff reduction. Therefore, the proposed stormwater strategy was developed considering the boulevard and median areas as pervious. Additional details and specifications for the permeable material are to be included in the detailed design stage.

It was determined that the proposed roadway improvements will result in an additional 7.19 hectare increase in pavement area within the Ninth Line study corridor as shown in **Table 10-8**.

Table 10-8: Pavement Area Analysis

Study Corridor	Existing Pavement Area (ha)	Proposed Pavement Area (ha)	Increased Pavement Area (ha)	Percentage Increase
Ninth Line	9.17	16.36	7.19	78%

10.1.12.9 STORMWATER MANAGEMENT PLAN SUMMARY

The proposed stormwater management plan for the project has been developed by examining the opportunities and constraints within the entire study corridor. Runoff from the paved roadway area will be conveyed to the proposed oil-grit separators and bioretention systems and roadway storm sewer systems and discharge into either existing storm sewer systems, natural watercourse or drainage features. As per **Table 10-9** the total roadway pavement area will increase by 7.19 ha, including the cycle tracks and sidewalks within the boulevard areas. Enhanced level water quality, water balance, and erosion control treatment will be provided for 7.81 ha of pavement area, exceeding the MECP requirement of providing treatment to the increased pavement area. The stormwater management plan for this project is presented on the Drainage Plans. It also provides a summary of the water quality treatment and quantity control strategies proposed to mitigate the increase in impervious surface within the project limits, where road widening is proposed.

Table 10-9: Summary of Stormwater Management Plan

Drainage Area ID	Existing Pavement Area (ha)	Additional Pavement Area (ha)	Pavement Area Receiving Quality Treatment (ha)	Quality Storage Volume Provided[2] (m3)	Required Storage to Control Minor Flows[3] (m3)	Required Storage to Control Major Flows[4] (m3)
A-1	1.58	0.99	N/A	N/A	161	286
A-2	2.00	1.53	1.53	423	249	442
A-3	0.66	0.48	0.48	137	79	140
A-4[1]	0.41	0.31	0.72	179	50	88
A-5[1]	2.83	2.23	5.07	1133	363	643
A-6	0.56	0.62	N/A	N/A	100	177
A-7	0.25	0.17	N/A	N/A	28	50
A-8	0.87	0.84	N/A	N/A	137	243
Total	**9.17**	**7.19**	**7.81**	**1872**	**1167**	**2070**

[1] Total pavement area is treated in order to meet MECP requirements of treating the overall increased pavement area in the corridor
[2] Areas discharging to municipal systems will be treated using catchbasin inserts and OGS units
[3] Based on the capacity of the receiving storm sewer system (up to 10 year storm)
[4] Based on CH requirement (up to 100 year storm)

10.1.13 Illumination

The proposed road improvements on Ninth Line include road widening from existing two (2) lanes to four (4) lanes and in-boulevard cycle track and sidewalks on both sides of Ninth Line. Due to the proposed road widening, many of the existing hydro poles, with mounted lighting fixtures, will require relocation. Therefore, a new illumination system is required.

In this report, three typical illumination plans are developed and analyzed based on City of Mississauga streetlighting standards. These standards were provided by the City of Mississauga's ("City") streetlighting coordinator with supplementary design standards provided by Alectra, City's hydro service provider. The three typical illumination plans are:

- Ninth Line typical mid-block roadway illumination plan

- Ninth Line typical intersection illumination plan
- Ninth Line typical sidewalks/cycle tracks illumination plan

Based on the illumination calculations presented in this report, hydro poles (with mounted light fixtures) that are spaced 50 metres apart would adequately illuminate the roadway, intersection and sidewalks/cycle track facilities as per the RP-8-18+Addendum 1 Recommended Practice for Design and Maintenance of Roadway requirements. Details will be confirmed during detailed design, at which the location of poles and luminaires will be confirmed and finalized. The illumination plan can be found in **Appendix O**.

10.1.14 Noise

A Noise Impact Study was undertaken to determine potential noise impacts resulting from the proposed road improvement activities. The guiding documents and policies used to establish the criteria to assess traffic noise and when noise mitigation is warranted are discussed in **Section 6.3**.

The findings of the Noise Assessment are:

- The results show that changes in sound levels resulting from the proposed project are expected to be negligible. Noise impacts are extremely minor and below the 5 dBA impact criteria in the Noise Protocol.
- The ‘as-built’ sound levels are less than the 60 dBA criteria for all the homes on the east side of Ninth Line, outlined in the City of Mississauga policy for consideration for replacement based upon a roadway expansion.
- For the existing homes on the west side of Ninth Line, noise mitigation is not required or recommended because most of the noise in the Noise Sensitive Areas (NSA’s) are on the side of the homes directly exposed to noise from Highway 407. Any additional noise mitigation between the homes and Ninth Line would not be acoustically feasible or effective.
- Any future new residential subdivision development (west side) along the Ninth Line corridor will have to carry out noise analyses in accordance with MECP requirements as part of the development application process under the Planning Act. These studies would recommend the provision of outdoor and indoor noise attenuation measures and the inclusion of noise warning clauses on title of affected properties; these are outside the scope of the Ninth Line EA Study
- No additional noise mitigation is recommended for this project for existing homes located on either side of Ninth Line.
- Construction noise impacts are temporary in nature but may be noticeable at times in nearby residential NSAs. Methods to minimize construction noise impacts should be followed.

Therefore, the consideration of noise mitigation is not warranted based on MTO/MECP Noise Protocol. Additional details from the Noise Assessment are included in **Appendix P**.

10.1.15 Air Quality

An Air Quality Assessment was conducted by SLR Consulting (Canada) Ltd. to determine potential impacts of the proposed road widening on local air quality in the vicinity of the study area. The Air Quality Assessment is found in **Appendix Q.** The Air Quality criteria used for assessing the air quality effects of the proposed road improvements are provided in MECP's Ambient Air Quality Criteria (AAQC), Health Canada / Environment Canada's National Ambient Air Quality Objectives (NAAQOs) and the Canadian Council of Ministers of the Environment' (CCME) Canadian Ambient Air Quality Standards (CAAQS).

To represent the worst-case impacts, the Air Quality Assessment for the Ninth Line corridor followed the "hot spot methodology". The segment of Ninth Line selected as the Hot Spot Area is the 1km segment centred around the intersection of Ninth Line and Britannia Road. This location was selected as it has one of the highest future 2041 intersection volumes and high concentrations of critical and sensitive receptors in the form of parks and low-rise residential units along Ninth Line. The assessment reviewed the 2018 no-build with the 2041 future build scenarios to assess the impacts.

Based on the analysis, the maximum combined concentrations for the Future Build of the proposed Ninth Line improvements were all below their respective MECP guidelines or CAAQS, with the exception of the 1-hr and annual NO2 CAAQ, annual PM2.5, 24-hr PM10, 24-hr TSP, 24-hour benzene and annual benzene. Note that background concentrations exceeded the guideline for all of these contaminant averaging periods as well. The contribution from the roadway emissions to the combined concentrations was small.

Mitigation measures are not warranted, due to the small number of days which are expected to exceed the guideline.

10.1.16 Utilities

Existing utilities along the corridor are based on availability information at the time of the study are described in **Section 6.11**. A topographic survey with Subsurface Utility Engineering Quality Level D (SUE QL-D) was provided by the City of Mississauga. Utility companies with existing utility infrastructure within the study area were also contacted to obtain and verify the SUE information. Existing utilities along the Ninth Line corridor, including gas lines, buried and aerial hydro conduits, and buried and aerial telecommunication conduits will be relocated as required to accommodate the preferred design. Utility relocation plans will be confirmed during detailed design.

As mentioned in **Section 6.11,** Sun Canadian Pipeline (SCPL) operates two existing high-pressure oil pipelines that are 200mm and 300mm in size, crossing Ninth Line 50m north of Janice Drive. SCPL requires a crossing permit prior to digging and a SCPL Inspector is required to stake out pipeline location and assist with gathering field data that will facilitate the crossing permit application.

There are two pressure gas mains crossing Ninth Line between Beacham Street and Baggins Court, which will require construction stipulations and/or a Crossing Agreement signed by the owner of the proposed facility during detailed design.

Storm sewers within the study area will be relocated or replaced as necessary to accommodate the preferred design subject to the condition of the existing sewer.

The location and alignment of existing municipal services is to be confirmed during Detailed Design, which may result in changes to the identified utility impacts. Formal definition of impacts on utilities will be determined during Detailed Design, in consultation with individual utility companies. All utility information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary. During Detailed Design, meetings with be held with utility companies as required where potential impacts to existing or future services are identified.

An existing utility composition plan is provided in **Appendix R**.

10.1.17 Preliminary Cost Estimate

Based on preliminary estimates, the cost of the recommended improvements is estimated to be approximately **$51.6M**. This preliminary cost estimate includes costs for road work, addition of streetlights and traffic signals, culvert modifications, landscaping, traffic control, and engineering services; however, property acquisition costs are not included in the estimate.

The breakdown of the preliminary cost estimate is provided in **Appendix S.** The estimated costs are preliminary only and would be reviewed and confirmed during detailed design.

10.1.18 Constructability, Staging and Detour Considerations

The construction staging for Ninth Line will maintain 2 lanes of traffic (one lane in each direction) including pedestrian movements equal to pre-construction levels during construction. However, the nature of the required work is such that traffic disruption and delays cannot be entirely avoided. If deemed necessary, temporary, short-term lane closures may be permitted during off-peak/night-time hours only.

Impacts will be temporary in nature and the City of Mississauga will attempt to mitigate impacts as much as possible. During detailed design, a traffic management plan will be developed to determine how traffic and pedestrian access will be accommodated during construction and how access to properties adjacent to Ninth Line will be maintained.

10.1.19 Construction Monitoring and Maintenance Considerations

The reconstruction of Ninth Line should be staged to maintain both local and through traffic within the study area. Any necessary interruptions to traffic should be kept brief and to a minimum. There should be close coordination with MiWay to minimize impacts on Ninth Line traffic, MiWay buses, as well as EMS/fire/police operations.

Property owners and tenants may experience temporary interruptions to their property access during construction. To reduce this impact, all property owners will be notified prior to construction and/or in advance of work related to their access. Detailed design plans should include details to describe how temporary accesses will be maintained, and contract specifications should specify the allowable lengths of closures and the notification requirements to property owners.

Construction of the improvements has the potential to create noise and dust for the adjacent property owners. Construction noise is temporary and will vary periodically during the construction depending on the specific activities being performed. Contract specifications will include provisions to define the allowable work hours, in accordance with local ordinances, to minimize impacts to the adjacent landowners in the evenings. However, some considerations will be given to the ability of completing the work in a lesser duration by allowing longer work hours. The impact of construction noise will vary based on the type of equipment used, number of pieces of equipment, time and duration of operation, and the proximity to noise sensitive receivers in question. Construction noise will be kept to a minimum through the use of well-maintained equipment with appropriate noise controls by the contractors.

Removal of existing paved surface and existing landscaping will expose native soils to wind and rain erosion, and result in a temporary increase in dust in the project area. This dust can become airborne as construction traffic runs on the exposed ground and may be noticeable by the adjacent property owners. This increase in dust levels will be temporary, and the application of best management practices, including the application of non-chloride dust suppressants, by the contractor during his normal operations can help to minimize the exposure of native soils to wind and rain erosion.

All waste generated during construction must be disposed of in accordance with ministry requirements and best management practices. Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met.

Communication protocols for construction will be developed during Detailed Design. Generally, if a resident has a concern during construction, they can typically contact either the Construction Administrator (CA) or Communications and Community Engagement Specialist (CCES). A Notice of Construction letter distributed prior to the start of construction lists the contact information for the applicable CA (for construction related inquiries) and CCES (for general inquiries) on the project.

Construction and post-construction monitoring plans should be developed during detailed design in consultation with MECP and other regulatory agencies.

11 Potential Environmental Impacts and Mitigation

11.1 Potential Environmental Impacts and Mitigation

The proposed cross-section, horizontal and vertical alignment designs aim to minimize impacts to adjacent lands and features, including sensitive natural areas, vegetation, culturally significant features, buildings, and properties outside the road right-of-way; however, although the benefits outweigh the negative effects, there will be some impacts that will need to be mitigated. A summary of the potential impacts to natural, social/economic and cultural environments, together with recommended mitigation measures, is provided in **Table 11-1.**

Table 11-1: Anticipated Impacts and Proposed Mitigation Measures

Factor	Details/Anticipated Impact	Proposed Mitigation
	Social Environment	
1. Land Use and Socio-Economic Impacts	a. Impacts on residents during construction, including increased travel time or possible detours. b. Impacts to driveway access during construction. c. Some driveways will need to be re-graded.	i. Prior to construction, specific notices and contact information will be delivered to area residents and property owners informing them of construction details, including temporary impacts to driveway access prior to construction and in advance of work related to their access. ii. Maintain access to individual driveways during construction.
2. Archaeology	a. Stage 1 Archaeological Assessment in **Appendix F** identified some properties within the study corridor that exhibit archaeological potential and will require a Stage 2 AA. b. Proposed improvements may impact grassed area along the property boundary of St. Peter's Catholic Cemetery. In this location there is potential for unmarked burial shafts and will require Stage 3 AA investigation. Impacts to grave sites will be avoided.	i. Prior to construction, complete Stage 2 Archaeological Assessment by test pit / pedestrian survey at five metre intervals where appropriate to impacted lands. ii. Prior to construction, complete Stage 3 AA to lands at the property boundary of St. Peter's Catholic Cemetery to confirm the presence / absence of graves. iii. Should future work require an expansion of the study area, complete additional Stage 1 AA to determine archaeological potential of surrounding lands.
3. Cultural Heritage	a. Construction and staging should be planned to avoid unintended negative impacts to BHRs and CHLs as documented in the CHRA in **Appendix G** b. Indirect impacts to BHR1, CHL1, and CHL3 are anticipated which may require a resource-specific Heritage Impact Assessment (HIA), however no structures or apparent landscape features of significant CHVI are anticipated to be impacted c. Indirect impacts to BHR1, CHL1, and CHL3 may occur due to proximity to proposed alignment. Potential adverse impact to the structures from construction vibration.	i. Should future work require an expansion of the study area, then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources. ii. City of Mississauga to consider waiving requirement for Heritage Impact Assessment to BHR and CHL as noted in the CHRA if suitable mitigation measures included given no structures or apparent landscape features of significant CHVI are anticipated to be impacted iii. No further cultural heritage reporting is recommended to CHL2 as it no longer retains CHVI as it was removed from the Heritage Register for Mississauga.

Factor	Details/Anticipated Impact	Proposed Mitigation
	d. Indirect impacts to CHL2 due to proximity to proposed alignment but no anticipated impacts to heritage attributes.	iv. During Detailed Design complete baseline vibration monitoring for BHR1, CHL1 and CHL3 to confirm if structures are subject to potential vibration impacts during construction. Complete vibration monitoring plan and follow during construction if required. v. **During construction** establish no-go zones with fencing and instruct construction crews to avoid CHR and unintended impacts vi. **Post-Construction** consider planting with sympathetic plant species and replacement of any impacted landscape features with potential cultural heritage value
4. Noise	a. Noise Impact Study (provided in **Appendix H**) predicted future projected sound levels along the study corridor upon implementation of the proposed road improvements. Changes in sound levels are expected to be negligible. b. Construction of the improvements has the potential to create noise for the adjacent property owners. Construction noise is temporary and will vary periodically during the construction depending on the specific activities being performed. The impact of construction noise will vary based on the type of equipment used, number of pieces of equipment, time and duration of operation, and the proximity to noise sensitive receivers in question.	i. No additional noise mitigation is recommended for the project. ii. Contract specifications should include provisions to define the allowable work hours, in accordance with local ordinances, to minimize impacts to the adjacent landowners in the evenings. Construction noise can be kept to a minimum through the use of well-maintained equipment with appropriate noise controls that are in good working order by the contractors. It is recommended that during the construction period, the following be considered: • All pertinent noise by-laws to be adhered to. • General noise control measures to be included in contract documents where applicable. • Any noise complaints or concerns to be investigated to ensure compliance with the noise control measures as recommended in the contract documents. The contractor shall be warned for non-compliance and the contract shall be enforced. • Additional noise control measures are to be investigated in accordance with the MECP sound level criteria for construction equipment if a persistent complaint has been made.
5. Property Requirements	a. Potential property acquisition and construction easements are anticipated at some locations as a result of the proposed design. Details are provided in **Section 10.1.8** b. Impacts to trees located outside of the existing right-of-way.	i. Formal definition of property requirements to be confirmed during Detailed Design ii. Temporary or permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations) to reduce the amount of area required, or in some cases considering a retaining wall or other type of soil retention feature to minimize grading footprint iii. Where impacts to trees cannot be avoided, compensation will be provided as per a compensation strategy developed during Detailed Design. This will consist of a plan to either replant trees at these locations or provide compensation to the property owner. iv. During Detailed Design, opportunities to optimize design and cross-sectional elements will be reviewed to identify potential to minimize impacts at constrained locations.

Factor	Details/Anticipated Impact	Proposed Mitigation
6. Climate Change	a. The Ministry of the Environment, Conservation and Parks (MECP) guide, Consideration of Climate Change in Environmental Assessment in Ontario, sets out ministry expectations and supports the province's Climate Change Plan by outlining climate change considerations for EA Study. The guide notes "climate consideration" within a project means that consideration has been given to methods to reduce greenhouse gas emissions and developing a design that is more resilient to future changes in climate and helps maintain the ecological integrity of the local environment in the face of a changing climate. b. The City's approach to considering climate change is guided by provincial policies (Growth Plan and Provincial Policy Statement), and embedded in several of the policies, including the: • Province's Growth Plan • Provincial Policy Statement • City's Official Plan; and • City's Transportation Master Plan. c. Climate change impacts related to this study are related to operations and maintenance as the transportation sector is one of the biggest contributors to CO2, a key greenhouse gas. Climate Change will also impact the study area in the future as extreme weather conditions will affect the conditions of the roadways and will require more frequent repairs and updates as time passes.	The project specific recommendations directly support climate change policies. For example: i. Opportunities for tree planting within the boulevard will be explored ii. Low Impact Development (LID) strategies, will be explored as feasible iii. A key objective of the EA study is to reduce single occupancy automobile use and encourage a more efficient transportation system that: a. Provides continuous active transportation improvements through dedicated off-road facilities b. Supports improved transit service along the study corridor. c. The proposed improvements make use of an existing transportation route and propose to accommodate all road users in such a way that minimizes impacts to surrounding areas including residences, businesses, and the natural environment. To mitigate potential effects during the construction phase of the project, the following best practices will be implemented: i. Develop and implement detailed erosion and sediment control measures to be carried out during all construction phases to limit the amount of sediment/laden material entering receiving drainage systems ii. Dust suppression techniques to be employed for the duration of construction activities iii. A traffic staging plan to be developed during Detailed Design to accommodate local access and through traffic during construction to minimize excessive detouring and congestion in alternate routes. Further opportunities to reduce idling to be considered during Detailed Design. iv. Potential effects to consider pertaining to construction include the greenhouse gas (GHG) emissions associated with the construction period, including the physical machinery and equipment, travel distance and time for construction workers to get to and from the site, and the sourcing of building materials. Movement and access to the site for construction vehicles are to be described in the contract documents to be prepared at the time of Detailed Design. Conditions within the contract documents related to idling and hours of work should also be considered. To mitigate potential effects during the operational phase of the project, aligning with best practices for infrastructure design, practices such as the improvement of hydrological data collection, use of models and monitoring localized effects, more frequent monitoring and maintenance and improvement of road design to be more climate change resistant are recommended. In addition, measures to adapt to climate change impacts and

Factor	Details/Anticipated Impact	Proposed Mitigation
		minimize impacts to individuals using the road corridor in the future may include (but are not limited to): i. Erosion protection techniques developed during Detailed Design to limit the extent of channel and bank erosion in the vicinity of the watercourse crossing along the study corridor ii. Updating plans for weather emergencies, closures and rerouting during severe weather conditions/events, and traveler information systems to include future climate change projections iii. As the amount of impervious surface areas will increase, appropriate stormwater capacity should be considered to mitigate additional runoff, climate change and the likelihood of extreme precipitation, as described in **Section 10.1.12** iv. Exploring opportunities of using LID treatment to store drainage during storm events beyond the minimum requirements will be reviewed during Detailed Design
7. Air Quality	a. The potential impact of the proposed project infrastructure on local air quality was assessed at a representative hotspot location (1km centred around the intersection of Britannia Road) and are detailed in the Air Quality Assessment found in **Appendix Q.** The following conclusions and recommendations are: • Based on the analysis, the maximum combined concentrations for the Future Build of the proposed Ninth Line improvements were all below their respective MECP guidelines or CAAQS, with the exception of the 1-hr and annual NO2 CAAQ, annual PM2.5, 24-hr PM10, 24-hr TSP, 24-hour benzene and annual benzene. Note that background concentrations exceeded the guideline for all of these contaminant averaging periods as well. The contribution from the roadway emissions to the combined concentrations was small. • Total GHG emissions between the 2018 No-Build and 2041 Future Build scenarios were predicted to increase by 8%but are considered small compared to provincial and Canada-wide targets emissions, contributing less than 0.0093% and 0.0019%. b. Construction activities have the potential to create temporary, localized effects on air quality in the immediate vicinity of the project. Emissions from construction are primarily comprised of fugitive dust and combustion products from the movement and operation of construction equipment and vehicles.	i. The proposed improvements to the corridor will improve traffic flows and encourage use of active transportation within the local vicinity which will minimize the air quality impact. Specific mitigation measures are / are not warranted as a result of the proposed improvements due to the small number of days which they are expected to exceed the guideline. The City is committed to implementing best practices that will mitigate air quality impacts. ii. Mitigation measures and best management practices during construction of the roadway for reducing emissions during construction activities to reduce air quality impacts can be reviewed from Environment Canada “Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities”. Some mitigation measures are: a. Regular maintenance of equipment used on site to minimize exhaust b. Use of effective dust suppression techniques such as on-site watering, chemical suppressants, wind barriers, and limiting exposed areas as necessary c. Reducing speed limits on unpaved areas for mobile equipment d. Optimization of material transfer operations, including reducing distance for material transfers, if possible. iii. The recommendations from the EA Study support various initiatives and plans to help improve the overall air quality by implementing active transportation options that reduce emissions: • The City is managing emissions and greenhouse gases through sustainable transportation

Factor	Details/Anticipated Impact	Proposed Mitigation
		infrastructure planning and implementation. • The planting of trees and vegetation promotes healthy and sustainable communities. There will be opportunities for tree planting and landscape features in the boulevards as part of the EA study. Regional and local municipalities throughout Ontario are working with MECP in taking on tree and vegetation planting initiatives to mitigate air quality impacts resulting from the growing population and increasing traffic volumes. The addition of trees creates and maintains healthy natural environments that promote healthy, sustainable communities.
8. Source Water Protection	a. The study corridor, based on the MECP Source Protection Information Atlas and correspondence with CVC and CH, is located in both the Credit Valley Conservation and Conservation Halton Source Protection Areas. A minor part of the study area closer to Eglinton Avenue West is situated on lands designated as Significant Groundwater Recharge Area (SGRA) and Highly Vulnerable Aquifer (HVA), however the threats are not significant and no associated polices are applicable. CH confirmed the Halton-Hamilton source protection plan policies for the protected area only applies to projects that involve the conveyance of oil in pipelines. Therefore, no associated policies are applicable b. Potential threats associated with the improvements include: • The establishment, operation, or maintenance of a system that collects, stores, transmits, treats, or disposes of sewage (limited to stormwater runoff) • The application of road salt • The storage of snow (limited to roadway clearing operations only)	i. The additional impervious surface associated with the roadway improvements would reduce the amount of groundwater infiltration from the surface. To offset these impacts and balance water quantity, the stormwater management strategy described in **Section 10.1.12** addresses infiltration of stormwater runoff from the road right-of-way. In addition, the implementation of Low Impact Development (LID) measures will be considered during Detailed Design. ii. Additional road salt associated with winter maintenance for the proposed roadway improvements and snow storage in the boulevards may increase impacts to source water protection areas. The City will prepare Salt Management Plans for effective winter maintenance while striving to minimize the amount of salt entering the environment and at the same time meeting Provincial legislation related to road maintenance standards for winter services. Reduction in the amount of salt that is applied during winter maintenance activities will reduce the amount of salt present in roadside snowbanks iii. The stormwater management strategy (described in **Section 10.1.12**) addresses other contaminants that may be present in roadside snowbanks. These would be treated by stormwater management facilities alongside the corridor prior to discharge into receiving watercourses.
9. Streetscaping / Urban Design	a. Impact to existing trees and landscaped features in the boulevard	i. Where impacts to trees cannot be avoided, compensation will be provided as per a compensation strategy developed during Detailed Design. ii. Impacted features will be restored or relocated, where feasible iii. Increased opportunity for aesthetics throughout the corridor with the provision of landscaped boulevards and median where feasible to be implemented within the right-of-way. iv. Consideration should be given to:

Factor	Details/Anticipated Impact	Proposed Mitigation
		• Raised landscaped medians where space allows • Boulevard trees on both sides of the road where space allows
10. Utilities	a. Existing utilities in conflict with proposed improvements.	i. A relocation plan will be developed during Detailed Design, as required. ii. All utility information will be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary, in consultation with utility companies.
11. Construction Detours/ Temporary Lane Restrictions	a. Inconvenience during construction	i. Impacts will be temporary in nature. The City will attempt to mitigate impacts as much as possible. ii. During Detailed Design, a traffic management plan will be developed to determine how traffic will be accommodated during construction and how access to properties adjacent to the corridor will be maintained.
Natural Environment		
12. Vegetation and Vegetation Communities	a. Impacts to terrestrial natural feature generally limited to west side of Ninth Line, as lands on east side are built-up and urbanized. Impacted area includes CUM1 features which are relatively disturbed and vegetation species with high proportion of non-native species growth b. Direct impact to three significant woodlands which includes impacts to two significant woodlands FOD6-5 and FOD6-4 for inclusion in Ninth Line Lands NHS (AFW 2017) c. Encroachment of the wetland unit (Graminoid Mineral Meadow Marsh MAM2) opposite of Ninth Line / Doug Leavens Boulevard intersection will require removal where the proposed improvements infringe on the east side. This wetland is considered low ecological quality and impacted area is occupied by disturbance-tolerant and ecologically generalist species d. Encroachment of the wetland unit (Cattail Mineral Shallow Marsh MAS2-1) located along watercourse NLT-1 on the west side of Ninth Line will require an encroachment footprint of approx. 15m^2 into the MAS2-1 wetland. The total limits of construction disturbance within the wetland will be determined during Detailed Design e. Minor infringement of Drainage Feature B and Watercourse NLT-1, but this minor impact overlaps with infringement areas from the sub-watershed study (AFW 2017) and compensation has been identified within Ninth Line Lands NHS. f. No impacts to federally or provincially significant vegetation species. Grading may require removal of regionally-significant vegetation species as documented in the Natural Environment Assessment Report in **Appendix G**.	i. The boundaries of the significant woodland features will be delineated and confirmed during future woodland dripline surveys that will inform the Detailed Design. ii. Proposed design includes reduced boulevard width to minimize impacts to sensitive natural features where feasible, such as reduction in tree planting opportunities while maintaining above ground utility corridor. This has generally been applied adjacent to significant woodland features where feasible. During Detailed Design, opportunities to further reduce impacts to natural features will be reviewed. iii. Regionally significant vegetation to be retained, to the extent possible and individual plants protected during construction. If impacts are unavoidable, it is recommended these individual plants be transplanted into suitable habitat conditions. Where possible, these plants or seeds collected from them, should be transplanted into the newly created edges of those impacted communities, but outside the limit of disturbance. iv. Impacts from the road improvements to the wetlands are identified to be minor, and compensation to address applicable project-specific impacts will be determined in Detailed Design. Depending on the construction timing wetland compensation areas may be incorporated within City owned lands and / or within the Ninth Line Lands NHS as the Ninth Line Lands NHS are planned to increase the ecological quality and functionality of wetlands. Specific and suitable locations will be determined in consultation with City staff and CH v. Complete supplementary tree inventory in Detailed Design as required to identify impacted trees. Tree Removals to be

Factor	Details/Anticipated Impact	Proposed Mitigation
	g. Tree removals resulting from the proposed design and grading limits as per the Tree Protection Plan in **Appendix G** h. Potential for indirect disturbance to adjacent natural features on the west side of Ninth Line. i. Potential for indirect disturbance including noise, vibrations, human presence, dust, and artificial lighting from construction activities. Construction impacts on adjacent woodlands and wetland features.	confirmed during Detailed Design and recommendations identified in the EA Study's Tree Preservation Plan to be confirmed. Opportunities to avoid /minimize impacts to the Potential Bat Habitat Trees to be reviewed in Detailed Design where feasible. vi. Clearly define construction limits using tree protection fencing to avoid unnecessary vegetation removal where tree protection measures are recommended in the TPP found in **Appendix H.** vii. Mitigate dust by moistening areas of bare, dry soil with water during construction to reduce the amount of dust produced. viii. Where impacts to vegetation cannot be avoided, compensation will be provided as per a compensation strategy developed during Detailed Design at a rate determined with agencies. Consideration of compensation rate of 3:1 replacement ratio. Compensation for loss of vegetation communities will be in accordance with the CVC and CH guidelines. Compensation should be established within the right-of-way as feasible with consideration within the planned Ninth Line Lands. ix. An Edge Management Plan will be prepared for any woodland or wetland features that require encroachment in areas within the CH and CVC Regulation Limits to accommodate road construction works.
13. Fisheries and Aquatic Habitat	a. The location of the watercourse crossing NLT-1 (Osprey Marsh) at Ninth Line will not change as a result of the proposed recommendations b. Watercourse NLT-1 is the only aquatic feature in the study area that provides suitable, limited, and direct fish habitat. It facilitates the flow of water and nutrients from upstream to downstream. It is anticipated the proposed improvements (culvert extension) can avoid HADD. c. In-water works during construction of the culvert extension has potential for direct impacts to fish within NLT-1 watercourse d. Sedimentation and erosion to watercourse NLT-1 and the East Lisgar Branch during construction activities e. Temporary changes to water quality f. Temporary disruption or permanent loss of site-specific habitat g. Accidental spills in watercourses during construction	a. Complete a DFO self-assessment screening with a potential requirement to submit a DFO Request for Review under the Fisheries Act required during Detailed Design b. If in-water works are confirmed to be required in NLT-1, conduct a fish salvage by a qualified biologist to prevent death of fish. This will require obtaining a License to Collect Fish from MNRF prior to the fish salvage. During construction maintain flow from upstream to downstream. c. Review opportunities for watercourse channel enhancement and culvert infrastructure during Detailed Design to improve functionality of fish habitat at the crossing. d. Good housekeeping practices related to materials storage/stockpiling, equipment fueling/maintenance, etc. will be implemented during construction e. Avoid and minimize disturbance to watercourse riparian areas during construction. Prepare Erosion and Sediment Control (ESC) Plan prior to on-site construction. Disturbed riparian areas will be vegetated and/or covered with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation. ESC measures such as silt fences, rock check dams and sedimentation ponds to be considered. Appropriate sediment control structures will be installed prior to and maintained during

Factor	Details/Anticipated Impact	Proposed Mitigation
		construction to prevent entry of sediments into the watercourse f. Changes to water quality will be mitigated through the deployment and maintenance of erosion and sediment controls which will prevent sediments from reaching the watercourses from exposed soils upslope g. Habitat impacts will require compensation h. Work areas will be delineated with construction fencing to minimize the area of disturbance i. During Construction spills will be reported and documented to MECP's Spill Response Hotline. Efforts will be made to contain a spill if it is safe to do so. j. Natural Channel Design principles will be incorporated into detailed restoration design of the NLT-1 watercourse within the ROW.
14. Wildlife and Wildlife Habitat	a. Displacement of wildlife and wildlife habitat b. No negative impacts to Bobolink and Eastern Meadowlark are anticipated from minor encroachment to CUM1 (identified as Bobolink and/or Eastern Meadowlark habitat) as this habitat does not represent important habitat and area of removal is considered negligible. Construction disturbances are temporary. c. No anticipated impact to Barn Swallow as their habitat is beyond the study corridor. However atypical but periodic Barn Swallow nesting occurrences were observed. d. No anticipated impacts to breeding territories for Eastern Wood-Pewee from vegetation removals from narrow encroachment to FOD6-5 and FOD6-4 Construction-stage disturbance. However, has potential to impact if removals completed during bird nesting period. e. Removal of 3 potential bat roosting habitat trees, including habitat for Species at Risk (SAR) are anticipated. Two of the trees require a Certified Arborist to confirm health assessment and if opportunities to preserve the trees; third tree requires removal as it is dead and considered a public safety impact. f. Barrier effects on wildlife passage g. Wildlife/vehicle conflicts h. Human Encroachment and wildlife movement disturbance i. Temporary construction disturbance to wildlife from noise, dust, vibrations, light, and visual intrusion will be temporary, minimal, and localized. j. Important ecological linkage at NLT-1 watercourse culvert crossing (Osprey Marsh) under Ninth Line will be maintained with the proposed improvements as no physical barriers are being introduced. Proposed improvements provide opportunities to improve the linkage and maintain the existing passage of small to medium sized wildlife.	i. No clearing or disruption to vegetation (especially FOD6-5, CUW1/ FOD7-2 and FOD6-4, and Potential Bat Habitat Trees A, C and D) to occur between April 1 and October 31 to avoid the breeding season for the majority of the bird species protected under the Migratory Birds Convention Act (MBCA) and to avoid injury / mortality to bats. ii. Consultation with MECP regarding tree removals to FOD6-5 if confirmed to be required in Detailed Design, to determine appropriate actions in accordance with the ESA. iii. Certified Arborist to confirm the structural health of Bat Roosting Habitat Trees (2 trees) identified for removal. Opportunities to preserve the trees to be reviewed in Detailed Design. Where removal is confirmed, consultation with MECP Species At Risk is required (SAROntario@ontario.ca) to identify appropriate removal to mitigate impacts and minimize habitat loss. iv. Culvert inspection for Barn Swallow nesting to occur prior to any works in the culvert(s) based on periodic occurrences. v. Culvert extension at NLT-1 watercourse crossing (Osprey Marsh) maintains wildlife passage for small/medium mammals as per openness ratio. Structural modifications to consider inclusion of dry bench to accommodate small to medium wildlife passage. vi. Consideration of wildlife fencing at the NLT-1 watercourse crossing (Osprey Marsh) to direct wildlife under/through the structures rather than across the roadway during Detailed Design. vii. Consideration of permanent fencing installed along the ROW boundary facing woodland FOD6-5 to inhibit future human encroachment and mitigate road mortality impacts and road hazards (due to potential deer crossings). viii. Construction duration and disturbance in the vicinity of the culvert will be minimized to the extent possible to reduce the

Factor	Details/Anticipated Impact	Proposed Mitigation
		potential for increase in road mortality caused by wildlife avoidance of these structures. ix. Preparation of restoration planting plans / landscaping planning plan, with consideration of invasive species management and ecological offsets in accordance with CH and CVC guidelines and policies as required and determined during Detailed Design. x. Construction impacts are anticipated to be minimal as significant impacts to wildlife are not anticipated as it is expected that displaced wildlife species will return to the vicinity following construction.
15. Groundwater	a. Dewatering of shallow excavations will be required for sewers, watermains and culvert extensions. The extent of dewatering is not confirmed and will be. b. As documented in the Phase 1 ESA in **Appendix L** private water wells within the study area were identified based on available water well records. The installation dates for the wells range from 1953 to 1998. It is not known whether the wells are currently in use. Active wells that are in close proximity to construction works may potentially be adversely affected, such as from dewatered excavations causing the water level in the wells to be lowered, or construction spills impacting the groundwater quality. c. Typically, a well survey could be completed to assist in determining which wells are active along a roadway corridor, so it can be assessed whether they should be further studied or monitored during construction.	i. During Detailed Design complete a Hydrogeological Investigation to confirm water taking needs for the proposed improvements, impact assessment, permitting requirements, and identify monitoring and mitigation measures. ii. During Detailed Design undertake a well survey to confirm if wells are currently in use and whether any active wells in close proximity to the proposed construction have the potential to be impacted from dewatering activities and / or construction spills iii. When the potential daily withdrawal construction dewatering estimate are greater than 50 m3/day but less than 400 m3/day, an Environmental Activity and Sector Registry (EASR) may be required to permit the construction dewatering as stipulated by MECP. If triggered an EASR for construction dewatering would apply to the entire project and therefore construction would need to be staged such that the dewatering demands of the entire project do not exceed the 400 m3/day limit at any time. If simultaneous dewatering is required that would result in the project takings exceeding the 400 m3/day rate, then a Permit to Take Water (PTTW) would be required from the MECP to permit this level of water taking iv. Once engineering drawings for structural improvements are finalized, detailed dewatering estimates will be completed prior to commencing construction to determine and support permitting requirements.
16. Surface Water	a. Impacts resulting from any excavating, or cut and fill operations, will be temporary in nature b. Changes to the existing pavement area may result in an increase in quantity runoff	i. Erosion and sedimentation mitigation measures will be implemented prior to the construction phase. Control measures will include, but not be limited to: limiting the geographical extent and duration soils are exposed to the elements; implementing standard erosion and sediment control measures in accordance with Ontario Provincial Standard Specification (OPSS); and managing surface water outside of work areas to prevent water from coming in contact with exposed soils. ii. Monitoring of erosion and sediment control measures during and after construction will

Factor	Details/Anticipated Impact	Proposed Mitigation
		be implemented to ensure their effectiveness. These environmental measures should reduce/ minimize adverse environmental impacts iii. Erosion and sedimentation control (ESC) plans will be prepared in accordance with applicable guidelines [Erosion and Sediment Control Guidelines for Urban Construction (TRCA, 2019)] iv. A preliminary drainage/stormwater management plan has been prepared to mitigate potential changes to the existing pavement area resulting from potential increase in quantity runoff. This plan will be reviewed and finalized in Detailed Design.
17. Soil Removal and Contaminants	a. Soil samples indicate soils contain too much fine material to meet OPSS Granular A or Granular B Type 1 or Type II specifications. b. Potential for fill material and salt-related impacts as a result of roadway de-icing activities in the study area. Based on the preliminary test results, the excavated materials are anticipated to be acceptable for reuse in engineering applications on site (i.e. site grading fill or backfill) pending geotechnical approval. The material should not be used in landscape areas with sensitive vegetation and plant species. c. Excess excavated soils are anticipated to be accepted for disposal off-site at suitable fill received sites or waste disposal facilities subject to additional Toxicity Characteristic Leaching Procedures (TCLP) analysis in accordance with O. Reg. 558/00 as appropriate d. Management of excavated soil must not result in the discharge of a contaminate into the natural environment that causes or may cause an adverse effect. Should this occur, appropriate mitigation measures are required. e. Potential impacts to properties associated with issues of potential environmental concern and spill locations as per the Phase 1 ESA in **Appendix L**	i. Testing of bulk samples collected from open test pits would be required to confirm gradation. ii. An assessment of the quality of the fill material and any sub-surface soils is recommended as part of the proposed construction activities prior to the reuse of any excavated and/or excess material. Similarly, the quality of water generated during any construction/dewatering activities should be assessed prior to being discharged into the environment iii. Additional testing is required during Detailed Design to confirm management of excess excavated soils. In particular additional testing and preparation of additional planning documents it may be necessary to meet the new O. Reg. 406/19 “Excess Soil Regulation” requirements. iv. Activities related to management of excess soil through construction should be completed in accordance with MECP’s new regulation released December 2019, titled “On-Site and Excess Soil Management” (O. Reg. 406/19). This document provides guidance on proper management of excess soils, ensuring valuable resources don’t go to waste and to provide clear rules on managing and reusing excess soil. New risk-based standards referenced by this regulation help to facilitate local beneficial reuse which in turn will reduce greenhouse gas emissions from soil transportation, while ensuring strong protection of human health and the environment. v. If soil removed during construction is determined to be contaminated, the disposal of contaminated soil is to be consistent with Part XV.1 of the Environmental Protection Act and Ontario Regulation 153/04, Records of Site Condition, which detail the requirements related to site assessment and clean up. In addition, should contaminated soil be present at the site, the MECP District Office is to be contacted for further consultation. vi. Should there be discharge of a contaminate into the natural environment, notice of the discharge must be provided in accordance

Factor	Details/Anticipated Impact	Proposed Mitigation
		with the provisions of the Environmental Protection Act, R.S.O 1990, c. E. 19 (EPA). vii. If, at any time, the management of excavated soil or excess soil causes an adverse effect, such as odour, litter, dust, noise, or other impacts to the natural environment or water quality, appropriate preventive and remedial actions will immediately be taken to alleviate the adverse effect or impact. Until these issues are addressed, all soil management activities may need to be suspended, including soil excavating, transporting, or receiving. viii. If subsurface work is to be conducted in the vicinity of any of the properties identified as having issues of potential environmental concern, further investigations including Phase II ESAs may be required and will be undertaken during Detailed Design. If impact is encountered, it should be managed in consultation with a qualified professional. ix. Each spill location would require additional subsurface environmental investigations to assess related impacts

12 Timing of Implementation and Future Commitments

12.1 Project Schedule

As part of the Environmental Assessment process, this Environmental Study Report is to be filed and placed on the public record for a minimum 30 calendar days for review by the public and review agencies.

As per the recently amended through Bill 197, Covid-19 Economic Recovery Act, 2020, the City cannot proceed with the Ninth Line project until at least 30 days after the end of the comment period provided for in the Notice of Completion. Further, the Region may not proceed after this time if:

- a Part II Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or
- the Director has issued a Notice of Proposed Order regarding the project

If after 30 days following the public review period, provided that no Part II Orders are received regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights and a Notice of Proposed Order regarding the project is not issued, the Region may proceed to Phase 5 of the Class EA process – design and construction. Property acquisition and utility relocation will then be scheduled, followed by construction.

12.1.1 Lapse of Time

According to the Municipal Class EA, “If the period of time from the filing of the Notice of Completion of ESR in the public record or the MECP’s denial of a Part II Order request(s), to the proposed commencement of construction for the project exceeds ten (10) years, the proponent shall review the planning and design process and the current environmental setting to ensure that the project and the mitigation measures are still valid given the current planning period. The review shall be recorded in an addendum to the ESR which shall be placed on the public record.”

Notice of Filing of Addendum shall be placed on the public record with the ESR and shall be given to the public and review agencies, for a minimum 30-day public review period. The notice shall include the public’s right to request a Part II Order during the 30-day review period. If no Part II Order request is received the proponent is free to proceed with implementation and construction.

12.2 Commitments of Future Work

The ESR identifies specific items to be reviewed and confirmed during Detailed Design. Some of these commitments will address specific concerns raised by property owners and review agencies during the EA process. Items of particular interest to be addressed include:

1) Property Requirements
    a. Property requirements identified in this report and shown on the preliminary design drawings are preliminary and will be finalized during Detailed Design. Where feasible, review opportunities for easements instead of property acquisition.
    b. Review design opportunities to minimize property acquisition requirements at constrained locations.
    c. Obtain construction easements as required.
    d. Consult with property owners during the development of construction staging plans to maintain access to properties and minimize impacts (as feasible).
    e. Obtain Permission to Enter Agreements from landowners where access to their property is required.
2) Archaeology
    a. Should future work require an expansion of the study area, complete Stage 1 Archaeological Assessment (AA) to confirm presence / absence of archaeological potential.
    b. Complete Stage 2 AA for impacted lands as per recommendations of the Stage 1 AA.
    c. Complete Stage 3 archaeological assessment for lands that border the St. Peter's Catholic Cemetery property as per recommendations of the Stage 1 AA.
    d. Consult with Indigenous Communities (Mississauga's of the Credit First Nation) to identify opportunities for participation in field investigations where additional archaeological assessment is required.
    e. Findings from subsequent archaeological assessments are to be filed with the MHTSCI to obtain clearance for archaeology.
3) Cultural Heritage
    a. Should future work require an expansion of the study area, a qualified heritage consultant to confirm the impacts of the proposed work on potential heritage resources.
    b. Consider planting sympathetic plant species and replace any impacted landscape features with potential cultural heritage value at identified cultural

heritage resources as per the CHRA. City to confirm if HIAs for indirect impacts can be waived, given no structures or apparent landscape features of significant CHVI are anticipated to be impacted.

c. Erect temporary fencing and establish no-go zones to buffer BHR1, CHL1 and CHL3 from unintended impact from construction activities.

d. Conduct baseline vibration monitoring for BHR1, CHL1 and CHL3 to confirm if structures are subject to potential vibration impacts and prepare vibration monitoring plan if required.

4) Natural Heritage

a. Review opportunities to reduce the design footprint and minimize impacts to natural features during Detailed Design.

b. A CH permit under Ontario Regulation 162/06 will be required for all works within regulated areas.

c. A CVC permit under Ontario Regulation 160/06 will be required for all works within regulated areas.

d. Complete DFO self-assessment during Detailed Design to determine if serious harm to fish or fish habitat is expected due to activities from the project at NLT-1 watercourse. There is a potential requirement to submit a Request for Review to DFO for approval.

e. Confirm if in-water works are required at NLT-1 and obtain a License to Collect Fish from MNRF to conduct a fish salvage by a qualified biologist to prevent death of fish.

f. Confirm specific timing windows during Detailed Design. To comply with the requirements of the Migratory Birds Convention Act (MBCA) and to avoid injury / mortality to bats it is recommended that disturbance, clearing or disruption of vegetation where birds may be nesting should be completed outside the window of April 1 to October 31 to avoid the breeding bird season for the majority of the bird species protected under the act.

g. Identify woodland edge management techniques as part of the development of Landscaping Planting Plan / Restoration Planting Plan, Erosion and Sediment Control Plan, Invasive Species Management Plan, Edge Management Plan, and Environmental Inspection and Monitoring Plan during Detailed Design, in consultation with CH Guidelines and CVC's Plan Selection Guidelines and Offsetting Guidelines, and tailored to existing conditions and restoration requirements.

h. Develop construction and post-construction monitoring plans as required in consultation with the City, Conservation Halton, and CVC during Detailed Design and apply applicable components of the Ninth Line Monitoring Plan (Wood 2020, NRSI 2020) where appropriate.

i. Develop water quality monitoring program in accordance with recommendations from the subwatershed study and CEIIS (Wood 2020, NRSI 2020) and in consultation with agency staff during Detailed Design.

j. Develop habitat and vegetation restoration monitoring, which should be coordinated with monitoring identified for the Ninth Line Lands and reviewed in consultation with agencies during Detailed Design.

k. Prepare Salt Management Plan to mitigate road salt impact to aquatic features where applicable.

l. Detailed delineation and agency confirmation of Significant Woodland and wetland boundaries within or adjacent to the ROW and boundary surveying. Georeference and confirm regionally significant vegetation mitigation and removals within the ROW. Detailed wetland boundaries will be delineated according to the Ontario Wetland Evaluation System, confirmed and staked with CH during the Detailed Design stage. The confirmed boundaries will be surveyed by an OLS for inclusion on maps and plans. Boundary surveys will be completed for wetlands within or immediately adjacent to the existing or proposed ROW, subject to site access

m. Complete supplementary tree inventory as needed and confirm tree removal compensation requirements and strategy

n. Inspect culverts for Barn Swallow habitat prior to any works in the culvert(s)

o. Review opportunities to retain Potential Bat Habitat Tree A and Tree D. Consult with MECP regarding potential bat habitat impacts as required

p. Review opportunities for installation of permanent fence (wildlife exclusion fencing) along east boundary of the FOD6-5 woodland

q. Prior to construction, including tree removal and utility work, install tree protection zones and ensure they remain in good repair for the duration of the project.

r. During Detailed Design determine permit requirements (submit Information Gathering Form) under the Ontario *Endangered Species Act, 2007* in consultation with MNRF/MECP. If required, the necessary permit(s) will be secured during Detailed Design

s. Significant Woodland encroachment impacts may be reduced through completion of the Detailed Design. Total woodland compensation requirements should therefore be confirmed during the Detailed Design stage. In addition to woodland edge restoration plantings, invasive species management and edge management, additional woodland compensation requirements will be accommodated on City-owned lands. Specific and suitable locations will be determined in consultation with City staff.

5) Drainage and Stormwater Management

a. During Detailed Design conduct a detailed hydraulic analysis to assess the impact along the upstream reach at Crossing C-3 (NLT-1). Review the opportunity to raise the road profile at this crossing to minimize / eliminate overtopping. Recommend option that has no negative impacts and will not increase hazard risks or limits.

b. During Detailed Design coordinate with Conservation Halton at the Crossing C-3 (NLT-1) culvert to minimize impacts to the watercourse and surrounding wetlands. Updates to the hydraulic modelling, floodplain assessment and revisions to Conservation Halton floodplain mapping shall be completed during Detailed Design to reflect the final design and grading footprint of the crossing.

c. In-situ infiltration rate measurements should be completed at all proposed LID locations to confirm the soil infiltration rates and groundwater levels.

d. The design flows to be reviewed and verified to confirm any changes to the land-use and associated hydrologic information that may affect the peak flows presented in this Class EA Study.

e. A spread analysis should be completed at the detailed design stage to ensure that the ponding at low points does not exceed the crown of the road.

f. Any proposed watercourse realignment, relocation, or enhancement works are to be investigated during detailed design and/or under separate study.

g. Note that the proposed inverts of the crossing culverts are to be confirmed during detailed design to accommodate the road design and the roadside ditch grading.

h. Explore opportunities of using LID treatment to store drainage during storm events beyond the minimum requirements during Detailed Design.

i. During Detailed Design explore opportunities to eliminate or reduce the flood hazards (including spill), to the greatest extent possible.

j. During Detailed Design review opportunities to create a flood free roadway or at a minimum reduce road overtopping during the Regional Storm.

k. During Detailed Design, provide a water balance assessment as necessary to demonstrate that wetland hydrological function (including hydroperiod) will not be impacted.

l. During Detailed Design, an updated SWM and Drainage Report will be prepared to reflect updated information available at the time of detailed design including existing conditions, final design, and updated modelling information.

m. During Detailed Design, an updated SWM and Drainage assessment will be prepared using the HEC-RAS model to demonstrate adequate conveyance capacity and no negative flooding impacts.

n. During Detailed Design, the City will make design modifications, including culvert upsizing (if required), to address any flooding concerns that arise, to the satisfaction of CH.

o. During Detailed Design, update CH mapping of the floodplain and spill hazards within the study area using the latest available hazard mapping of existing conditions.

p. During Detailed Design investigate the stormwater management approach as it relates to unitary storage and discharge criteria to mitigate flood impacts.

q. During Detailed Design investigate supplemental Best Management Practice Measures to mitigate water temperature impacts and to inform the treatment train approach to be considered as outlined in Drainage and Stormwater Management Report (as per Appendix J).

r. During Detailed Design conduct detailed analysis using an applicable model confirmed with CH (for example, approved SWS model or other available modelling from work by others), to identify that no impacts to the floodplain will result from the proposed works on Ninth Line.

s. During Detailed Design, a review of the current practice on road salt management and an evaluation of the potential impacts on surface water from the increase salt load of the pre-development versus post-development roadway salt impacts will be included.

6) Roadway Design

a. Address design requirements through the preparation of contract drawings and specifications.

b. Consider retaining walls at constrained locations.

c. Confirm proposed re-grading at driveways during Detailed Design once each driveway design is developed.

d. Confirm signage and pavement markings during Detailed Design.

e. At the time of Detailed Design, any changes to design standards and/or industry best practices compared to those available at the time of the EA, are to be considered.

7) Active Transportation Facilities

a. Confirm material type, pavement markings, signage, transitions and treatment for the recommended cycle tracks and sidewalks

b. At the time of Detailed Design, any changes to design standards and/or industry best practices related to the accommodation of active transportation users, compared to those available at the time of the EA, are to be considered. This includes consideration of the applicable standards for pedestrian and cyclist treatment across entrances and intersections.

8) Transit Facilities

a. In consultation with MiWay re-confirm proposed bus stop locations and transit amenities during Detailed Design.

b. Confirm the need for delineation through the bus stop area by signage, tactile warning or change in elevation during Detailed Design.

9) Streetscaping and Landscaping

a. Confirm streetscaping opportunities as per the preliminary design. Develop streetscaping plan, including individual tree planting locations, during Detailed Design.

b. Request for three (3) continuous privacy fences on the east side of Ninth Line from Berryman Trail to Zenith Court to be confirmed during Detailed Design. This includes:

I. Confirmation the location/type/height/extent of the proposed privacy fences;

II. Coordination for the replacement (if required) of the existing noise walls; and

III. Maintained existing active transportation connections from the Lisgar neighbourhood (i.e. Berryman Trail, Worthview Place, Apex Court, Discovery Court and Zenith Court).

10) Intersection Design, Access, and Signals

a. Intersection improvements to be confirmed during Detailed Design in coordination with Region of Peel's future Derry Road MCEA Study (Highway 407 to Millcreek Drive)

b. Intersection improvements at Britannia Road and Ninth Line to be confirmed during Detailed Design in coordination with Region of Peel

11) Illumination

a. Final locations of illumination/hydro poles to be confirmed during Detailed Design.

12) Geotechnical Investigations

a. To accommodate the culvert extension at Osprey Marsh structure (Asset ID: 056005) during Detailed Design advance additional deeper boreholes to confirm founding soil conditions

b. Additional testing during Detailed Design to confirm preliminary recommendations for management of excess excavated soils in accordance with current regulations

c. During construction, material testing and inspection should include observations and inspection of sewer trench, culvert and pavement sub-grade conditions, compaction testing of backfill and pavement materials as well as concrete and asphalt testing

13) Hydrogeological Investigations

a. During Detailed Design undertake a Hydrogeological Investigation to assess the proposed project on changes to groundwater flow patterns, groundwater and surface water interactions and natural features. The investigation will identify construction dewatering and long-term dewatering estimate calculations, groundwater settlement impacts, and permitting requirements. Monitoring requirements to address quality and quantity in baseline, during and post construction will be identified and if needed, mitigation measures will be proposed.

b. During Detailed Design, conduct well survey to confirm/identify any active wells prior to construction and if potential impacts to active wells will be required from potential dewatering / construction spills. The well survey will be completed as per Peel Region guidelines to protect private water supplies in terms of water quality and quantity.

c. In the event a Permit to Take Water (PTTW) or EASR registration for construction is required:

    i. City should consider initiating a pre-consultation with MECP hydrologists to expedite the construction process.

    ii. Discuss with MECP of potential impacts to the natural environment, risks posed to nearby structures, and potential for the movement of contaminated groundwater due to construction dewatering is required as part of the PTTW application.

    iii. Detail the planned disposal method of water taken, that the water criteria for disposal is met, and a groundwater depressurization assessment is conducted in the event of artesian conditions in the PTTW application.

14) Contamination

a. If subsurface work is to be conducted in the vicinity of any of the properties identified with potential environmental concern, further investigations including Phase II ESAs may be required and will be undertaken during Detailed Design. If impact is encountered, it will be managed in consultation with a qualified professional.

15) Utilities

a. Update utility information prior to construction to ensure that the data is accurate. Confirm location and resulting impacts to existing utilities and future services.

b. Determine formal definition of impacts on utilities during Detailed Design, in consultation with individual utility companies. Finalize relocation requirements with utility companies as necessary.

16) Constructability, Staging and Detours

a. Develop traffic management plan and staging concept to determine how vehicular (maintain one lane in each direction) and pedestrian traffic will be accommodated during construction and how access to properties adjacent to Ninth Line will be maintained.

17) Additional Consultation and Coordination

a. Consult with affected property owners including those where property is required or where access to their property will be impacted.

b. Consult with regulatory agencies and individual municipalities as required.

c. Coordinate with developers as required to determine their status, timelines, and any impacts to the study corridor.

18) Summary of Anticipated Permits and Approvals

a. DFO self-assessment with potential requirement for DFO Request for Review under the Fisheries and Wildlife Conservation Act to confirm if authorization is required.

b. Obtain License to Collect Fish from MNRF to conduct a fish salvage if in-water works are confirmed at NLT-1 watercourse crossing

c. CH permit under Ontario Regulation 162/06

d. CVC permit under Ontario Regulation 160/06

e. Environmental Compliance Approval (ECA) from MECP for stormwater management facilities and storm sewers.

f. MECP Species at Risk (SAR) permitting requirements under the Endangered Species Act (ESA)

g. Permission to Enter Agreements.

h. Clearance for cultural heritage and archaeology from MHTCSI based on findings from subsequent cultural heritage assessments and archaeological assessments as required.

12.3 Timing of Improvements

Timing of improvements will be confirmed during Detailed Design. The Development Charges Background Study (2019) identified the need to widen Ninth Line between Eglinton Avenue West and Derry Road West from two (2) to four (4) lanes, with an estimated timing year of implementation in 2023 – 2024 (Arterial Road System Items 1.1.17 and 1.1.18). Construction timing is subject to annual Council review and prioritization. Widening of Ninth Line north of the study area to Highway 401 is slated for 2029 – 2033.