Environmental Study Report

Square One Drive Extension
Municipal Class Environmental Assessment and Preliminary Design

Prepared for:
City of Mississauga

Prepared by:
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November 6, 2017

Sign-off Sheet

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Executive Summary

Introduction

Stantec Consulting Ltd. (Stantec) has completed a Municipal Class Environmental Assessment (EA) study on behalf of the City of Mississauga (the City) to evaluate the need for an extension of Square One Drive, from Confederation Parkway to Rathburn Road West (hereinafter referred to as the "study area") to: improve access to, from, and within downtown Mississauga; support multi-modal transportation and encourage walking, cycling, and transit use; and, create a fine-grained street grid in downtown Mississauga with an urban scale, more walkable blocks, new routing options for local trips.

This EA study was guided by the City's goals and objectives for downtown Mississauga, including but not limited to the 2009 Strategic Plan, the Downtown 21 Master Plan and the Downtown Core Local Area Plan. A vibrant downtown for Mississauga will be achieved by: strengthening the transportation system, improving linkages/access, and enhancing the pedestrian experience; creating a well-connected road network that supports multiple modes of transportation; and, developing an urban environment that includes high-quality public spaces, such as parks, pedestrian friendly sidewalks, outdoor seating areas, and other amenities. The extension of Square One Drive is identified as one of a number of proposed roadway extensions intended to maximize access into and beyond downtown Mississauga.

Consultation

Public consultation is a key component of this EA study to ensure that the interests and concerns of the public, agencies, interest groups, and Indigenous communities are identified, documented, assessed, and considered. The following consultation activities were carried out in order to achieve these objectives:

- Posting project milestones on the City's website (www.mississauga.ca/squareoneclassea) including Notices of Study Commencement, Public Information Centres (PICs) 1 and 2, and Study Completion;
- Holding meetings with stakeholders at key points during the study;
- Publishing newspaper notices in the Mississauga News for all study milestones;
- Mailing notices to the public, agencies, interest groups, and Indigenous communities regarding project milestones;
- Holding two (2) PICs to engage and obtain input from interested persons; and
- Placing this ESR on the public record and distribution of the Notice of Study Completion.

Need and Justification

Square One Drive lies within the jurisdiction of the City of Mississauga and provides access to the Square One Shopping Centre, the Mississauga City Centre Transit Terminal, Sheridan College (Hazel McCallion Campus), and high density residential buildings (condominiums). Square One Drive currently consists of an east-west minor collector road, comprising four lanes east of Hammerson Drive, and two lanes west of Hammerson Drive. The posted speed limit is 30 km/h adjacent to Sheridan College, and 50km/hr elsewhere. In addition, the study area roadways service nine Mississauga MiWay and GO Transit routes.

Substantial development is expected within and adjacent to the study area within the next 25 years. Given the predicted increase in residential population and employment in the study area,

traffic volumes across the study area are expected to grow from 1% to 2% per annum (p.a.) to 2041. If no improvements are undertaken in the study area, long delays are expected at study area intersections, as traffic volumes will have increased without any additional capacity in the broader area.

Problem/Opportunity Statement

Based on the above, the Problem and Opportunity Statement established for this EA study is as follows:

Improvements in the Square One Drive extension study area are required to provide better access to, from, and within downtown Mississauga; to accommodate future development adjacent to the study area; to facilitate the creation of a smaller, fine-grained street network; to further develop a multi-modal transportation system; and to create a gateway treatment to downtown Mississauga from the west.

Alternative Solutions

Alternative 1: Do Nothing

Alternative 2: Improve Transit, Employ Transportation Demand Management (TDM) Measures

Alternative 3: Improve Alternative East-West Routes

Alternative 4: Extension of Square One Drive

Preferred Solution

Based on the results of the evaluation, Alternative 4, Extension of Square One Drive, fully addresses the identified problems and opportunities by improving access to, from, and within downtown Mississauga, and contributing to the development of a smaller, fine-grained street network. It also supports a multi-modal transportation system, and provides an opportunity for a gateway treatment to downtown Mississauga from the west. Alternative 4 addresses many of the selected evaluation criteria by creating a high-quality urban environment and meeting planning objectives, as well as improving pedestrian and cyclist accommodation, network connectivity, streetscaping, property access, and overall safety.

While Alternative 4 is anticipated to incur higher initial capital costs when compared to the other alternatives, and impose a slightly higher impact on park greenspace, this alternative was selected as the Preferred Alternative Solution as it has the highest potential to support multi-modal transportation for both the Square One Drive corridor and the broader area of interest, as well as the potential to accommodate a gateway treatment to downtown Mississauga.

Alternative Design Concepts

Alternatives were generated and modified to reflect both "hard" constraints (such as buildings/parking areas, watercourses, other roadways) and "soft" constraints (such as existing utilities, streetscaping, and landscaping). Other key considerations in developing the Alternative Design Concepts included potential property impacts, traffic disruptions during construction, and capital costs. Given these considerations, the following Alternative Design Concepts were generated for the Preferred Solution:

Alternative 1: Extend Square One Drive and construct a new traffic signal at the intersection of Square One Drive with Rathburn Road West.

Alternative 2: Extend Square One Drive and construct a new roundabout at the intersection of the Square One Drive with Rathburn Road West.

Preferred Design

Based on the findings of the assessment, **Alternative 2**, the extension of Square One Drive with a roundabout at the intersection with Rathburn Road West was selected as the Preferred Design given its ability to improve traffic operations and roadway safety at the Square One Drive and Rathburn Road West intersection, and to provide a gateway treatment (through the installation of public art within the central island of the roundabout) to downtown Mississauga from the west.

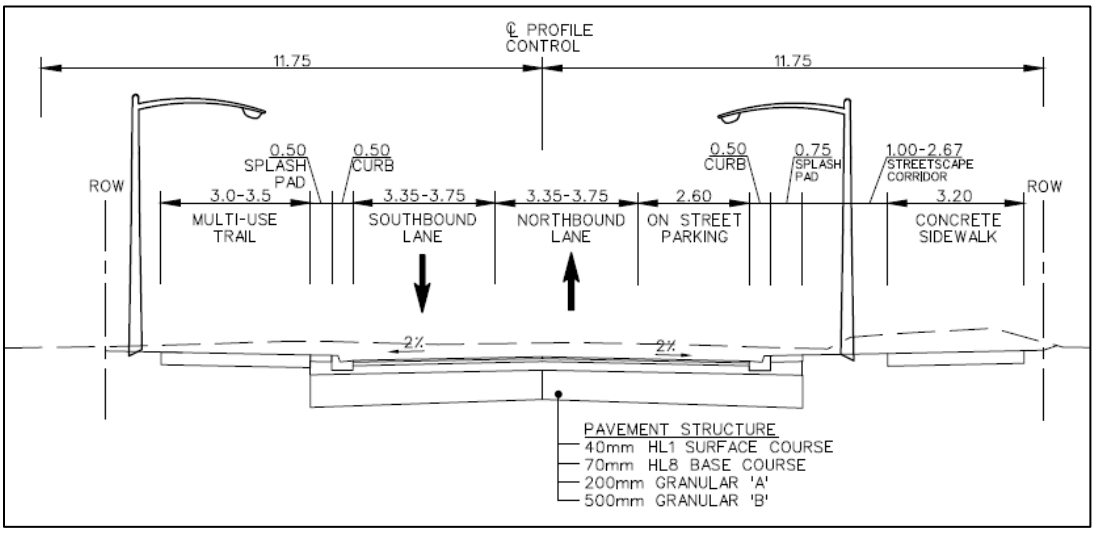
Project Description

The typical cross-sections for the proposed extension of Square One Drive and realignment of Rathburn Road West are illustrated in **Figure ES 1**and **Figure ES 2** below.

The key features of the recommended preliminary design for **Square One Drive** are as follows:

- Extend Square One Drive from Confederation Parkway to Rathburn Road West;
- Construct a new signalized intersection at Confederations Parkway and Square One Drive, which will require partial removal of the existing centre median on Confederation Parkway;
- Relocate the existing access to 330/350 Rathburn Road West from Confederation Parkway to Square One Drive;
- Construct sidewalks (with streetscaping and landscaping features), a 3.0 m – 3.5 m multi-use trail, and a 0.5 m splash pad;
- Implement on-street parking on the south side of Square One Drive Extension, between the access to the Alectra Utilities substation and the intersection with Confederation Parkway;
- Construct a new 2-lane roundabout at the intersection of Square One Drive and Rathburn Road West, with public art in the central island;
- Provide opportunities for new urban space within Zonta Meadows Park;
- Relocate (3) existing load centres from Alectra Utilities' current property; and
- Install pedestrian facilities to meet current AODA and City standards, including retrofitting detectable warning surfaces in all existing curb ramps and providing detectable warning surfaces in the construction of all new curb ramps.

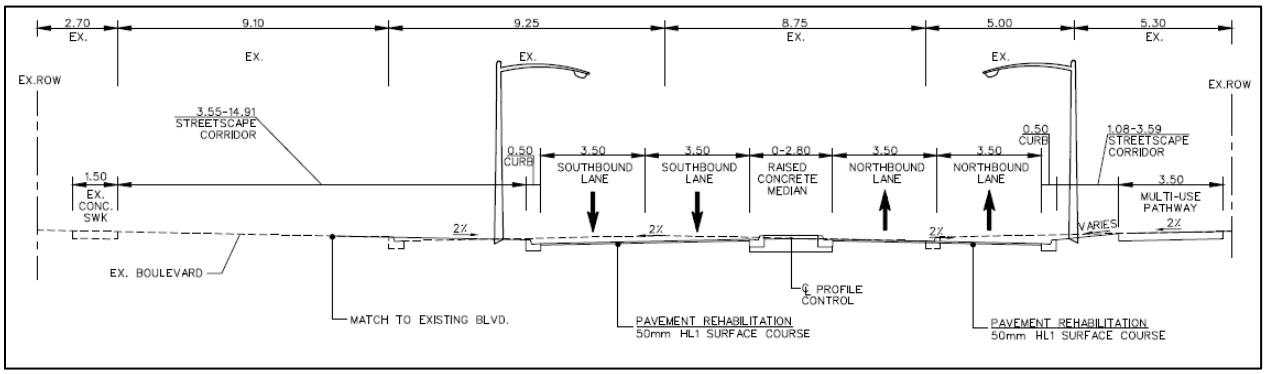
Figure ES 1: Typical Cross-Section, Square One Drive Extension



The key features of the recommended preliminary design for **Rathburn Road West** are as follows:

- Re-align Rathburn Road West to the south to accommodate the new roundabout at Square One Drive while minimizing impacts to residents to the north;
- Remove the existing traffic signals at the combined intersection with Elora Drive (east leg)/ entrance to 330/350 Rathburn Road West, and extend the center median from the new roundabout at Square One Drive through the intersection. Note, the existing entrances will be limited to right-turns in and out only;
- Construct a large landscaped boulevard with stormwater management opportunities, on the north side of Rathburn Road West;
- Install new streetlighting to accommodate the wider roadway cross-section and meet current City standards; and
- Replace vegetation loss associated with construction activities with new and enhanced landscaping on the boulevards of Rathburn Road West, where possible.

Figure ES 2: Typical Cross-Section, Rathburn Road West



The Preferred Design for the Square One Drive Extension is provided in **Appendix L** of this ESR.

Mitigation Measures and Implementation Commitments

Many of the environmental concerns related to this project have been mitigated through the process by which the preferred design was selected, as described in this Environmental Study Report. The anticipated impacts and proposed mitigation measures are described in **Section 9**. A detailed list of specific commitments to be carried forward to Phase 5 of the Municipal Class EA process (i.e., detailed design and implementation) is provided in **Section 10**. Monitoring of construction activities shall ensure that all environmental standards and commitments for construction are met. The City will work with the appropriate approval agencies during detailed design, and prior to implementation, to ensure that the proposed works are acceptable.

1.0 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Square One Drive currently consists of an east-west minor collector road, comprising of four lanes east of Hammerson Drive, and two lanes west of Hammerson Drive. Square One Drive has eight signalized and unsignalized intersections between and including Hurontario Street and Confederation Parkway. A Municipal Class Environmental Assessment (EA) study was completed to evaluate the need for an extension of Square One Drive, from Confederation Parkway to Rathburn Road West (hereinafter referred to as the "study area") to: improve access to, from, and within downtown Mississauga; support multi-modal transportation and encourage walking, cycling, and transit use; to create a finer street grid in downtown Mississauga with an urban scale, more walkable blocks, new routing options for local trips, and provide better transit access.

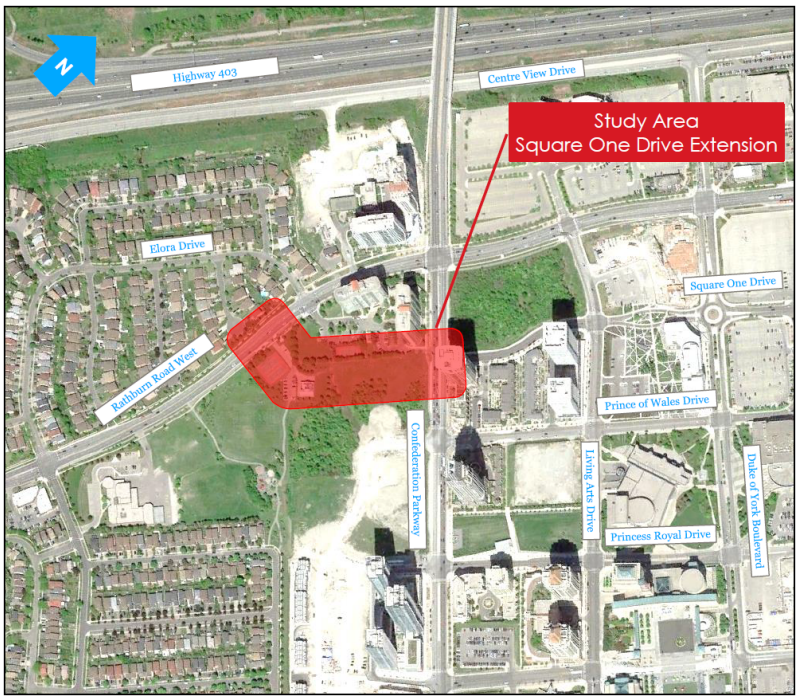
Stantec Consulting Ltd. (Stantec) was retained by the City to complete a Municipal Class EA study and preliminary design, to confirm the type of improvements required, as well as to address short- and long-term needs on both this section of Square One Drive and on intersecting roadways within the study area.

1.2 STUDY AREA

The study area is situated between Confederation Parkway and Rathburn Road West, as illustrated in

Figure 1. In addition to Square One Drive, traffic operations on other major east-west roadways located in the vicinity of the study area were assessed. Specifically, this study examined how the capacity of Rathburn Road West and Burnhamthorpe Road West are affected by potential improvements on Square One Drive.

Figure 1: Study Area



1.3 PLANNING FRAMEWORK

1.3.1 Provincial Planning Context

1.3.1.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) is issued under the authority of section 3 of the *Planning Act* and came into effect in April 2014. It is intended to build upon the PPS issued in 2005. The PPS provides policy direction on matters of provincial interest related to land use planning and development. Provincial plans are to be read in conjunction with the PPS and take precedence over the policies of the PPS to the extent of any conflict, except where relevant legislation indicates otherwise (MMAH 2014).

Key policy objectives of the PPS that are particularly relevant to the Square One Drive study area are:

- promote the use of active transportation, transit, and transit-supportive development, and provide for connectivity among transportation modes;
- protect nearby employment areas;
- strengthen the protection for transportation corridors and promote land use compatibility for adjacent lands; and,
- planning for infrastructure and public facilities can extend beyond the typical 20-year horizon (MMAH 2014).

1.3.1.2 Places to Grow – Growth Plan for the Greater Golden Horseshoe

The Greater Golden Horseshoe (GGH) is one of the fastest growing regions in North America, stretching around Lake Ontario from Niagara Falls to Peterborough. The GGH is forecasted to add an additional 4.5 million people and nearly 2 million jobs by the year 2041. The Growth Plan

for the GGH has been prepared under the *Places to Grow Act* (2005) and provides guidance on transportation, infrastructure planning, land-use planning, urban form, housing, natural heritage and resource protection. The Plan focuses on linking urban growth centres through a multi-modal transportation network that uses efficient public transit and highway systems to move people and goods. The Growth Plan for the GGH 2017 was approved by the Lieutenant Governor in Council No. 1024/2017 and is in effect as of July 1, 2017, replacing the 2006 Growth Plan. The 2017 Plan builds upon the successes of the 2006 Plan, continuing towards the achievement of complete communities that are compact, transit-supportive, and make effective use of investments in infrastructure and public service facilities.

The Square One Drive study area is classified as an Urban Growth Centre that under the Growth Plan for the GGH 2017 should be planned as a focal area for investment in public services and a variety of uses, for regional scale transit infrastructure, for high density major employment centres, and to accommodate population and employment growth (MMAH 2017).

1.3.2 Municipal Planning Context

1.3.2.1 Region of Peel Official Plan

The City of Mississauga is a lower tier municipality within the Region of Peel. The Region of Peel Official Plan provides a long-term regional strategic policy framework for the more specific objectives and land use policies within the lower tier municipal official plans, which must conform with the Region's Official Plan. The over-arching theme within the Region's Official Plan is sustainability, acknowledging the various environmental, social, economic, and cultural imperatives to create and maintain a healthy, vibrant, and safe community. The Square One Drive study area is located within the Conceptual Urban Growth Centre. The proposed improvements within the Square One Drive study area will contribute to the goals and objectives of the Regional Official Plan and the Urban Growth Centre Policies by supporting walking, cycling, and access to public transit.

1.3.2.2 City of Mississauga Strategic Plan

The City of Mississauga's *Strategic Plan* (2009) is characterized by its five "Strategic Pillars for Change": move, belong, connect, prosper, and green. The study area is located within an area that will experience employment and population growth by 2031, resulting in additional commercial vehicles in the area. The Square One Drive study area and its proposed improvements positively contribute to several of these pillars:

- increasing the transportation capacity and providing transit facilities;
- providing mobility choices for residents to be able to use active transportation facilities;
- meeting the needs of its employment areas; and,
- reducing emissions through efficient passenger movements (City of Mississauga 2009).

1.3.2.3 Mississauga Official Plan

The *Mississauga Official Plan* (2016) will guide the city's growth and development to the year 2031. The *Mississauga Official Plan's* policies are designed to manage and direct the next stage of the city's growth - redevelopment and intensification. They will help the city adapt to the effects of growth on the social, economic, cultural, and natural environment.

Mississauga's population and employment growth are expected to remain strong through the year 2031, as outlined in **Table 1-1** (City of Mississauga 2016).

Table 1-1: Employment and Population Growth Forecast, Mississauga Official Plan (March 2013)

Year	Population	Employment
2009	730,000	453,000
2011	738,000	455,000
2021	768,000	500,000
2031	805,000	510,000

The study area falls within the Downtown Core Local Area. The land use designation for the study area is Downtown Mixed Use. Mixed use development is encouraged to balance the Downtown Core's employment, retail commercial, and civic centre lands with residential development, entertainment, and business/tourism facilities. The Official Plan suggests that roads within the Downtown Core should be public and provide frequent through access.

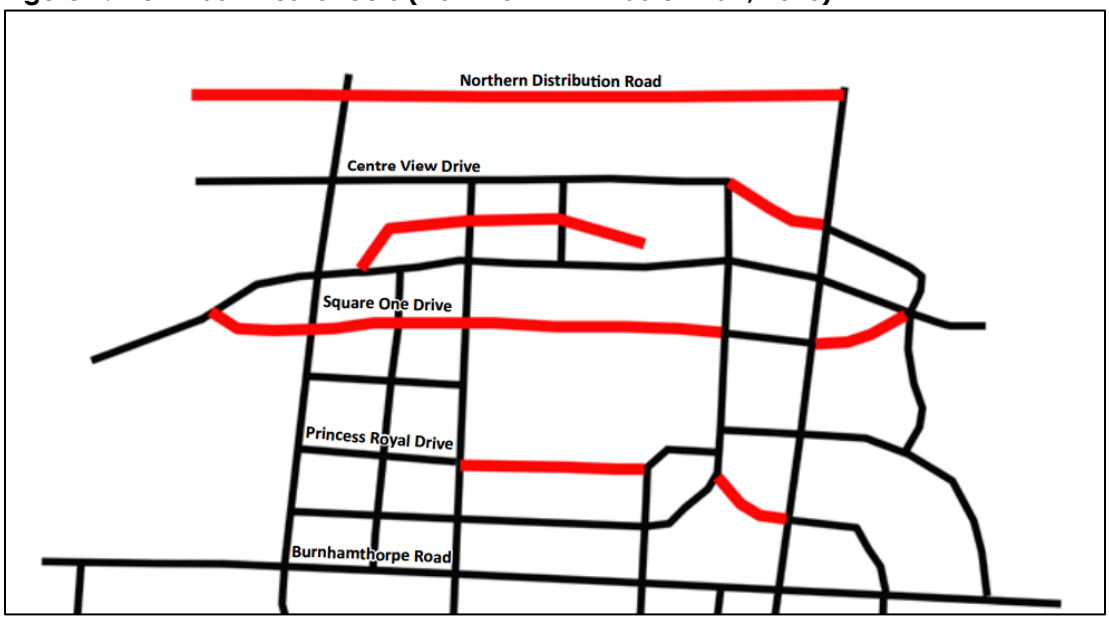
1.3.2.4 Downtown 21 Master Plan

The *Downtown 21 Master Plan (2010)* builds upon the extensive public engagement and visioning completed as part of the 2009 *Strategic Plan,* and seeks to implement its "Strategic Pillars for Change". Objectives within the *Downtown 21 Master Plan* that are particularly relevant to the Square One Drive study area include:

- encourage development of a multi-modal transportation system to create a livable, compact, and accessible downtown for Mississauga;
- prioritize active transportation when designing new streets;
- use small block sizes for new developments;
- ensure jobs, homes, and services are within walking distance of each other; and
- provide connections to nearby higher-order transit (i.e. future Light Rail Transit).

The Plan identifies a number of proposed east-west connections and street extensions to maximize access in and beyond the Downtown, including the extension of Square One Drive from Rathburn Road west of Confederation Parkway to Rathburn Road east of Hurontario Street (please refer to **Figure 2**).

Figure 2: New East-West Streets (Downtown 21 Master Plan, 2010)



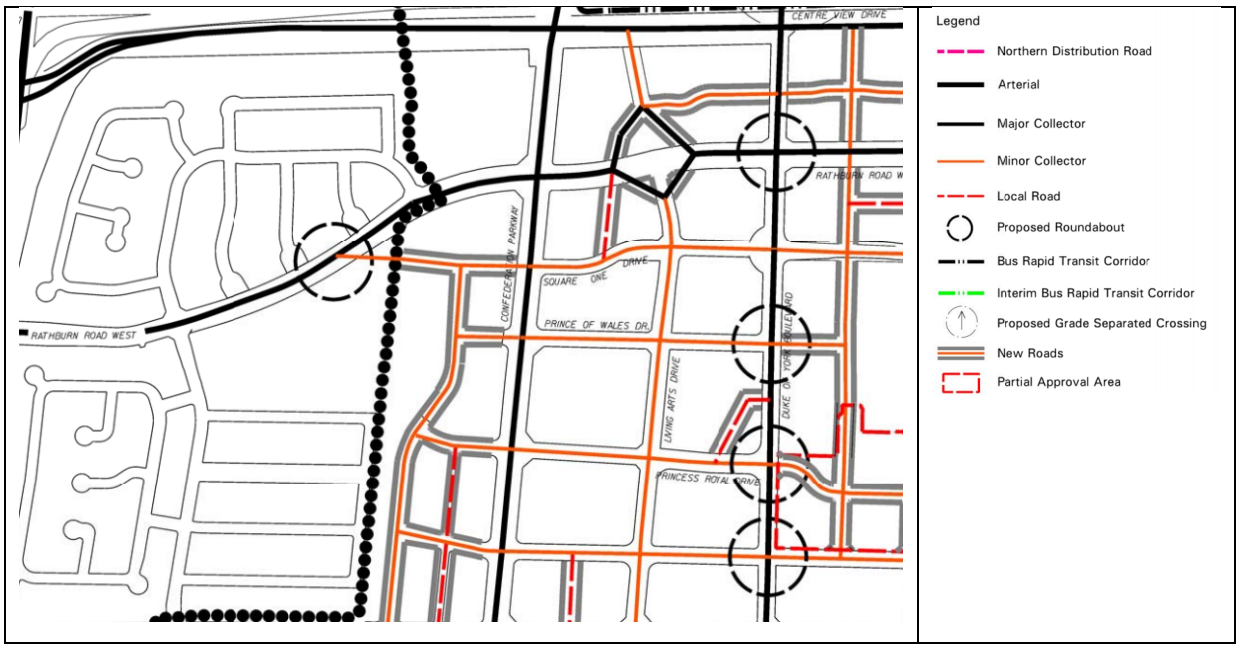
1.3.3 Downtown Core Local Area Plan – Official Plan Amendment 8 (Under Appeal)

The *Downtown Core Local Area Plan* (Official Plan Amendment 8) forms part of the Mississauga Official Plan, and contains policies and schedules particular to the Downtown Core. The extension of Square One Drive between Confederation Parkway and Rathburn Road West is identified on Schedule 2 – Downtown Core Local Road Network and Classification (please refer to **Figure 3**).

The proposed improvements within the Square One Drive study area will contribute to the goals and objectives of the Downtown Core Local Area Plan which include:

- creating a vibrant downtown for Mississauga by strengthening the transportation system, improving linkages/access, and enhancing the pedestrian experience;
- creating a fine-grained, well-connected road network that supports multiple modes of transportation; and
- developing an urban environment that includes high-quality public spaces, such as parks, pedestrian friendly sidewalks, outdoor seating areas, etc.

Figure 3: Schedule 2 Long Term Road Network and Classification (Downtown Core Local Area Plan 2015)

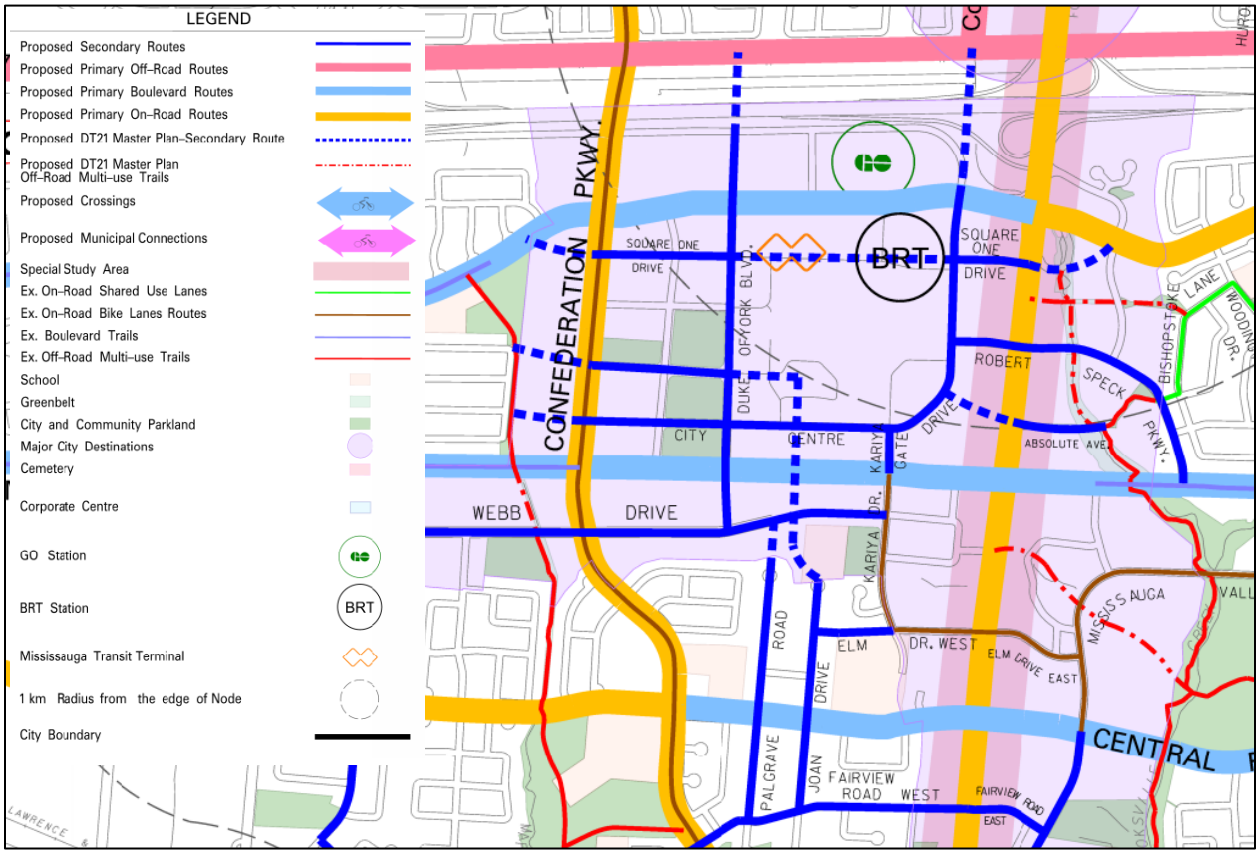


1.3.4 Mississauga Cycling Master Plan

The Mississauga Cycling Master Plan (2010) includes the identification of primary and secondary bicycle route networks and supportive infrastructure, such as bicycle parking and other trip-end facilities. Primary routes form the backbone of the cycling network, and provide the most direct access to key destinations, including higher order transit stations. Facilities within a primary route may include bicycle lanes, shared-use lanes, and multi-use trails. Secondary routes provide links between primary routes, and serve a more community-focused function. Facilities within a secondary route may include bicycle lanes, shared-use lanes (i.e. sharrows or signed routes). Proposed cycling facilities within the study area identified in the *Mississauga Cycling Master Plan* (2010) include a secondary route along Square One Drive, connecting to a primary route on Rathburn Road and existing on-road bicycle lanes on Confederation Drive, as shown on **Figure 4.**

Confederation Parkway currently has painted, 1.7 m wide bicycle lanes in the study area. Additionally, a shared boulevard multi-use trail (MUT) is situated along the south/southeast boulevard of Rathburn Road West.

Figure 4: Proposed Cycling Route Network (Mississauga Cycling Master Plan Map 5-2 2010)



1.3.5 2014 Future Directions - Master Plan for Parks and Forestry

The Parks and Forestry Master Plan (2014) serves to guide Mississauga's decisions regarding sustainable planning and management of parks and natural areas for continued enjoyment by residents and visitors. The Plan provides a number of recommendations, from parkland dedication ratios for new development in different areas of the City, to strategies for the location and acquisition of City-owned parkland. The Square One Drive improvements will support the objectives of the Master Plan by recognizing the importance of street design to the success and quality of life in the downtown, connecting to and extending the function of the open space system, providing safe and attractive connections for pedestrians and cyclists.

1.3.6 Metrolinx Hurontario Light Rail Transit Project

An Environmental Assessment was completed in 2014 by the City of Mississauga, The City of Brampton, and Metrolinx for the introduction of Light Rail Transit (LRT) along the Hurontario-Main Street Corridor. The high frequency LRT service will run between the Port Credit GO Station through Downtown Mississauga to the Gateway Terminal at Steeles Avenue in Brampton. Construction is expected to begin in 2018 and anticipated to be completed by 2022. The Square One Drive Class EA considers the implementation of the Hurontario LRT, and its associated impacts on future transit connections, and pedestrian, cyclist, and vehicle traffic patterns.

2.0 STUDY APPROACH

2.1 ENVIRONMENTAL ASSESSMENT ACT OF ONTARIO

The Ontario *Environmental Assessment Act, 1990* (EAA) identifies two types of environmental assessment and approval processes:

- Individual EAs are large complex projects with extensive potential for environmental impacts for which a Terms of Reference and an individual EA are carried out and submitted to the Ministry of the Environment and Climate Change (MOECC) for approval.
- Class EAs are projects which are approved subject to compliance with the approved Class EA process. Projects proceed if this approval process is followed and the proponent has complied with EAA requirements.

To address the needs and justifications for the proposed project, as well as develop and evaluate a range of Alternative Solutions, the City has complied with the requirements of the Municipal Engineers Association Municipal Class EA document (2000, as amended in 2015). The Municipal Class EA process is approved under the EAA.

2.1.1 Municipal Class Environmental Assessment Process

A Municipal Class EA is described as an approved planning process for an undertaking (project) that must be followed to meet the requirements of the EAA. Since environmental impacts vary from project to project, Class EA projects are classified in terms of the following schedules:

Schedule A – Normal or emergency operational and maintenance activities with minimal environmental effects, and so are pre-approved;

Schedule A+ – Also pre-approved, but requiring public notice prior to construction;

Schedule B – Improvements and minor expansions to existing facilities with potential for some adverse environmental impacts, and so requires a screening process including consultation prior to construction; and,

Schedule C – Construction of new facilities and major expansion of existing facilities.

The extension of Square One Drive is considered a Schedule "C" project given that the, and expected to cost more than $2.4 million to construct".

As illustrated in **Figure 5**, the Municipal Class EA document outlines a five (5) phase planning and design process. Each phase is summarized below:

Phase 1 - Identify the problem and/or opportunity to be addressed.

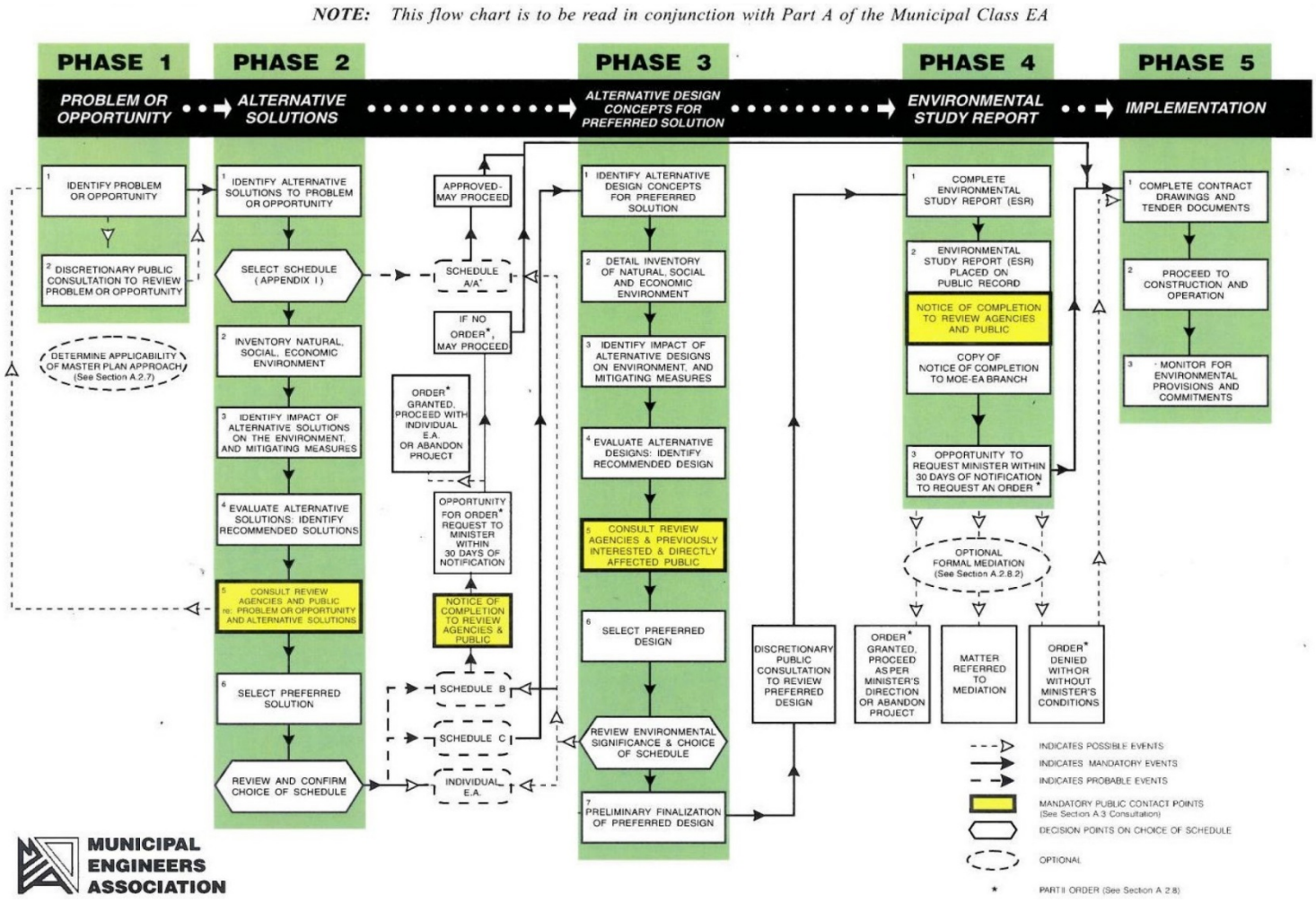
Phase 2 - Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and determine the preferred solution considering public and regulatory agency input.

Phase 3 - Examine alternative methods of implementing the preferred solution, considering the existing environment, public and regulatory agency input, anticipated environmental impacts, and methods of minimizing negative impacts and maximizing positive impacts.

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

Phase 5 - Complete contract drawings and documents, and proceed to construction and operation. Monitor construction and operation where necessary for adherence to environmental provisions and mitigation. Phase 5 is not part of this study. This phase will be undertaken immediately prior to construction.

Figure 5: Municipal Class EA Process



This study is classified as a 'Schedule C' project, which involves completion of Phases 1 through 4 of the planning and design process (Phase 5 will be completed prior to construction).

The filing of the ESR for public review completes the planning and preliminary design stage for Schedule 'C' projects. The ESR is available for public review for a thirty (30) calendar day period commencing **November 6, 2017**. A Notice of Completion is published to announce the review period. Copies of the ESR are available for review and comment until **December 6, 2017**, at the following locations during normal business hours, and online at the City of Mississauga website:

The City of Mississauga **Office of the City Clerk** 300 City Centre Drive, 2nd Floor Mississauga, ON L5B 3C1 Telephone: 905.615.4311 Monday-Friday: 8:30 am to 4:30 pm Weekends: Closed	**Central Library** 301 Burnhamthorpe Road West Mississauga, ON L5B 3Y3 Telephone: 905.615.4745 Monday-Thursday: 9:00 am to 9:00 pm Friday: 9:00 am to 6:00 pm Saturday: 9:00 am to 5:00 pm Sunday: 1:00 pm to 5:00 pm

If no outstanding concerns are brought forward during the review period, the City of Mississauga may proceed to the construction stage, Phase 5 of the Class EA process, when considered appropriate.

If members of the public, interest groups and/or government agencies feel that their concerns have not been addressed through the Class EA study process, there is a provision that allows for changing the status of the project from a Schedule 'C' Class EA to an Individual Environmental Assessment. During the 30-day review period, the affected party(ies) may request the Minister of the Environment and Climate Change to make an order for the project to comply with Part II of the EA Act (referred to as a Part II Order), which addresses Individual Environmental Assessments. The Minister of the Environment and Climate Change determines whether this is necessary, and the decision in this regard is final. If the Part II Order is granted, the project cannot proceed unless an Individual Environmental Assessment (IEA) is prepared. The IEA is subject to a formal government review and approval, and may result in a formal public hearing. If the Part II Order is denied, the project may proceed, with or without further conditions.

Anyone wishing to request a Part II Oder must submit a written request within the thirty (30) calendar day review period, to the Minister of the Environment and Climate Change with a copy to the Director, Environmental Approvals Branch and the City of Mississauga Project Manager:

Honorable Chris Ballard **Minister of Environment and Climate Change** 77 Wellesley Street West, 11th Floor Toronto, Ontario M7A 2T5 E-mail: minister.moecc@ontario.ca	**Director, Environmental Approvals Branch** **Ministry of the Environment and Climate Change** 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5
Dana Glofcheskie, P. Eng. **Project Manager, City of Mississauga** 201 City Centre Drive, Suite 800 Mississauga, ON L5B 2T4 Tel: 905-615-3200, ext. 8243 Email: dana.glofcheskie@mississauga.ca	

2.2 STUDY OBJECTIVES

The objectives of this Municipal Class EA study are to:

- Improve access to, from and within Downtown Mississauga;
- Support multi-modal transportation and encourage walking, cycling and transit use in Downtown Mississauga;
- Create a finer street grid in Downtown Mississauga with an urban scale, more walkable blocks, new routing options for local trips and better transit access;
- Implement the urban objectives, key principles, and street framework outlined in the City's Downtown21 Master Plan and MOPA8/Downtown Core Local Area Plan;
- Encourage multi-modal transportation design that incorporates future urban expansion;
- Undertake individual technical studies required by the Class EA process for Schedule C projects;
- Evaluate different environmental impacts of Alternative Solutions and designs;
- Consider opportunities to improve roadways, intersections, and pavement including transit stops, sidewalks, cycling lanes, streetscaping, public art, noise barriers, and natural features to satisfy City standards;
- Identify a consensus-based solution to the existing deficiencies and future needs on this section of Square One Drive and intersecting roads;
- Coordinate with current and proposed projects and studies near the Project;
- Employ best project management practices and maintain a record of all documentation, communications, decisions, and consultation from the Class EA process;
- Elicit participation from public and potential stakeholders from Project commencement forward;
- Follow a defined timeline to Project completion for the Municipal Class EA process and preliminary design;
- Plan the preliminary design in accordance with City and other applicable standards;
- Develop a preliminary design that incorporates commitments to protection of the surrounding natural and socio-economic environment by mitigating the adverse effects of road reconstruction, as well as taking advantage of the opportunities it offers; and,
- Obtain approvals and other construction prerequisites (i.e. property needs, utility relocations, permitting requirements, etc.) in a timely manner to permit detailed design and construction to proceed in a way that addresses the identified needs and deficiencies.

2.3 STUDY TEAM ORGANIZATION

This study was carried out by a diverse team consisting of engineering, planning and environmental services staff from the City, Stantec and its subconsultants.

3.0 CONSULTATION

One of the objectives of the Municipal Class EA process is to ensure that project planning considers the potential effects to all aspects of the environment. Engaging affected parties is key to the planning process to ensure that the interests and concerns of the public and affected groups are identified, and to provide a mechanism for the City to define and respond to issues before key decisions are made. A summary of the consultation activities undertaken as part of this study are described herein. In addition, a complete listing of the agencies, organizations, utilities, and other stakeholders contacted as part of this study is provided in **Appendix A.1** of this ESR.

3.1 STUDY WEBSITE

A website for the study was established through the City of Mississauga's website at study initiation. Information related to the study was posted to this website during the study process and updated accordingly, including notification of Public Information Centres (PICs), copies of material presented at the PICs and technical reports. The website address is: http://www.mississauga.ca/ squareoneclassea.

3.2 STUDY EMAIL ADDRESS

An opportunity for users to become part of the study mailing list and/or submit their comments was available through a study email address (squareoneclassea@stantec.com). The study email address was provided on all study notifications and presented at as part of each public consultation event.

3.3 STUDY CONTACT LIST

A study contact list, comprising residents, businesses, utilities, Indigenous community representatives, and agencies that may have an interest in this project, was developed at the initiation of the study. This list was updated regularly based on feedback received throughout the duration of the study.

3.4 STUDY NOTIFICATIONS

Four separate notifications were distributed via mail/email at key points in the study to those indicated on the study mailing list, and to those who had expressed an interest in the project. In addition, all residents, tenants and business owners located within 300 m of the study received all study notifications. Each notification was also published in 2 separate issues of the Mississauga News and posted on the study website. A copy of all study notifications is provided in **Appendix A.1** of this ESR.

3.4.1 Notice of Study Commencement

A notice signifying the initiation of the study was sent to those indicated on the study mailing list on March 31, 2016. The notice was also advertised in the Mississauga News on March 31, 2016 and April 7, 2016, and posted on the City's website. An invitation for interested parties to

complete an introductory online survey on the Project website was included as part the notice, as described in Section 3.5.

3.4.2 Notice of PIC #1

A notice of PIC #1 was sent to those included on the study mailing list on June 9, 2016. The notice was advertised in the Mississauga News on June 9, 2016 and June 16, 2016, and posted on the City's website.

3.4.3 Notice of PIC #2

Notice of PIC #2 was sent those included on the study mailing list on November 3, 2016. The notice was also advertised in the Mississauga News on November 3, 2016 and November 10, 2016, and posted on the City's website.

3.4.4 Notice of Study Completion

The Notice of Study Completion was issued to those included on the study mailing list on November 1, 2017. The notice was also advertised in the Mississauga News on November 2 and November 9, 2017, and posted on the City's website.

3.5 PUBLIC INFORMATION CENTRES

Public Information Centre #1 – PIC #1 was held on June 22, 2016, from 5:30 pm to 8:00 pm at the Mississauga Civic Centre in the Great Hall, 300 City Centre Drive, Mississauga, Ontario. The PIC was held in a drop-in format to allow members of the public to view study information, including the project background, the Municipal Class EA process, Alternative Solutions considered and associated criteria, evaluation of alternatives and the recommended alternative. Members of the Project Team were available to discuss and/or respond to any questions or comments. Following the PIC, the display material and a comment form was also placed on the City's website. Further details related to PIC #1 are provided in Section 6.3.5.

Public Information Centre #2 – PIC #2 was held on November 17, 2016, from 6:00 pm to 8:00 pm at the Mississauga Civic Centre in the Great Hall, 300 City Centre Drive, Mississauga, Ontario. The PIC gave interested stakeholders the opportunity to view various materials and documents for this study, including the alternative design concepts and evaluation criteria/matrix, or provide comments on the environmental impacts and mitigation measures. Following the PIC, the display material and a comment form was also placed on the City's website. Further details related to PIC #2 are provided in Section 7.3.1.

A summary of each PIC event is provided in Appendix A.2 of this ESR.

3.6 PUBLIC SURVEY

A public online survey was offered as part of study initiation. Members of the public were invited to participate in the survey online and/or via a hard copy, if request by a member of the study team. In total, twenty-nine (29) people participated in the online survey. A copy of the public online survey, and associated summary of results, is provided in **Appendix A.3** of this ESR.

3.7 STAKEHOLDER CONSULTATION

As noted in Section 3.3, a list of the agencies contact during the course of this study is provided in Appendix A.1. A copy of all correspondence received from agencies, and associated responses from members of the Project Team, are included in **Appendix A.4** of this ESR.

3.7.1 Stakeholder Meetings

Individual agency meetings were held during the initial stages of the study to introduce the project and discuss potential issues, concerns and property acquisitions, as described herein. A copy of the minutes from each stakeholder meeting is included in **Appendix A.5** of this ESR.

3.7.1.1 Stakeholder Meeting #1

A meeting with Peel Condominium Corporation (PCC) 417 was held on February 9, 2016, at 330/350 Rathburn Road West. The purpose of the meeting was to introduce and discuss project details, given the proximity of the project study area in relation to the PCC 417 property (i.e. 330/350 Rathburn Road West). During the meeting, it was noted that the project would not likely require acquisition of any portion of the PCC 417 property.

3.7.1.2 Stakeholder Meeting #2

A meeting with Amacon was held on February 11, 2016 to introduce the project and discuss the potential effects of the project in association with the future development of Parkside Village. The potential relocation of access to the property was discussed during this meeting.

3.7.1.3 Stakeholder Meeting #3

A meeting with Alectra (formerly Enersource) representatives was held at the utility's Mississauga offices on February 16, 2016. The purpose of the meeting was to introduce the project and discuss the potential impacts of the project on the utility's existing infrastructure within the study area and the potential requirement to relocate the 3 load centres currently located on-site in order to accommodate the project.

3.7.1.4 Stakeholder Meeting #4

A meeting with representatives of both Alectra Utilities (formerly Enersource) and Amacon was held at the City of Mississauga's offices on the morning of November 4, 2016. The purpose of this meeting was to provide a project status update, review the draft Alternative Design Concepts, and discuss the upcoming Public Information Centre (#2). The relocation of Alectra's load centres, as well as the reconfiguration of access to Alectra's existing substation, was also discussed.

3.7.1.5 Stakeholder Meeting #5

A meeting with PCC 417 and its representatives was held at 330/350 Rathburn Road West during the afternoon of November 4, 2016. The purpose of this meeting was to provide a project status update, review the draft Alternative Design Concepts, and discuss the upcoming Public Information Centre (#2).

3.8 INDIGENOUS CONSULTATION

The study area is located within and/or in proximity to the Traditional Territory of a number of Indigenous communities. As such, the following Indigenous communities and organizations were included on the study contact list:

- Chippewas of Georgina Island
- Hiawatha First Nation
- Curve Lake First Nation
- Haudenosaunee Confederacy
- Six Nations of the Grand River
- Mississaugas of Scugog Island First Nation
- Chippewas of Rama First Nation
- Metis Nation of Ontario
- Coordinator for the Williams Treaties
- Mississaugas of the New Credit First Nation
- Alderville First Nation
- Association of Iroquois and Allied Indians
- Curve Lake First Nation
- Beausoleil First Nation

The above Indigenous communities and organizations were circulated on all the study notifications, as described above. In addition, a letter was issued to these communities on March 22, 2017, to provide an update on the study and share information regarding the findings of the Stage 1 Archaeological Assessment (AA) carried out as part of the study, including the requirement to carry out further assessment and invitation to participate during the Stage 2 archaeological field assessment.

A copy of all correspondence carried out with Indigenous communities and organizations included in **Appendix A.6** of this ESR.

In response to the information sharing and invitation to participate in the Stage 2 archaeological field assessment, the Haudenosaunee Development Institute expressed an interest in providing an archaeological monitor. As such, the project archaeologists were joined by a representative of HDI on June 2, 2017. Representatives from the other communities contacted did not express an interest in participating in the field program.

A copy of the Record of Aboriginal Engagement is provided in **Appendix F,** Archaeological Assessment.

4.0 NEED AND JUSTIFICATION

4.1 TRANSPORTATION NETWORK ANALYSIS

An assessment of existing and future traffic conditions was completed for the study area as part of the City's review for the extension of Square One Drive. The assessment included an analysis of existing conditions, traffic forecasts, and operational performance for the study area, as described herein. A copy of the detailed Transportation and Traffic Analysis report is provided in **Appendix B** of this ESR.

4.1.1 Existing Road and Lane Configurations

Square One Drive lies within the jurisdiction of the City of Mississauga and is designated as a two-lane, east-west Minor Collector roadway, that provides access to the Square One Shopping Centre, the Mississauga City Centre Transit Terminal, Sheridan College (Hazel McCallion Campus), and high density residential buildings (condominiums). At present, the posted speed limit is 30 km/h in front of Sheridan College and 50km/hr elsewhere.

4.1.2 Existing Transit Routes

The study area roads services nine Mississauga MiWay transit and GO Transit routes. The City Centre Transit Terminal is located on Rathburn Road West east of Duke of York Boulevard at Station Gate Road. This bus terminal is a connection point for accessing various routes and GO stations. During the site visit on January 21, 2016, school buses were observed on Rathburn Road West, Elora Drive, and Confederation Parkway. Bus stops and shelters are located along the boulevards of the study area roads.

4.1.3 Active Transportation

Sidewalks are present on all roadway corridors in the study area and most are of sufficient width (i.e., 1.5m to 2.6 m) to allow two people to pass in opposite directions. Painted 1.7 m bicycle lanes are present on Confederation Parkway within the study area. A shared boulevard multi-use trail (MUT) is present in the study area, south of Rathburn Road West. Bicycle parking is available in the Downtown such as at Sheridan College. During a site visit conducted on January 21, 2016, low to moderate pedestrian activity was observed in all corridors, with the highest concentration of pedestrians observed entering and exiting the Sheridan College building located at Square One Drive and Duke of York Boulevard and in the vicinity of the City Centre Transit Terminal.

4.1.4 Existing Traffic Volumes

The City provided traffic data for the Square One Drive corridor study area. Traffic Survey Analysis Inc. was contracted to update a turning movement count at the intersection of Elora Drive at Rathburn Road West, in addition to performing a GPS travel time survey along Rathburn Road West. The traffic data consisted of intersection turning movement counts at eight study area locations for the morning, mid-day, and evening peak periods including volume, vehicle classification, and crossing pedestrians. The City provided signal timing plans and collision data.

4.1.5 Existing Traffic Analysis

An analysis of existing conditions was undertaken for the study area. Traffic operations were assessed with a micro-simulation model developed using PTV VISSIM 8.0. The results of these analyses are detailed in the following sections, and in greater detail in the Transportation and Traffic Analysis Report in **Appendix B**.

4.1.5.1 Intersection Analysis

An analysis of existing peak hour traffic was conducted for all intersections. The results of the analysis for the overall intersections are presented in Table 4-1. Intersections/movements with volume-to-capacity (v/c) ratios greater than 0.85 (i.e. at critical levels) have been highlighted.

Table 4-1: Existing Conditions – Intersection Peak Hour Level of Service Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	v/c	LOS	v/c
Elora Drive (west) / Rathburn Road West *Signalized*	B	12.6	B	15.1
Elora Drive (east) / Rathburn Road *Signalized*	A	9.1	B	18.6
Confederation Parkway / Rathburn Road *Signalized*	D	43.9	E	56.7
Living Arts Drive / Rathburn Road *Signalized*	B	17.1	C	30.4
Duke of York Boulevard / Rathburn Road *Signalized*	C	24.9	D	35.5
Confederation Parkway / Square One Drive *Unsignalized – Critical WBR movement*	A	8.9	F	163.9
Living Arts Drive / Square One Drive *Signalized*	B	12.3	B	12.5
Duke of York Boulevard / Square One Drive *Roundabout*	A	6.2	B	11.4

In the AM peak hour, the study area intersections operate at acceptable LOS. However, the Confederation Parkway at Rathburn Road West intersection southbound left turn movement is approaching capacity at LOS E. In the PM peak hour, several movements operate with long delays:

- At the Confederation Parkway at Rathburn Road West intersection, the westbound through and southbound left turn movements operate at LOS E and LOS F, respectively;
- At the Confederation Parkway at Square One Drive intersection, the westbound right turn movement operates at LOS F, primarily due to queue blockages from the Confederation Parkway at Rathburn Road West intersection; and
- At the Duke of York Boulevard at Rathburn Road West intersection, the eastbound left-turn movement operates at LOS F.

4.1.6 Future Travel Demand Forecasting

To develop traffic forecasts for the future 2021, 2031, and 2041 horizon years, model outputs were obtained from the City's EMME/3 travel demand forecasting model. The City uses the "Simplified GTA Model" which was developed by Peter Dalton Inc. The model is calibrated based on the 2011 Transportation Tomorrow Survey (TTS) and validated by several data sources including the TTS, cordon counts, and automatic traffic recorder traffic data.

Over the next 25 years, several changes to the transportation network are proposed both within and around the study area captured in the model. Through discussions with the City, transportation changes and their associated horizon years were identified (please refer to **Table 4-2**).

Table 4-2: Summary of Transportation Changes

Horizon Year	Summary of Transportation Changes
2021	• Extension of Living Arts Drive to Centre View Drive; • Hurontario Light Rail Transit with associated lane reductions on Hurontario Street, Duke of York Boulevard, Burnhamthorpe Road, and changes to intersection control and operations; and • New roadways associated with the Amacon, Rogers, and other future developments.
2031	• New roadways associated with new development south of Burnhamthorpe Road.
2041	• New north service road on the north side of Highway 403; • Extension of Duke of York Boulevard and City Centre Drive over Highway 403; • Removal of the loop ramp from eastbound Rathburn Road West to northbound Hurontario Street; • Extension of Centre View Drive to Hurontario Street; • Extension of Square One Drive east of Hurontario Street to Rathburn Road East; • Lane additions on Burnhamthorpe Road east of Hurontario Street; • Removal of Highway 403 EB off-ramp at Hurontario Street; and • Reconfiguration of Highway 403 westbound off-ramp at Mavis Road to connect to the new north service road.

Substantial development is expected within and adjacent to the study area within the next 25 years. Using volume plots from the City's model, traffic volumes were compared at a screenline level. Based on the predicted increase of population and employment values in the study area, modeled traffic volumes across each of the screenlines generally exhibited robust growth ranging from 1% to 2% per annum (p.a.) between each of the horizon years. The growth rates applied to the existing a.m. and p.m. peak hour traffic volumes follow:

- From 2011 to 2021, 1.5% p.a. for east-west and north-south traffic;
- From 2021 to 2031, 1.25% p.a. for east-west and north-south traffic; and
- From 2031 to 2041, 1.5% p.a. for east-west and north-south traffic.

4.1.7 2031 "Do Nothing" Scenario Analysis

The "Do Nothing" scenario assumes that the transportation network improvements planned for each horizon year in Section 4.1.6 will be implemented. It also assumes that Square One Drive will be partially extended as an access road to the Amacon development, that the unsignalized intersection of Confederation Parkway at Square One Drive will be converted to signal control, and that the traffic from the 300-350 Rathburn Road West condominium access on

Confederation Parkway will be reassigned to the extension of Square One Drive. A full extension of Square One Drive to Rathburn Road West is not proposed as part of this scenario.

The intersection analysis for the 2021 "Do Nothing" scenario shows that there are long delays at the intersections of Confederation Parkway and Duke of York Boulevard with Rathburn Road West in the p.m. peak hour. By 2031 and 2041, the delays at these intersections would be exacerbated. By 2031, the Confederation Parkway at Rathburn Road West intersection would experience long delays during the a.m. peak hour and the intersection of Living Arts Drive with Rathburn Road West would experience long delays during the p.m. peak hour. By 2041, the intersection of Duke of York Boulevard and Square One Drive would experience long delays during the p.m. peak hour. This is expected as traffic volumes will have increased without any additional capacity in the broader area of interest.

4.2 SAFETY PERFORMANCE REVIEW

A Safety Performance Review was conducted to identify existing safety issues and deficiencies, possible countermeasures to deal with these deficiencies, locations having higher-than-acceptable collision rates, and areas with the potential for increased collisions in the future. The Safety Performance Review is included in **Appendix B** of this ESR.

The Safety Performance Review consisted of two parts. The first component was a desktop review of the available collision data to determine the presence of any trends or patterns that could suggest a safety or operational deficiency in the existing road or intersection configuration. The second component was a thorough analysis of factors affecting safety performance during a site visit by an experienced transportation engineer, which included a review of roadway/intersection configuration/geometry, visibility, roadside conditions, traffic operations, and adjacent land use.

The desktop review was based on historical collision data for the years 2009-2013, and turning movement counts for each intersection within the study area, both of which were provided by the City.

The average number of collisions per year and the most-recent turning movement counts were used to determine the average collision rate per year per Million Vehicle Entering (MVE) for each major intersection within the study area. All intersections and mid-block locations in the study area had a collision rate less than 1.0 collision per MVE per year, which is generally considered to be within the "expected" or "normal" operating range.

The site assessment on April 9, 2016, noted items such as sight distance limitations/impairments, roadside hazards, and geometric issues that should be addressed in the development of the preliminary design. No immediate safety issues were recommended for rectification. While current horizontal and vertical geometrics are adequate to provide the necessary stopping sight distance for the design speed, intensification of urban conditions on study area roads will likely justify lowering the design speed from 70 km/h to 60 km/h. An existing transformer on the north side of the proposed Square One Drive extension corridor may require protection. The creation of additional intersections for the Project could lead to overlapping conflicting movements. Existing intersections and driveway entrance movements may need to be restricted or moved to a safer location. The key recommendation from the report was to upgrade all pedestrian facilities to meet current standards, as per the *Accessibility for Ontarians with Disabilities Act, 2005* and City of Mississauga Accessibility Design Handbook (City of Mississauga 2007).

4.3 PROBLEM AND OPPORTUNITY STATEMENT

Based on a review of both existing/projected traffic conditions, safety issues/deficiencies, and other existing conditions within the study area, the following issues and opportunities have been identified:

Problems

- There are limited connections within the study area roadway network to accommodate improved access to, from, and within downtown Mississauga, and access to future developments within or adjacent to the study area;
- Without network improvements and as both population and employment continues to grow in Mississauga, increased congestion will: reduce the safety of motorized and non-motorized roadway users; inconvenience motorists; increase emergency vehicle response times; create unnecessary vehicle emissions; and limit the City's ability to provide effective transit service; and
- Existing pedestrian and active transportation facilities require improvements to promote walkability and use of non-motorized methods of transportation within the study area.

Opportunities

- Implement a roadway network with smaller, urban-scale blocks that include wide sidewalks, streetscaping, and on-street parking, facilitating increased walkability, the creation of urban amenity space, and the development of active retail and other animated uses in adjacent developments;
- Implement a multi-modal transportation system that accommodates all roadway users, including pedestrians, cyclists, transit, and vehicles; and
- Create a gateway treatment to downtown Mississauga using landscaping, streetscaping, and public art to create an active public space.
- Implement additional travel lanes and intersection improvements to accommodate future traffic growth and increase traffic safety within the Square One Drive corridor;
- Improve the efficiency of access to, from, and/or through the broader study area, including destinations such as Square One Shopping Centre, future light rail transit and the City Centre Transit Terminal;
- Construct new sidewalks and/or multi-use trails to safely accommodate users of various modes of active transportation and further establish the route network laid out by the Mississauga Cycling Master Plan;
- Improve corridor aesthetics through improved landscaping, streetscaping, and lighting; and,
- Address other potential deficiencies identified within the corridor.

Based on the above, the Problem and Opportunity Statement established for this Project is as follows:

Improvements in the Square One Drive extension study area are required to provide better access to, from, and within downtown Mississauga; to accommodate future development adjacent to the study area; to facilitate the creation of a smaller, fine-grained street network; to further develop a multi-modal transportation system; and to create a gateway treatment to downtown Mississauga from the west.

5.0 EXISTING CONDITIONS

5.1 TRANSPORTATION

5.1.1 Existing Road Network

All roadways within the study area operate under the authority of the City. The only unsignalized intersection in the study area is at Square One Drive and Confederation Parkway. To properly assess the traffic impacts of a potential extension, an expanded study area was considered for the traffic analysis. This included the following intersections:

- Rathburn Road West at Elora Drive (east);
- Rathburn Road West at Elora Drive (west);
- Rathburn Road West at Confederation Parkway;
- Rathburn Road West at Living Arts Drive;
- Rathburn Road West at Duke of York Boulevard;
- Square One Drive at Living Arts Drive; and
- Square One Drive at Duke of York Boulevard.

Square One Drive consists of a two-lane east-west minor collector road consisting of a posted speed limit is 30 km/h in front of Sheridan College and 50km/hr elsewhere. An unsignalized intersection is formed with Confederation Parkway, with the westbound approach operating under stop control. Movements at this unsignalized intersection are limited to right-in/right-out as Confederation Parkway is divided by a median. A signalized intersection occupies its intersection with Living Arts Drive, with auxiliary left turn lanes provided on all approaches. Pedestrian signals and delineated crosswalks are provided on all approaches of the intersection. A single-lane roundabout occupies the intersection with Duke of York Boulevard. The northbound, southbound, and eastbound intersection approaches are all single lane approaches, whereas the westbound approach has an auxiliary right turn lane. Delineated pedestrian crosswalks are provided on all approaches of the intersection.

Rathburn Road West consists of a four-lane east-west road with two travel lanes in each direction. It is classified as a major collector with a posted maximum speed limit of 50 km/hr.

Elora Drive consists of a two-lane local road with one travel lane in each direction. It forms a crescent with Rathburn Road West ending at two signalized intersections approximately 425 m apart (i.e., at Elora Drive east and west). For the section of Elora Drive north of Rathburn Road West, there is no posted speed limit and the statutory 50 km/h speed limit governs. South of Rathburn Road West, the posted maximum speed limit on Elora Drive is 40 km/h as there is a school nearby. At Elora Drive (west), auxiliary left turn lanes are provided on all intersection approaches. Auxiliary right turn lanes are provided on the eastbound, westbound, and northbound approaches. At Elora Drive (east), auxiliary left turn lanes are provided on the eastbound and westbound approaches. The northbound intersection approach provides access for a residential condominium. Pedestrian signals and delineated crosswalks are provided on all approaches at both intersections.

Confederation Parkway consists of a four-lane north-south road with two travel lanes in each direction. It is classified as a major collector road with a posted maximum speed limit of 50 km/h.

A signalized intersection is formed with Rathburn Road West, with auxiliary left turn lanes, pedestrian signals, and delineated crosswalks provided on all intersection approaches.

Living Arts Drive consists of a two-lane north-south road with one travel lane in each direction. Within the study area, no maximum speed limit signage is evident and the statutory 50 km/h governs. The intersection with Rathburn Road West is signalized, with auxiliary left turn lanes provided on all intersection approaches. An auxiliary right turn lane is provided on the northbound approach. Pedestrian signals and delineated crosswalks are provided on all approaches at both intersections.

Duke of York Boulevard consists of a north-south road. From south of Square One Drive to Prince of Wales Drive, the roadway comprises four-lanes with one travel lane in each direction. On-street parking is permitted in the curbside lane. North of Square One Drive, Duke of York Boulevard transitions to two travel lanes in each direction. No posted maximum speed limit signage is evident within the study area, and the statutory 50 km/h governs. A signalized intersection is present at Rathburn Road West, with auxiliary left turn lanes provided on all approaches. Auxiliary right turn lanes are also provided on the eastbound and southbound intersection approaches. Pedestrian signals and delineated crosswalks are provided on all approaches at both intersections.

5.1.2 Transit

The study area services a number of Mississauga Transit and GO Transit routes (please refer to **Table 5-1**). The City Centre Transit Terminal is located on Rathburn Road West, east of Duke of York Boulevard and at Station Gate Road. This bus terminal is a key connection point and provides access to various routes and GO stations.

Table 5-1: Study Area Transit Routes

6 Credit Woodlands	20 Rathburn	61/61A Mavis
8 Cawthra	26 Burnhamthorpe	66 McLaughlin
9 Rathburn-Millers Grove	28 Confederation	91 Hillcrest-Cooksville GO

In addition, it is understood that Rathburn Road West, Elora Drive, and Confederation Parkway accommodate school bus service. Bus stops and shelters are located along the boulevards of study area roads.

5.2 NATURAL ENVIRONMENT

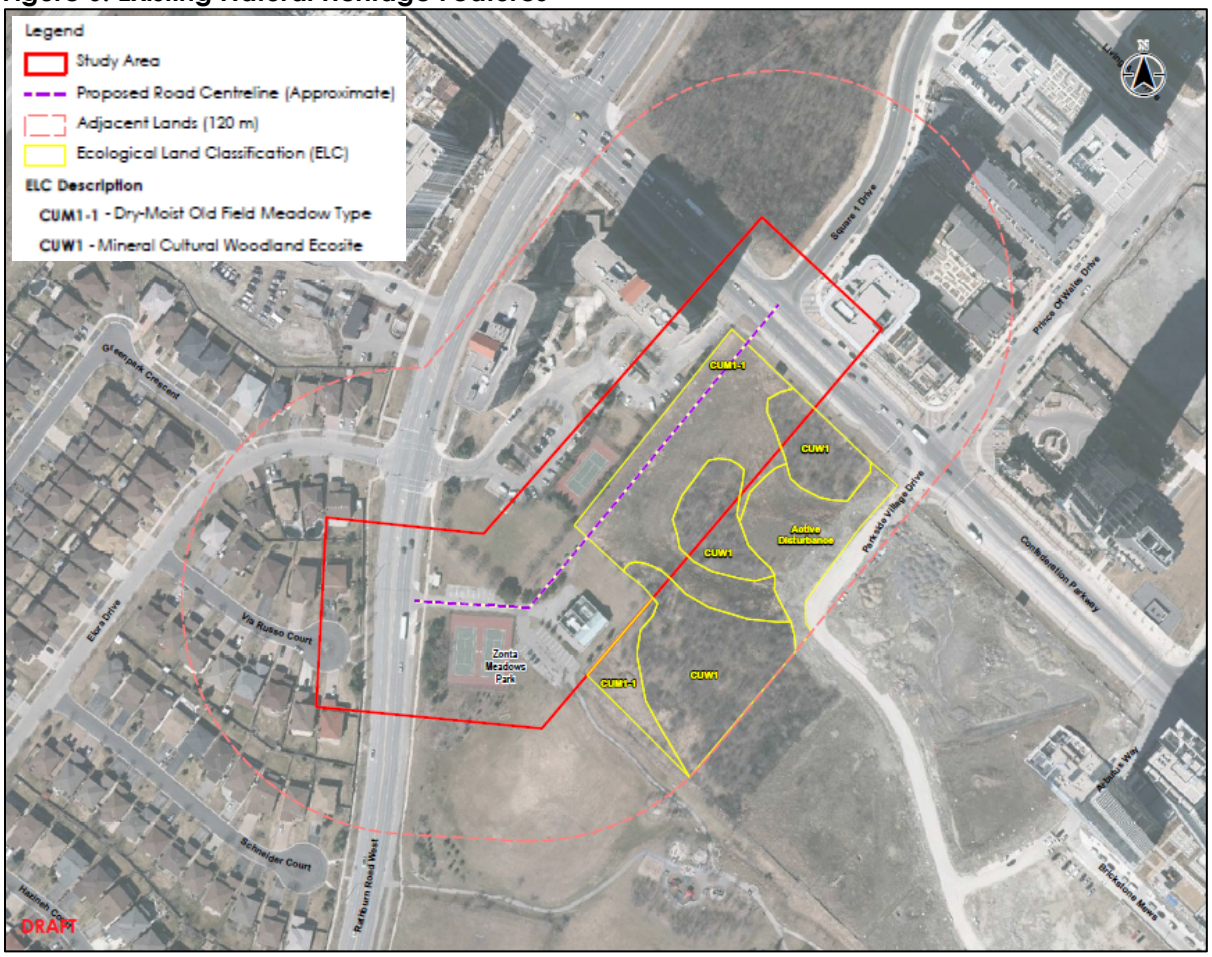
5.2.1 Natural Heritage

A review of natural heritage conditions was carried out within a 250 m radius of the study area to determine existing aquatic and terrestrial features that may be affected by road modifications. As part of the assessment, Stantec undertook a review of background information, including aerial photography, wildlife atlases, City Official Plan, MNRF Land Information Ontario base mapping, Geographic Information Systems (GIS) data, and available online resources. In addition, the background information review was supplement with two (2) field visits, each conducted in June 2017.

Based on the findings of the review, the following is noteworthy:

- There are no watercourses located within the study area; however, Mary Fix Creek is located approximately 50 m south of the study area.
- The study area is generally situated within a landscape that is common to urban environments. Two vegetation communities were identified in the study area (i.e., fragmented cultural woodland and cultural meadow) and are anticipated to support habitat for urban tolerant wildlife. **Figure 6** outlines the location of these vegetation communities.
- There are no recent records of Species at Risk (SAR) in the study area. A response received from the MNRF indicated that Butternut, Peregrine Falcon, and bat species have the potential to be present in the area; however, no candidate significant wildlife habitat features were identified during the desktop review and/or field investigations. However, Barn Swallow was observed be foraging in the study area at the time of the June 2017 field visit.
- No other designated natural areas, wetlands, SAR or provincially rare species (or their habitat) are present within the study area.

Figure 6: Existing Natural Heritage Features



A copy of the Natural Heritage Review provided in **Appendix C** of this ESR.

5.2.2 Physiography

The study area falls within the Peel Plain Physiographic Region. The Peel Plain is underlain by till containing large amounts of shale and limestone, which has been modified by a veneer of clay. Soils are sometimes well-drained; however, most are imperfectly drained.

5.2.3 Source Water Protection

The 2006 *Clean Water Act* (CWA) protects existing and future sources of municipal drinking water. As part of the CWA, vulnerable areas are delineated around surface water intakes and wellheads for every existing and planned municipal residential drinking water system that is in a Source Protection Area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) or surface water Intake Protection Zones (IPZs). According to the Source Protection Plan, no WHPAs are located within the study area. However, the study area is situated within and/or in close proximity to Intake Protection Zone (IPZ-2), an area defined as being on the water and land surrounding a municipal surface water intake. Since this system takes water from Lake Ontario, as opposed to an inland river or lake, none of the prescribed threats under the Clean Water Act (2006) can be considered significant. As such, no Source Protection Plan policies apply to the study area.

5.2.4 Tree Inventory and Assessment

A Tree Inventory and Assessment was completed as part of this study to identify individual tress that may be impacted by the project and document existing health, condition, diameter at breast height (DBH) and dripline radius. Field visits were conducted on April 26th and 27th, 2016, and June 19, 2017 to assess each tree.

At the time of the field visits, the study area primarily consisted of non-native trees species related to landscape plantings for the City park, streetscape, and within the condominium property. In general, the trees were predominantly mature and in good condition. Tree species encountered in the study area consisted of : Fir sp. (*Abies sp.*), Norway Maple (*Acer platanoides*), Red Maple (*Acer rubrum*), Hackberry (*Celtis occidentalis*), Ash (*Fraxinus sp.*), Honeylocust (*Gleditsia triacanthos 'inermis'*), Apple sp. (*Malus sp.*), White Spruce (*Picea glauca*), Colorado Blue Spruce (*Picea pungens 'glauca'*), Cherry sp. (*Prunus sp.*), Austrian Pine (*Pinus nigra*), Pear sp. (*Pyrus sp.*), English Oak (*Quercus robur*), Red Oak (*Quercus rubra*),European Buckthorn (*Rhamnus cathartica*), Staghorn Sumac (*Rhus typhina*), Willow sp. (*Salix sp.*), Eastern White Cedar (*Thuja occidentalis*), and Littleleaf Linden (*Tilia cordata*).

There were no rare or endangered species identified within the study area. The detailed results of the inventory are documented within the Arborist Report, provide in **Appendix D** of this ESR.

5.3 CULTURAL ENVIRONMENT

5.3.1 Built Heritage and Cultural Heritage Review

A Built Heritage and Cultural Heritage Review was undertaken to determine the potential for cultural heritage resources to be present within the study area. As part of the review, a desktop assessment of available and relevant mapping and data, and consultation with the Ministry of Tourism, Culture and Sport (MTCS) and the City of Mississauga was carried out to determine the extent or boundaries of potential heritages resource, if any. In addition, Stantec completed the MTCS Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage

Landscapes checklist. Based on the findings of the review, there are no potential and/or protected heritage resources within the study area.

A copy of the Built Heritage and Cultural Heritage Review memorandum is included in **Appendix E** of this ESR.

5.3.2 Archaeological Assessment

A Stage 1 Archaeological Assessment was carried out in accordance with MTCS *Standards and Guidelines for Consultant Archaeologists* (2011) to determine the potential for archaeological resources to be present within the study area. Based on the results of the assessment, selected portions are undisturbed in the study area and have the potential to contain archaeological resources, based on the following rationale:

- Located in proximity to a potable water sources (i.e., Mary Fix Creek);
- First Nations peoples previously occupied the area; and
- Located within 1 km of previously identified and registered archaeological sites.

A Stage 2 Archaeological Assessment was subsequently completed in June 2017 within the following portions of the study area: the undeveloped segment fronting Confederation Parkway; the manicured lawn; and the manicured parkland fronting Rathburn Road West.

As noted in Section 3.8, an archaeological monitor representing HDI participated in the Stage 2 field assessment. In total, approximately 1.2 hectares (ha) within the study area was subjected to Stage 2 field assessment, including hand excavation of 30 cm by 5 cm test pits at 5 m to 10 m intervals (as appropriate) and screening of excavated soils through 6 m mesh hardware cloth to facilitate the recovery of small artifacts. No archaeological resources were identified during the Stage 2 field work.

A copy of the Stage 1 and 2 Archaeological Assessment reports and Record of Indigenous Engagement is provided included in **Appendix F** of this ESR.

5.4 SOCIO-ECONOMIC ENVIRONMENT

5.4.1 Land Use

The study area is generally surrounded by low-density, residential land uses to the west, north of Rathburn Road West, public open space to the south, and mixed use, including high-density residential buildings, within the balance of the area. The study area falls within the designated Downtown Mixed Use area of the Downtown Core Local Area Plan (DCLAP). According to the DCLAP, Mixed Use development is encouraged to balance the Downtown Core's employment, retail commercial, and civic centre lands with residential development, entertainment, and business/tourism facilities. Notable uses within or adjacent to the project footprint include high-rise condominium buildings and Zonta Meadows Park.

5.4.2 Environmental Site Assessment

A Limited Phase One Environmental Site Assessment (Phase I ESA) was completed to identify areas of potential environmental concern within the study area. The Limited Phase I ESA included: a review of historical records, mapping, aerial photography, and city directories; a review of current records (i.e., environmental datasets); and a site visit, to identify former and

existing land uses and associated activities that have the potential to impact on-site soil and groundwater conditions in the study area.

Based on the findings of the assessment, the following areas of potential environmental concern were identified within the study area:

- The presence of hydro three (3) on-site transformers
- Registered waste generator of acid solutions containing heavy metals on-site

Based on a review of historic and existing activities within 250 m of the study area, no other areas of potential environmental concern were identified, with the exception of the potential presence of salt-impacted soil/groundwater given seasonal road de-icing activities on adjacent roadways.

A copy of the Phase One ESA is provided in **Appendix G**.

5.5 ENGINEERING ENVIRONMENT

5.5.1 Drainage and Stormwater Management

A drainage and stormwater assessment was prepared to document the existing drainage and water quantity and quality conditions in the study area, evaluate the relative impacts of the preferred design on the receiving surface water systems, and recommend measures to mitigate the potential impacts.

The study area lies within the Mary Fix Creek Subwatershed of the Credit River and is under the jurisdiction of the Credit Valley Conservation Authority (CVC). Surface water drainage generally flows from northeast to southwest, through parkland towards catch basins (CB) before flowing through storm sewers to a 1500 mm x 3000 mm concrete box culvert approximately 150 m to the southwest. Drainage from Rathburn Road West is picked up by CBs in the road and is conveyed to the same 1500 mm x 3000 mm concrete box culvert near Schneider Court. Although the water drains over grassed parkland, it does not receive any water quality control treatment before discharging into storm sewers.

The findings of the assessment are documented with the Drainage and Stormwater Management (SWM) Report, provided in **Appendix H** of this ESR.

5.5.2 Utilities

The study area roadways are occupied by a number of services, including: Bell Telephone; Enbridge Gas; Group Telecom; Rogers Cable; Telus; Alectra Hydro Mississauga; Region of Peel (Sanitary Sewer and Watermain). A hydro utility building and three (3) transformers associated with Alectra are situated at the northeast corner of Zonta Meadows park, between Confederation Parkway and Rathburn Road West. The existing utility configuration in the study area is illustrated in the Composite Utility Plan, provided in **Appendix I** of this ESR.

5.5.3 Geotechnical and Pavement

A preliminary geotechnical and pavement investigation was undertaken to determine the condition of the existing pavement structure, as well as the subsurface soil and groundwater conditions in the study area.

The condition of the existing pavement at the proposed intersections of the Square One Drive extension with Confederation Parkway is generally good, and at Rathburn Road West is good to fair with intermittent low to medium severity longitudinal and transverse cracking and low severity utility cut patching. The existing pavement on Confederation Parkway at the proposed intersection of Square One Drive Extension was observed to be in generally good condition

Five (5) boreholes and two (2) coreholes were advanced to depths ranging from approximately 1.3 m to 2.0 m below ground surface (bgs) as part of the drilling program. Subsurface conditions encountered during drilling program primarily consisted of clayey silt till underlain by weathered grey shale bedrock interbedded with limestone/siltstone at depths between 1.3 m and 1.8 m bgs. Groundwater was encountered at a depth of 0.6 m and 0.9 m below ground surface within two (2) of the boreholes.

The existing pavement structure of Rathburn Road West and Confederation Parkway is approximately 660 mm and 820 mm, respectively.

A copy of the Preliminary Geotechnical and Pavement Investigation Report is included in **Appendix J** of this ESR.

6.0 ALTERNATIVE SOLUTIONS

6.1 ALTERNATIVE SOLUTIONS CONSIDERED

The Project Team generated four Alternative Solutions to ensure that all feasible solutions to the identified problems and opportunities were given fair consideration. The Problem and Opportunity Statement identifies that road modifications in the study area are required to provide better access to, from, and within downtown Mississauga; to accommodate future development adjacent to the study area; to facilitate the creation of a smaller, fine-grained street network; to further develop a multi-modal transportation system; and to create a gateway treatment to downtown Mississauga from the west. As such, the following planning alternatives were identified:

Alternative 1: Do Nothing

Maintain existing transportation system conditions within the study area (i.e., no modifications);

Alternative 2: Improve Transit, Employ Transportation Demand Management (TDM) Measures

Improve access to, from, and within downtown Mississauga by discouraging single-occupant vehicles and encouraging transit, shifting demand to alternative modes of transportation, and encouraging carpooling;

Alternative 3: Improve Alternative East-West Routes

Widen existing adjacent parallel roadways, such as Burnhamthorpe Road West and Rathburn Road West; and

Alternative 4: Extension of Square One Drive

Extend Square One Drive as a two-lane street from Confederation Parkway to Rathburn Road West and construct new intersections with Confederation Parkway and Rathburn Road West.

It should be noted that modifications to the intersection of Rathburn Road West and the east end of Elora Drive (near Confederation Parkway) would include the removal of the existing traffic signals and extension of the existing median through the intersection to restrict it to only right turns in and out.

6.2 EVALUATION CRITERIA

An evaluation framework was developed in consideration of all aspects of the environment, as well as comments received during project commencement and confirmed in consultation with the public and other stakeholders at/following PIC #1. The existing environment was taken into consideration leading to a descriptive, qualitative assessment based on the following measures developed within each category, as outlined in Table 6-1.

Table 6-1: Evaluation Criteria and Associated Measures

Criteria	Measures
Socio-Economic Environment	• Streetscaping • Property Access • Property Impacts
Planning and Transportation	• Planning Objectives • Urban Environment • Network Connectivity • Pedestrian & Cycling Accommodation • Transit Services • Overall Safety
Cultural Environment	• Archaeological • Built Heritage/Cultural Landscape
Natural Environment	• Impacts to Existing Vegetation • Terrestrial Resources
Cost	• Capital Costs • Operation & Maintenance Costs

6.3 EVALUATION OF ALTERNATIVE SOLUTIONS

The alternatives were assessed using a reasoned argument approach. This methodology identifies the differences in net impacts associated with the various alternatives. The relative significance of the impacts is assessed and provides clear rationale for the selection of a recommended solution. The results of the assessment are discussed herein and summarized in **Table 6-2** below. In addition, the findings of the Evaluation of Alternative Solutions were presented as part of PIC#1.

6.3.1 Alternative 1: Do Nothing

Under this alternative, the transportation network improvements planned for each horizon year in Section 4.1.6 will be implemented. The "do nothing" alternative assumes that Square One Drive will be partially extended as an access road to the Amacon development, that the unsignalized intersection of Confederation Parkway at Square One Drive will be converted to signal control, and that the traffic from the 300-350 Rathburn Road West condominium access on Confederation Parkway will be reassigned to use the extension of Square One Drive. A full extension of Square One Drive to Rathburn Road West and other roadway improvements in the study area are not proposed as part of this scenario.

While the "do nothing" alternative has no additional impact on the cultural/natural environments and requires no additional capital expenditure, it would likely result in congestion and unacceptable traffic delays on Rathburn Road West, as well as other parallel and intersecting routes within the study area. The intersection analysis for the 2021 "Do Nothing" scenario shows that there are long delays at the intersections of Confederation Parkway and Duke of York Boulevard with Rathburn Road West in the p.m. peak hour. Increased forecast demands in the 2031 and 2041 horizon years exceed the transportation network's capacity, so the model results for these horizon years are unreliable. The overall trend, however, is that by 2031 and 2041, the delays at these intersections will be exacerbated. This is expected as traffic volumes will have increased without any additional capacity in the broader area of interest.

The "do nothing" alternative does not satisfy the planning objectives of the City. Further, it does not address (or result in improvements to) several other evaluation criteria, including pedestrian and cycling accommodation, transit services, network connectivity, planning objectives, and overall safety. Therefore, the "do nothing" solution is neither a sustainable nor desirable solution, and is unable to address the requirements of the Problem and Opportunity Statement (POS).

6.3.2 Alternative 2: Improve Transit, Employ TDM Measures

Under the Improve Transit and Employ TDM Measures alternative, transportation system operations in both the study area and downtown Mississauga would be improved through reductions in single-occupant vehicle usage and improvements to transit service.

Like the "do nothing" alternative, the TDM/transit alternative has no impact on either the cultural or natural environments, and has a relatively low capital cost. TDM techniques such as carpooling, public transit, cycling, walking, or flexible work hours will have a small effect on the reduction of traffic volumes in the study area. This range of options would target the reduction of vehicular traffic in downtown Mississauga with the ultimate objective of reducing the potential for future operational, environmental, and safety-related concerns.

The study area roads are served by nine Mississauga MiWay transit and GO Transit routes. The City Centre Transit Terminal is located on Rathburn Road West, east of Duke of York Boulevard at Station Gate Road. This bus terminal is a connection point for accessing various routes and GO stations. School buses were observed on Rathburn Road West, Elora Drive, and Confederation Parkway during the site visit. Bus stops and shelters are located along the boulevards of study area roads.

Both Mississauga MiWay transit and GO Transit have multiple routes serving the study area; ridership is currently strong and is expected to increase. Additionally, the *Mississauga Cycling Master Plan* has designated Rathburn Road West as a future "primary boulevard route", Confederation Parkway as a future "primary on-road route", and Square One Drive and Duke of York Boulevard as future secondary routes with proposed Downtown21 Master Plan secondary route developments (City of Mississauga 2010). These initiatives will serve to reduce the total rate of traffic growth within the broader area of interest; however, they cannot exclusively address the future traffic demands. Further, they do not facilitate the creation of either a fine-grained street network in downtown Mississauga or a gateway treatment to downtown Mississauga from the west. Therefore, on its own, this alternative is unable to fully address the goals of the POS.

6.3.3 Alternative 3: Improve Alternative East-West Routes

Under the "Improve Alternative East-West Routes" alternative, parallel (i.e. east-west) roadways/corridors adjacent to Square One Drive would be upgraded to improve the current operation of the transportation system in both the study area and downtown Mississauga. Major parallel routes adjacent to the Square One Drive study area include Burnhamthorpe Road West and Rathburn Road West.

Burnhamthorpe Road West is a six-lane major arterial roadway under the authority of the City, located approximately 600 m southeast of Square One Drive. As Burnhamthorpe Road West is currently a six-lane cross-section through downtown Mississauga, further efforts to widen the roadway to add the required capacity to accommodate both excess traffic demand and pedestrians/cyclists are likely less feasible than with Rathburn Road West or Square One Drive and would result in similar (if not greater) impacts in terms of property requirements and costs.

As described in Section 5.1.1, Rathburn Road West is a four-lane east-west minor arterial road located approximately 140 m northwest of Square One Drive. It is the second-longest east-west route through downtown Mississauga (the other route being Burnhamthorpe Road West). While it could be improved to accommodate excess traffic demand and provide safer facilities for both pedestrians and cyclists, this may require additional private and City-owned property acquisition and would not address the City of Mississauga's planning objectives for the study area.

Alternative 3's ability to improve traffic operations within the broader area of interest is limited without a relatively large capital expenditure. It would improve access to, from, and within downtown Mississauga; however, it does not contribute to the smaller, fine-grained downtown street network for which the City strives. Additionally, Alternative 3 has a limited potential to develop a multi-modal transportation system and does not provide opportunity for a gateway treatment to downtown Mississauga from the west. For these reasons, the "Improve Alternative East-West Routes" alternative is unable to satisfy the POS.

6.3.4 Alternative 4: Extension of Square One Drive

Under Alternative 4, Square One Drive would be extended west from Confederation Parkway to Rathburn Road West through the Zonta Meadows Park to accommodate the anticipated traffic volume growth in both the study area and downtown Mississauga, as well as to provide safer accommodation for both pedestrians and cyclists. These improvements would consist of:

- The extension of Square One Drive to form a new intersection controlled by either signal or roundabout with Rathburn Road West;
- Converting the unsignalized three-way intersection at Confederation Parkway and Square One drive to a signalized four-way intersection;
- Reassigning the access to the 330/350 Rathburn Road West condominium complex from Confederation Parkway to the Square One Drive extension;
- Creation of an urban space within Zonta Meadows Park with relocated parking area and tennis courts; and
- Provision of a multi-use trail, on-street parking, and sidewalks with streetscaping and landscaping.

Intersection analysis with optimized signal timings was undertaken for Alternative 4. Growth rates for roadways were developed using predicted population and employment growth rates for the City of Mississauga in the 2021, 2031, and 2041 horizon years. There is minimal difference between the calculated roadway growth rates in the scenario with no extension of Square One Drive and the scenario with the extension of Square One Drive. This suggests that the extension of Square One Drive would primarily serve as a collector road providing access to local developments, rather than an arterial road serving traffic travelling through the study area.

Table 6-2: Evaluation of Alternative Solutions

Category	Criteria	Definition	Alternative 1 Do nothing	Alternative 2 Improve Transit, Employ Transportation Demand Management Measures	Alternative 3 Improve Alternative East-West Routes Burnhamthorpe Road, Rathburn Road, etc.	Alternative 4 Extension of Square One Drive from Confederation Parkway to Rathburn Road West
Socio-Economic Environment	Streetscaping	*Provides opportunities to improve streetscaping and landscaping, as well as enhance the public realm.*	**Least preferred** - no opportunity to improve streetscaping and/or landscaping, or enhance the public realm.	**Least preferred** - no opportunity to improve streetscaping and/or landscaping, or enhance the public realm.	**Partially preferred** - limited opportunities to improve streetscaping and/or landscaping and enhance the public realm as part of improvements to alternative east-west routes.	**Preferred** - presents significant opportunities to improve streetscaping and landscaping, and enhance the public realm.
	Property Access	*Maintains, improves, and/or maximizes opportunities to improve access to adjacent residential land uses.*	**Least preferred** - no opportunity to improve access to adjacent residential land uses within the Study Area.	**Least preferred** - no opportunity to improve access to adjacent residential land uses within the Study Area.	**Least preferred** - no opportunity to improve access to adjacent residential land uses within the Study Area.	**Preferred** - presents opportunities to improve access to adjacent residential land uses within the Study Area.
	Property Impacts	*Requires acquisition of privately-owned property to accommodate construction of the proposed alternative.*	**Preferred** - no additional private property required.	**Preferred** - no additional private property required.	**Least preferred** - additional private property may be required to improve alternative east-west routes.	**Partially preferred** - acquisition of private property (owned by a third-party utility) would be required.
		Requires City of Mississauga-owned property to accommodate construction of the proposed alternative.	**Preferred** - no additional City of Mississauga property required.	**Preferred** - no additional City of Mississauga property required.	**Least preferred** - additional City of Mississauga property may be required to improve alternative east-west routes.	**Least preferred** - additional City of Mississauga property (Zonta Meadows Park) required.
Cultural Environment	Archaeological	*Potential for disruption of archaeological resources.*	**Preferred** - no impact on archaeological resources.	**Preferred** - no impact on archaeological resources.	**Partially preferred** - potential for limited impact to archaeological resources.	**Partially preferred** - potential for limited impact to archaeological resources.
	Built Heritage/ Cultural Landscape	*Potential for disruption of built heritage and cultural landscape features.*	**Preferred** - no impact on built heritage and cultural landscape features.	**Preferred** - no impact on built heritage and cultural landscape features.	**Partially preferred** - potential for limited impact to built heritage and cultural landscape features.	**Partially preferred** - potential for limited impact to built heritage and cultural landscape features.

Table 6-2: Evaluation of Alternative Solutions

Category	Criteria	Definition	Alternative 1 Do nothing	Alternative 2 Improve Transit, Employ Transportation Demand Management Measures	Alternative 3 Improve Alternative East-West Routes Burnhamthorpe Road, Rathburn Road, etc.	Alternative 4 Extension of Square One Drive from Confederation Parkway to Rathburn Road West
Planning & Transportation	Planning Objectives	*Meets/satisfies the goals and objectives of the City of Mississauga's Downtown 21 Master Plan, MOPA8/ Downtown Core Local Area Plan, Strategic Plan, Official Plan, and the Mississauga Cycling Master Plan.*	**Least preferred** - unable to address the City of Mississauga's planning objectives for the Study Area.	**Least preferred** - unable to address the City of Mississauga's planning objectives for the Study Area.	**Least preferred** - unable to address the City of Mississauga's planning objectives for the Study Area.	**Preferred** - fully addresses the City of Mississauga's planning objectives for the Study Area.
	Urban Environment	*Facilitates creation of: 1) an urban-scale street network in downtown Mississauga, with smaller block sizes that accommodate alternative routings for local trips (independent of modal choice); and, 2) a gateway into downtown Mississauga.*	**Least preferred** - unable to facilitate creation of either an urban-scale street network or a western gateway treatment for downtown Mississauga.	**Least preferred** - unable to facilitate creation of either an urban-scale street network or a western gateway treatment for downtown Mississauga.	**Least preferred** - unable to facilitate creation of either an urban-scale street network or a western gateway treatment for downtown Mississauga.	**Preferred** - facilitates creation of an urban-scale street network in downtown Mississauga, as well as creation of a western gateway treatment.
	Network Connectivity	*Facilitates improved access to, from, and within downtown Mississauga (independent of modal choice).*	**Least preferred** - unable to improve access to, from, and within downtown Mississauga.	**Least preferred** - unable to facilitate improved access to, from, and within downtown Mississauga.	**Partially preferred** - potential to facilitate improved access to, from, and within downtown Mississauga through increased capacity for private vehicles and transit. Limited improvements for other modes of transportation.	**Preferred** - potential to facilitate improved access to, from, and within downtown Mississauga for all modes of transportation.
	Pedestrian & Cycling Accommodation	*Encourages development of a multi-modal transportation system through improved integration of non-motorized modes.*	**Least preferred** - unable to encourage development of a multi-modal transportation system through improved integration of non-motorized modes.	**Partially preferred** - limited potential to encourage development of a multi-modal transportation system through improved integration of non-motorized modes.	**Partially preferred** - limited potential to encourage development of a multi-modal transportation system through improved integration of non-motorized modes as part of improvements to alternative east-west routes.	**Preferred** - potential to encourage development of a multi-modal transportation system through improved integration of non-motorized modes as part of the extension of Square One Drive.
	Transit Services	*Facilitates improved integration of transit services into the overall transportation system.*	**Least preferred** - unable to facilitate improved integration of transit services into the overall transportation system.	**Preferred** - facilitates improved integration of transit services into the overall transportation system.	**Partially preferred** - potential for limited improvements to the integration of transit services into the overall transportation system as part of improvements to alternative east-west routes.	**Partially preferred** - potential for limited improvements to the integration of transit services into the overall transportation system through the addition a new connection to the roadway network.

Table 6-2: Evaluation of Alternative Solutions

Category	Criteria	Definition	Alternative 1 Do nothing	Alternative 2 Improve Transit, Employ Transportation Demand Management Measures	Alternative 3 Improve Alternative East-West Routes Burnhamthorpe Road, Rathburn Road, etc.	Alternative 4 Extension of Square One Drive from Confederation Parkway to Rathburn Road West
Planning & Transportation (continued)	Overall Safety	*Improves roadway safety within the study area.*	**Least preferred** - unable to improve roadway safety within the study area.	**Partially preferred** - potential to facilitate limited improvements to roadway safety in the study area, by decreasing private vehicle traffic and increasing transit use.	**Partially preferred** - potential to facilitate limited improvements to roadway safety in the study area through improvements to alternative east-west routes (i.e. additional capacity for private vehicles and transit).	**Preferred** - facilitiates improvements to roadway safety within the study area through the addition of a new connection to the roadway network, with improved pedestrian and active transportation facilities.
Natural Environment	Existing Vegetation	*Impacts vegetation and/or the Green System (as defined by the City of Mississauga Official Plan).*	**Preferred** - no impact on existing vegetation.	**Preferred** - no impact on existing vegetation.	**Partially preferred** - limited impacts on existing vegetation.	**Partially preferred** - limited impacts on existing vegetation.
	Terrestrial Resources	*Impacts terrestrial species and their habitats.*	**Preferred** - no impact on existing terrestrial resources.	**Preferred** - no impact on existing terrestrial resources.	**Partially preferred** - limited impacts to existing terrestrial resources.	**Partially preferred** - limited impacts to existing terrestrial resources.
Cost	Cost	*Cost to construct, as well as maintain/continue effective operation.*	**Preferred** - no cost expenditure required.	**Partially preferred** - limited cost expenditure required.	**Least preferred** - potential for high cost expenditure.	**Least preferred** - potential for high cost expenditure.
Addresses Project Opportunity Statement?			**Unable to address the Project Opportunity Statement** Alternative 1 neither improves access to, from, and within downtown Mississauga nor contributes to the smaller, fine-grained street network that the City is striving for in the downtown. Additionally, Alternative 1 neither encourages development of a multi-modal transportation system nor provides opportunity for a gateway treatment to downtown Mississauga from the west.	**Partially addresses the Project Opportunity Statement** Alternative 2 neither improves access to, from, and within downtown Mississauga nor contributes to the smaller, fine-grained street network that the City is striving for in the downtown. Additionally, Alternative 2 has limited potential to develop a multi-modal transportation system and does not provide opportunity for a gateway treatment to downtown Mississauga from the west.	**Partially addresses the Project Opportunity Statement** Alternative 3 improves access to, from, and within downtown Mississauga; however, it does not contribute to the smaller, fine-grained street network that the City is striving for in the downtown. Additionally, Alternative 3 has limited potential to develop a multi-modal transportation system and does not provide opportunity for a gateway treatment to downtown Mississauga from the west.	**Fully addresses the Project Opportunity Statement** Alternative 4 improves access to, from, and within downtown Mississauga, and contributes to the smaller, fine-grained street network that the City is striving for in the downtown. Additionally, Alternative 4 supports a multi-modal transportation system and provides opportunity for a gateway treatment to downtown Mississauga from the west.
Recommendation			**Not carried forward**	**Not carried forward** Already implemented as part of current City of Mississauga policies.	**Not carried forward**	**Recommended** Selected as the Preliminary Preferred Alternative.

6.3.5 Public Information Centre #1

Public Information Centre (PIC) #1 was held in on June 22, 2016 to present and solicit feedback on the background of the study, the problems and opportunities in the study area and the identification and evaluation of the preliminary alternative solutions. Members of the project team were available to facilitate the understanding of information presented.

The Notice of PIC #1 was published in the Mississauga News and mailed to all agencies, Indigenous communities and other stakeholder identified on the project contact list, as well as all residents, tenants and business owners located within 300 m of the study area, and those who identified an interest in the study as part of study commencement. A copy of the PIC notice was also posted on the City website. Approximately 6,000 notices for PIC #1 were distributed to residents adjacent to the study area during the week of June 9, 2016.

Approximately 22 attendees signed in to the PIC. Seven written comment sheets were received during the PIC, and eight electronic surveys were received following the PIC. A number of comments from interested members of the public were also received by project team members via telephone and/or email following the PIC.

A copy of the material presented at PIC #1, as well as the comment forms, survey results and correspondence received at/following the PIC is provided in the PIC#1 Summary Report provided in **Appendix A.2** of this ESR.

6.4 SELECTION OF THE PREFERRED ALTERNATIVE SOLUTION

Based on the results of the evaluation, Alternative 4, Extension of Square One Drive, fully addresses the identified problems and opportunities by improving access to, from, and within downtown Mississauga, and contributing to the smaller, fine-grained downtown street network. It also supports a multi-modal transportation system and provides an opportunity for a gateway treatment to downtown Mississauga from the west. Alternative 4 addresses many of the selected evaluation criteria by creating an urban environment, meeting planning objectives, and improving pedestrian and cyclist accommodation, network connectivity, streetscaping, property access, and overall safety.

While Alternative 4 is anticipated to incur increased initial capital costs and impose a slightly higher impact on park greenspace, this alternative was selected as the Preferred Alternative Solution as it has the highest potential to accommodate a gateway treatment and support multi-modal transportation for both the Square One Drive corridor and the broader area of interest.

7.0 ALTERNATIVE DESIGN CONCEPTS

7.1 GENERATION OF ALTERNATIVE DESIGN CONCEPTS

The Preferred Alternative Solution for the study is the extension of Square One Drive, between Confederation Parkway and Rathburn Road West, and the construction of a new intersection at Rathburn Road West. When developing the resulting design concepts, alternatives were generated and modified to reflect both "hard" constraints (such as buildings/parking areas, watercourses, other roadways) and "soft" constraints (such as existing utilities, streetscaping, and landscaping).

The number of "hard" constraints to the Square One Drive extension are few, as the Square One Drive extension right-of-way is situated within existing public right-of-way and public open space (i.e., Zonta Meadows Park). Twin condominium buildings (330/350 Rathburn Road West), located at the corner of Confederation Parkway and Rathburn Road West, have access driveways, rear visitor parking lots, and a tennis court near the future right-of-way. Zonta Meadows Park also has tennis courts, a soccer field, and an associated parking lot south of the study area. An Alectra (formerly Enersource) facility is located within the central portion of the study area, west of Confederation Parkway, including load centres and underground facilities within the central portion of the study area. No watercourse crossings are present along the main Square One Drive alignment.

Other key considerations in developing the Alternative Designs included:

- Acquisition of privately-owned and City-owned property to accommodate the extension;
- Reconstruction of existing private entrances and parking areas;
- Relocation of existing utilities such as hydro poles, streetlighting, etc.;
- Removal of and replacement of existing street trees;
- Disruption of local traffic during construction; and,
- Capital cost of the roadway extension/improvements.

Given the above considerations, two Alternative Design Concepts were generated for the Preferred Solution:

Alternative 1 – Extend Square One Drive and construct a new traffic signal to control the intersection of Square One Drive extension with Rathburn Road West.

Alternative 2 – Extend Square One Drive and construct a roundabout to control the intersection of the Square One Drive extension with Rathburn Road West.

7.2 EVALUATION CRITERIA

The evaluation of Alternative Designs was carried out using the reasoned argument method described in **Section 6.3**, which evaluates the advantages and disadvantages of each alternative in response to each criterion.

The criteria and factors used to evaluate the Alternative Designs are presented in **Table 7-1.**

Table 7-1: Summary of Evaluation Criteria

Criteria	Measures
Socio-Economic Environment	• Streetscaping • Property Access • Property Impacts
Planning and Transportation	• Planning Objectives • Urban Environment • Network Connectivity • Pedestrian & Cycling Accommodation • Transit Services • Overall Safety
Cultural Environment	• Archaeological • Built Heritage/Cultural Landscape
Natural Environment	• Impacts to Existing Vegetation • Terrestrial Resources
Cost	• Capital Costs • Operation & Maintenance Costs

7.3 EVALUATION OF ALTERNATIVE DESIGNS

A brief summary of the evaluation of alternative design concepts is discussed herein. The detailed evaluation of alternative design is described herein and summarized in the evaluation matrix presented in **Table 7-3**.

7.3.1 Evaluation of Alternative 1

Alternative 1 improves access to, from, and within downtown Mississauga; supports development of a multi-modal transportation system; and, contributes to the smaller, fine-grained street network that the City of Mississauga is striving to create in the downtown core. However, the signalized intersection at Square One Drive and Rathburn Road West cannot accommodate creation of a gateway treatment to downtown Mississauga from the west, and can only facilitate limited roadway safety improvements on Rathburn Road West. Additionally, the existing signalized intersection at Rathburn Road West and Elora Drive (east leg) would be converted to a right-in/right-out, given its proximity to the new signalized intersection at Square One Drive and Rathburn Road West (i.e. approximately 90 m separation) and the resulting need to mitigate vehicular queue interaction between these 2 intersections. It should be noted that this conversion to a right-in/right-out would limit access to the downtown Mississauga road network by the local community.

7.3.2 Evaluation of Alternative 2

Roundabouts offer several benefits over signalized intersections, including improved safety due to lower speeds and a reduction in conflict points and angles, fewer delays, reduced environmental impact, less maintenance, and improved aesthetics by using the central island for public art and landscaping. Alternative 2 improves access to, from, and within downtown Mississauga; supports development of a multi-modal transportation system; and, contributes to the smaller, fine-grained street network that the City of Mississauga is striving to create in the downtown core. Additionally, through the implementation of a roundabout a Square One Drive and Rathburn Road West, Alternative 2 both provides opportunity for a gateway treatment to downtown Mississauga from the west and improves roadway safety on Rathburn Road West.

Similar to Alternative 1, Alternative 2 proposes the conversion of the existing signalized intersection at Rathburn Road West and Elora Drive (east leg) to a right-in/right-out, given its proximity to the new roundabout at Square One Drive and Rathburn Road West (i.e. approximately 90 m separation) and the resulting need to mitigate vehicular queue interaction between these 2 intersections. However, under Alternative 2, access to the downtown Mississauga road network by the local community would be preserved after conversion of the Rathburn Road West and Elora Drive (east leg) intersection to a right-in/right-out through the use of U-turn movements at the proposed Square One Drive and Rathburn Road West roundabout.

Design concepts related to Alternatives 1 and 2 are provided in **Appendix K** of this ESR.

7.3.3 Public Information Centre #2

PIC #2 was held on November 17, 2016 from 6:00 pm to 8:00 pm at the Mississauga Civic Centre. The intent of the PIC was to introduce the Project, POS, and Alternative Solutions to the public, interested stakeholders, and external agencies, and provide an opportunity for community members to meet the Project Team and provide feedback. Display boards were used to present information on the EA process, supporting background legislation and studies, existing conditions and potential safety improvements in the study area, projected traffic conditions, preliminary concepts for the extension of Square One Drive, the Project Team's evaluation of those concepts, and upcoming study activities. Members of the Project Team used large-format aerial photos to explain various aspects of the Project.

Approximately 55 people signed in to the PIC. In addition, the Project Team received three electronic and 20 written comment sheets before the requested submission deadline for comments (i.e., December 8, 2016).

7.3.4 Summary of Public Comments and Concerns

Several comments were received since commencement of this EA study, many of which focused on predominant themes that played an important role in the decision-making process. Table 7-2 provides a summary of the main comments received and a description of how these comments were incorporated into this EA study

Table 7-2: Summary of Public Concerns and Associated Consideration

Comment/Concern Theme	Consideration
Impacts to Zonta Meadow Park and associated amenities	• The City of Mississauga recognizes that Zonta Meadows Park is the largest recreational space near downtown Mississauga and is an important amenity to local community members. Accordingly, the City will be launching a redevelopment strategy for Zonta Meadows Park in the near future. Relocation/replacement of the tennis courts, parking lot, pathway system and servicing would be considered as part of this strategy.
Increase in vehicular traffic/encourages car use	• The extension of Square One Drive provides an important link in the larger, multi-modal transportation system. By designing a roadway that prioritizes walking, cycling, and other forms of active transportation, the City of Mississauga is furthering its goal of increasing the use of these modes of transportation throughout the downtown core • The City is currently working with Metrolinx to implement the Hurontario Light Rail Transit (LRT) project to improve both high-level mobility within Mississauga and connections to other areas outside Mississauga.
Safety /Accessibility Pedestrian (concerning school children, the elderly and public)	• A roundabout at Rathburn Road West and Square One Drive have number of advantages over a signalized intersection, including (but not limited to): increased safety for both motorists and pedestrians, reduced delay for motorists, decreased traffic speed, and decreased idling. • Pedestrian crossings are being planned to include a "splitter island" (median) to ensure pedestrians (and cyclists) cross only one direction of traffic at a time. It should also be noted that vehicles entering or leaving the roundabout are required to yield/stop for pedestrians at the crosswalk. • The City of Mississauga will explore additional measures to enhance the safety of pedestrian crossings, and the design would fully comply with the requirements of the Accessibility for Ontarians with Disabilities Act.
Traffic Infiltration	• Regarding the need to "shortcut" to avoid an obstacle, such as traffic congestion or traffic control (i.e. traffic signals, a stop sign, etc.), it should be noted that the analysis of future traffic conditions conducted for this study (i.e. for years 2021, 2031, and 2041) indicates that traffic operations at the proposed roundabout at Square One Drive & Rathburn Road West will be generally good, with minimal congestion.
Changes to Existing Access Patterns	• The Project Team recognizes that construction of the Square One Drive extension would represent a change for members of the local community; however, the Preferred Design will allow motorists continued access to their destinations with negligible change in overall travel time and more routing options. **Figure 7** and **Figure 8** provide an illustration of how motorists can navigate the study area roadway network following implementation of the Preferred Design.
Traffic Noise/Disturbance to Residences	• A traffic noise study was undertaken to analyze existing noise levels and predict future traffic noise levels generated by the operation of the preferred design, the findings of which indicated that the projected sound levels will not exceed the City's objective sound level of 60 dBA.

Table 7-2: Summary of Public Concerns and Associated Consideration

Comment/Concern Theme	Consideration
Safety Concerns Associated with Roundabout Use	• Based on the findings of the evaluation of alternative designs, the roundabout intersection at Square One Drive and Rathburn Road West is preferred over the signalized intersection based on its potential to improve overall traffic safety, facilitate creation of a gateway feature, maximize opportunities to access adjacent properties, enhance the public realm and implement the City's policy objectives for the Downtown Core. • The City is prepared to implement a public education campaign prior to, during, and after construction of the roundabout. Safe interactions between motorists, pedestrian, and cyclists will form one aspect of this campaign.
Light and Noise Pollution	• Existing mature trees and landscaping will be preserved to the extent possible. In addition, new trees will be replaced at 2:1 ratio along both the Square One Drive extension and Rathburn Road West, as well as 3:1 ratio within Zonta Meadows Park. • The design of the extension will be tailored to its function as a minor, local roadway and will include only 2 vehicular lanes (1 eastbound, 1 westbound), a multi-use trail and wide boulevards (with additional landscaping) to create a safe, efficient, and enjoyable environment for pedestrians, cyclists, and user of other modes of active transportation. While the extension would attract some traffic from nearby parallel routes (such as Rathburn Road West), it is not intended to serve as a vehicular thoroughfare for downtown Mississauga.
Air pollution	• An air quality assessment was carried out as part of this study to determine existing and predicted air quality levels generated by the operation of the preferred design. In general, the findings of the assessment indicated that overall air emissions associated with implementation of the project are expected to be of benefit in most considerations, when compared to'do nothing'.

Figure 7: Study Area Traffic Circulation Patterns Following Implementation (from 330/350 Rathburn Road West)

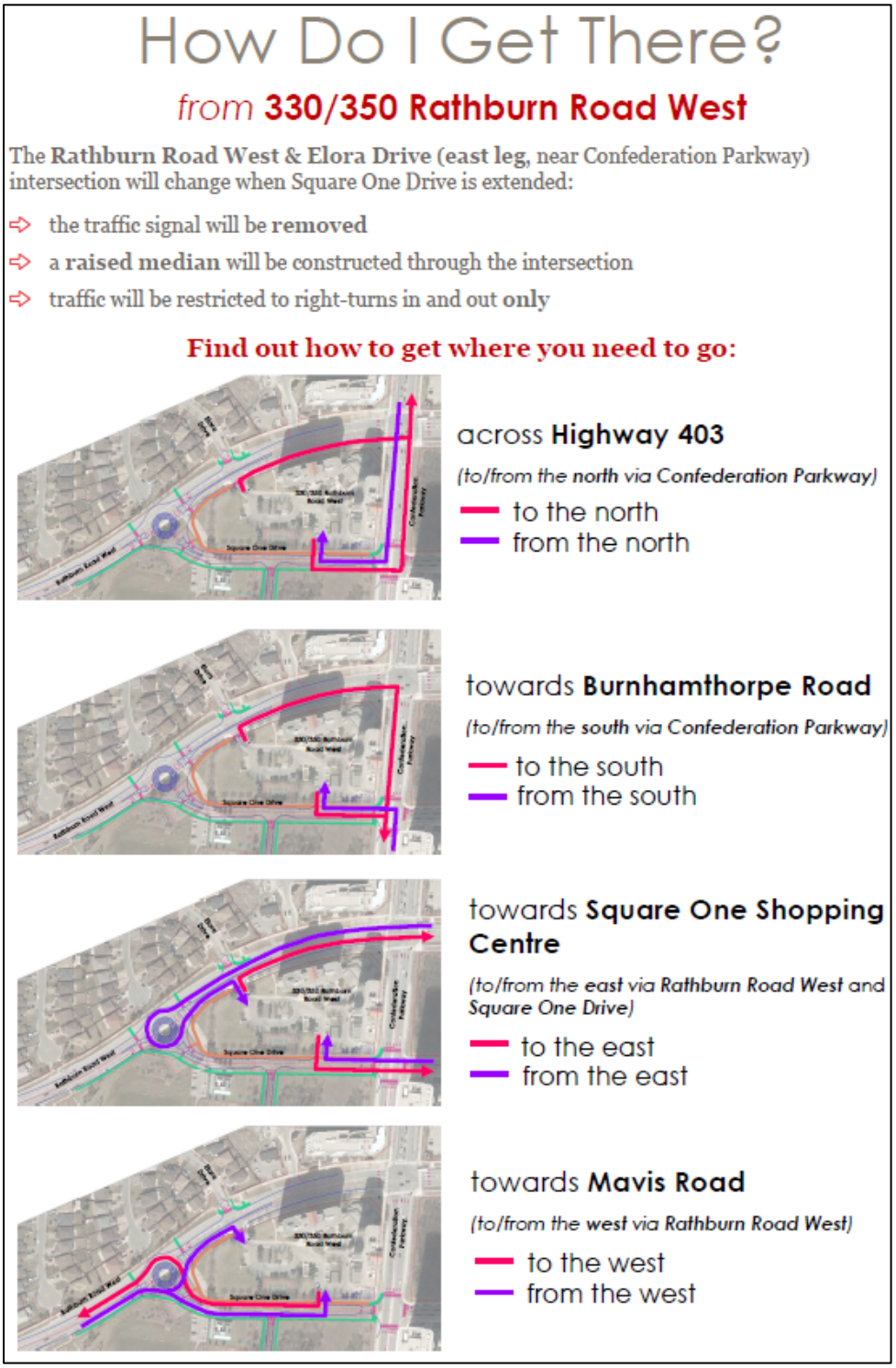


Figure 8: Study Area Traffic Circulation Patterns Following Implementation (from north of Rathburn Road West)

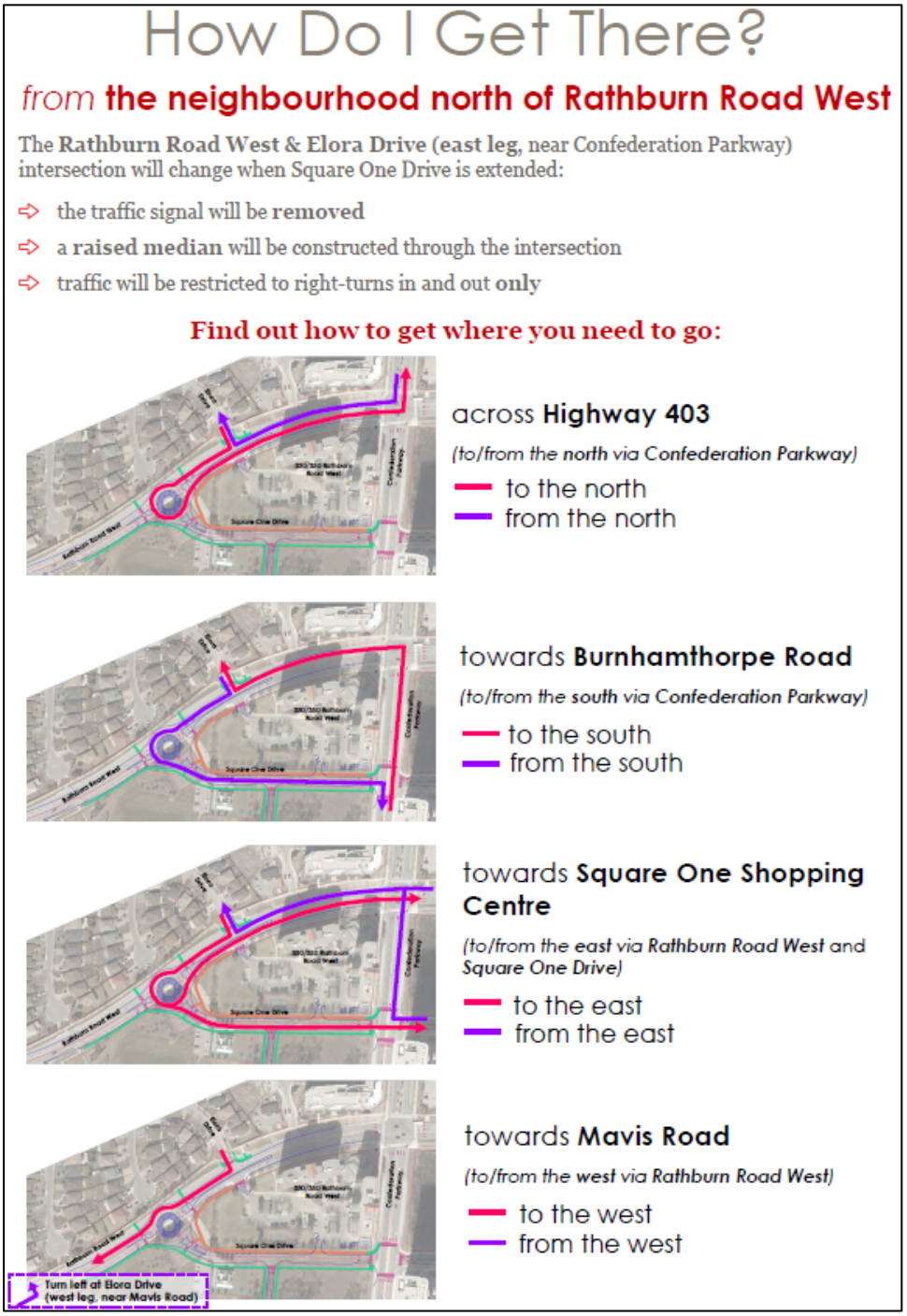


Table 7-3: Evaluation of Alternative Designs

Category	Criteria	Definition	Alternative 1 *Extension of Square One Drive, with:* - traffic signals at the intersection with Confederation Parkway - **traffic signals** at the intersection with Rathburn Road West	Alternative 2 *Extension of Square One Drive, with:* - traffic signals at the intersection with Confederation Parkway - a **roundabout** at the intersection with Rathburn Road West
Socio-Economic Environment	Streetscaping	*Provides opportunities to improve streetscaping and landscaping, as well as enhance the public realm.*	**Partially preferred** - presents opportunities to improve streetscaping and landscaping, as well as enhance the public realm. Unable to accommodate implementation of a western gateway feature to downtown Mississauga.	**Preferred** - presents significant opportunities to improve streetscaping and landscaping, as well as enhance the public realm through implementation of a western gateway feature to downtown Mississauga.
	Property Access	*Maintains, improves, and/or maximizes opportunities to improve access to adjacent residential land uses.*	**Partially preferred** - limited access improvements to adjacent residential land uses within the Study Area and relocation of access to 330 Rathburn required.	**Partially preferred** - limited access improvements to adjacent residential land uses within the Study Area and relocation of access to 330 Rathburn required.
	Property Impacts	*Requires acquisition of privately-owned property to accommodate construction of the proposed alternative.*	**Partially preferred** - anticipated to require acquisition of approximately 1,227 m^2 of privately-owned property.	**Partially preferred** - Anticipated to require acquisition of approximately 1,217 m^2 of privately-owned property.
		Requires City of Mississauga-owned property to accommodate construction of the proposed alternative.	**Least preferred** - anticipated to require approximately 2,125 m^2 of City of Mississauga-owned property.	**Least preferred** - anticipated to require approximately 2,325 m^2 of City of Mississauga-owned property.
Planning & Transportation	Planning Objectives	*Meets/satisfies the goals and objectives of the City of Mississauga's Downtown 21 Master Plan, MOPA8/ Downtown Core Local Area Plan, Strategic Plan, Official Plan, and the Mississauga Cycling Master Plan.*	**Partially preferred** - limited opportunity to address the City of Mississauga's planning objectives for the Study Area.	**Preferred** - fully addresses the City of Mississauga's planning objectives for the Study Area.
	Urban Environment	*Facilitates creation of: 1) an urban-scale street network in downtown Mississauga, with smaller block sizes that accommodate alternative routings for local trips (independent of modal choice); and, 2) a gateway into downtown Mississauga.*	**Partially preferred** - facilitates creation of an urban-scale street network, but unable accommodate creation of a western gateway feature to downtown Mississauga.	**Preferred** - facilitates creation of an urban-scale street network in downtown Mississauga, as well as creation of a western gateway feature.
	Network Connectivity	*Facilitates improved access to, from, and within downtown Mississauga (independent of modal choice).*	**Preferred** - potential to facilitate improved access to, from, and within downtown Mississauga for all modes of transportation.	**Preferred** - potential to facilitate improved access to, from, and within downtown Mississauga for all modes of transportation.

Table 7-3: Evaluation of Alternative Designs

Category	Criteria	Definition	Alternative 1 *Extension of Square One Drive, with:* - traffic signals at the intersection with Confederation Parkway - **traffic signals** at the intersection with Rathburn Road West	Alternative 2 *Extension of Square One Drive, with:* - traffic signals at the intersection with Confederation Parkway - a **roundabout** at the intersection with Rathburn Road West
Planning & Transportation	**Pedestrian & Cycling Accommodation**	*Encourages development of a multi-modal transportation system through improved integration of non-motorized modes.*	**Preferred** - potential to encourage development of a multi-modal transportation system through improved integration of non-motorized modes as part of the extension of Square One Drive (e.g., provides opportunity to incorporate new sidewalk and/or multi-use trail).	**Preferred** - potential to encourage development of a multi-modal transportation system through improved integration of non-motorized modes as part of the extension of Square One Drive (e.g., provides opportunity to incorporate new sidewalk and/or multi-use trail).
	Transit Services	*Facilitates improved integration of transit services into the overall transportation system.*	**Preferred** - potential to facilitate improved integration of transit services into the overall transportation system.	**Preferred** - potential to facilitate improved integration of transit services into the overall transportation system.
	Overall Safety	*Improves roadway safety within the study area.*	**Partially preferred** - facilitates limited improvements to roadway safety within the study area through the addition of a new connection to the roadway network and the construction of improved pedestrian/active transportation facilities.	**Preferred** - facilitates improvements to roadway safety within the study area through the addition of a new connection to the roadway network; the construction of improved pedestrian/active transportation facilities; and the, implementation of a roundabout. Roundabouts also have potential to reduce the severity of collisions by forcing veicles to travel more slowly, reducing conflict points and reducing conflict angles.
Cultural Environment	**Archaeological**	*Potential for disruption of archaeological resources.*	**Partially preferred** - low potential to impact archaeological resources.	**Partially preferred** - low potential to impact archaeological resources.
	Built Heritage/ Cultural Landscape	*Potential for disruption of built heritage and cultural landscape features.*	**Partially preferred** - limited potential to impact built heritage and cultural landscape features.	**Partially preferred** - limited potential to impact built heritage and cultural landscape features.
Natural Environment	**Existing Vegetation**	*Impacts vegetation and/or the Green System (as defined by the City of Mississauga Official Plan).*	**Partially preferred** - Anticipated to require removal of approximately 54 existing individual trees.	**Partially preferred** - Anticipated to require removal of approximately 61 existing individual trees.
	Terrestrial Resources	*Impacts terrestrial species and their habitats.*	**Partially preferred** - limited impacts to existing terrestrial resources.	**Partially preferred** - limited impacts to existing terrestrial resources.

Table 7-3: Evaluation of Alternative Designs

Category	Criteria	Definition	Alternative 1 *Extension of Square One Drive, with:* - traffic signals at the intersection with Confederation Parkway - **traffic signals** at the intersection with Rathburn Road West	Alternative 2 *Extension of Square One Drive, with:* - traffic signals at the intersection with Confederation Parkway - **a roundabout** at the intersection with Rathburn Road West
Cost	Cost	*Cost to construct, as well as maintain/continue effective operation.*	**Least preferred** - potential for initial high cost expenditure associated with impacts to Alectra property/utilities and higher maintainenance costs associated with signalized intersection, when compared to a roundabout intersection.	**Partially preferred** - potential for initial high cost expenditure associated with impacts to Alectra property/utilities; however lower maintainenance costs associated with roundabout intersection, when compared to a signalized intersection.
Addresses Project Opportunity Statement?			**Partially addresses the Project Opportunity Statement** Alternative 1 improves access to, from, and within downtown Mississauga; supports development of a multi-modal transportation system; and, contributes to the smaller, fine-grained street network that the City of Mississauga is striving to create in the downtown core. However, the signalized intersection at Square One Drive & Rathburn Road West cannot accommodate creation of a gateway treatment to downtown Mississauga from the west, and can only facilitate limited roadway safety improvements on Rathburn Road West.	**Fully addresses the Project Opportunity Statement** Alternative 2 improves access to, from, and within downtown Mississauga; supports development of a multi-modal transportation system; and, contributes to the smaller, fine-grained street network that the City of Mississauga is striving to create in the downtown core. Additionally, through the implementation of a roundabout a Square One Drive & Rathburn Road West, Alternative 2 both provides opportunity for a gateway treatment to downtown Mississauga from the west and improves roadway safety on Rathburn Road West.
Recommendation			**Not carried forward**	**Recommended** Selected as the Preliminary Preferred Design Alternative.

7.4 SELECTION OF THE PREFERRED ALTERNATIVE DESIGN

Following the completion of the public consultation component of the Alternative Design concept phase, the Project Team reviewed all comments received (i.e. from PIC #2, as well as all written comments from stakeholders/agencies and City staff during further internal review) and finalized the evaluation of the Alternative Design concepts. Based on the findings of the assessment, Alternative 2, Square One Drive extension with roundabout intersection at Rathburn Road West and right-in, right-out intersection at Rathburn Road West and the east leg of Elora Drive, be carried forward as the Preferred Alternative Design. This alternative was selected given its ability to improve traffic operations and roadway safety at the Square One Drive and Rathburn Road West intersection, and to provide a gateway treatment (through roundabout with public art) to Mississauga from the west.

8.0 PREFERRED DESIGN

8.1 ROAD DESIGN ELEMENTS

Following the evaluation process to select the Preferred Alternative Design, a preliminary design was developed and detailed (as shown in the preliminary design plans in **Appendix L**). This section describes the major elements of the recommended preliminary design.

The key features of the recommended preliminary design for **Square One Drive** are as follows:

- Extend the existing Square One Drive from Confederation Parkway connecting to Rathburn Road West;
- New signalized intersection at Confederations Parkway and the new Square One Drive extension, this will require partial removal of the existing centre median on Confederation Parkway;
- Relocation of existing access to 330/350 Rathurn Road West entrance from Confederation Parkway to the new Square One Drive Extension;
- Provide sidewalks with streetscaping and landscaping features, a 3.0 m – 3.5 m multi-use trail with a 0.5 m splash pad;
- On-street parking located on the south side of the Square One Drive Extension between the Alectra Utilities entrance and Confederation Parkway;
- Provide a new 2 lane Roundabout at the intersection of the new Square One Drive Extension and Rathburn Road West. Roundabout to feature public art in the centre;
- Provide opportunities for new urban space within Zonta Meadows Park;
- Relocation of (3) existing load centres from Alectra Utilities' current property; and
- Install pedestrian facilities to meet current standards set by AODA and the City of Mississauga Accessibility Design Handbook, including retrofitting detectable warning surfaces in all existing curb ramps and including detectable warning surfaces in the construction of all new curb ramps.

The key features of the recommended preliminary design for **Rathburn Road West** are as follows:

- Re-align Rathburn Road West by shifting to the south to accommodate the new roundabout while minimizing any impacts to the residents to the north;
- Remove traffic signals and build the center median as an extension of the new roundabout in front of Elora Drive (east leg) and the existing entrance to 330/350 Rathburn Road West (these entrances will be limited to right-turns in and out only);
- Large landscaped boulevard with stormwater management opportunities, to the north along Rathburn Road West;
- New streetlighting to accommodate the wider roadway cross-section and meet current City standards; and
- Replace vegetation loss associated with construction activities with new and enhanced landscaping on the boulevards of Rathburn Road West, where possible.

8.1.1 Design Criteria

Design criteria associated with the Preferred Design were established based on input from the City, Design Standards from Transportation Association of Canada (TAC) – Geometric Design Guide for Canadian Roads and TAC guidelines. A copy of the design criteria is included in **Appendix M** of this ESR.

8.1.2 Horizontal and Vertical Alignment

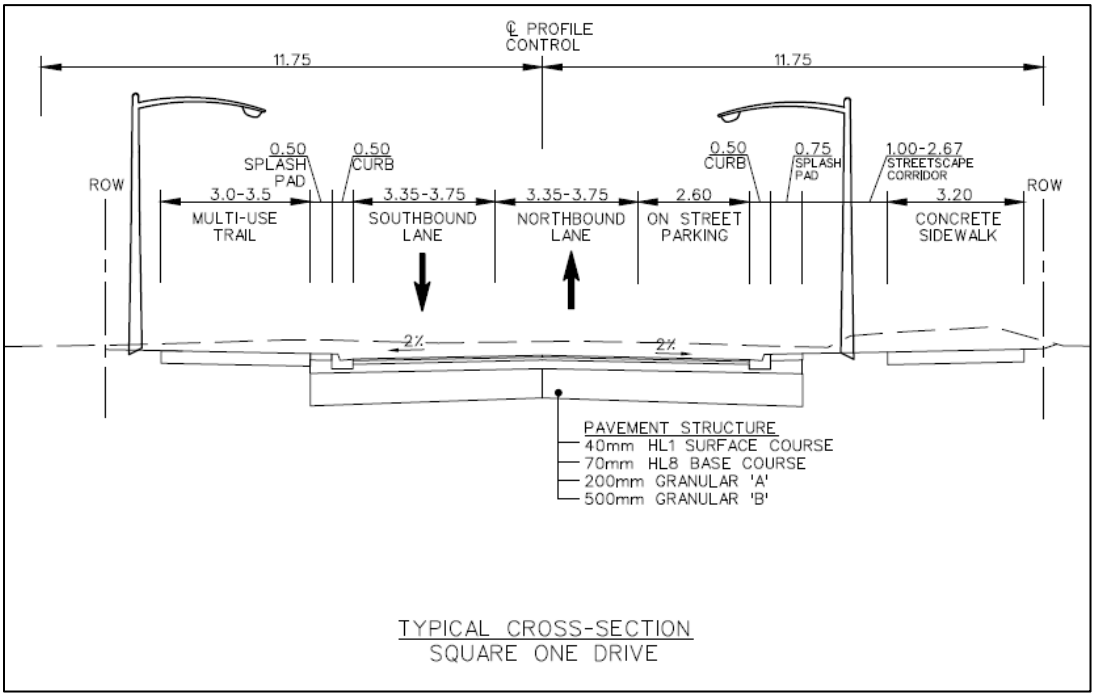
All existing horizontal/vertical curves and roadway gradients are within acceptable parameters, sufficient sight distance is provided at all locations. The existing horizontal alignments of Rathburn Road West will be subject to minor changes under the proposed preliminary design. From approximately 200m west of the proposed new roundabout, the horizontal alignment of Rathburn Road West will be shifted to the south to minimize the impacts to the residential properties to the north.

The vertical alignment of Rathburn Road West will match the existing ground through the updated corridor section. The vertical alignment of the Square One Drive extension will match into the crossfall of the proposed roundabout at Rathburn Road and the existing cross-fall of Confederation Parkway.

8.1.3 Typical Cross-Sections

- The typical cross-sections for the proposed Square One Drive Extension and the revised Rathburn Road West section are illustrated in **Figure 9** and **Figure 10**. The key features of the typical cross-sections are described below.

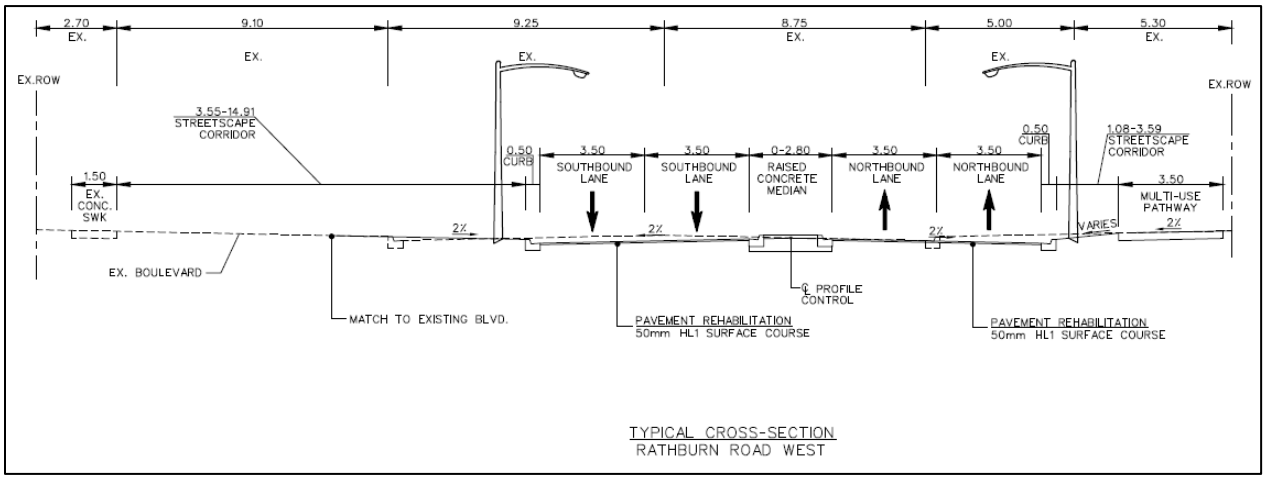
Figure 9: Typical Cross-Section, Square One Drive Extension



- Two 3.35 m through lanes on Square One Drive, between Confederation Parkway and Rathburn Road West;
- a continuous 3.2 m sidewalk, 0.5 splash pad, and 1.00 – 2.67 m streetscape corridor on the south side of Square One Drive, between Confederation Parkway and the muiti-use trail connection at Rathburn Road West;
- a 3.0 m - 3.5 m multi-use trail and a 0.5 m splash pad on the north side of Square One Drive, between Confederation Parkway and Rathburn Road West. Note, the multi-use

trail is narrowed for approximately 80 m to preserve some existing mature trees south of the property at 330/350 Rathburn Road West;
- 2.6m on-street parking between Confederation Parkway and the Alectra Utilities entrance on the south side of Square One Drive; and
- positioning of light standards and hydro poles.

Figure 10: Typical Cross-Section, Rathburn Road West



- Four 3. 5m through lanes on Rathburn Road West;
- a new 46 m diameter, 2 lane roundabout with 4.5m internal lane widths;
- a continuous 3.5 m multi-use trail between Confederation Parkway and the existing multi-use trail in Zonta Meadows Park (opposite Schneider Court), on the south side of Rathburn Road West;
- a 1.08 – 3.59 m streetscape corridor between Confederation Parkway and the entrance to 330/350 Rathburn Road West, on the south side of Rathburn Road West;
- the existing concrete sidewalk and a 3.55 – 14.91 m streetscape corridor between Confederation Parkway and the west construction limit east of Elora Drive (west leg), on the north side of Rathburn Road West; and
- positioning of light standards and hydro poles.

8.2 DRAINAGE / STORMWATER MANAGEMENT

8.2.1 Potential Impacts

The preferred design comprises a two-lane local road with a maximum pavement width of approximately 9 m (including on-street parking) in addition to a boulevard and concrete sidewalk to the south and a boulevard and multi-use trail to the north. As such, there will be an increase in imperviousness within the right-of-way due to a change from grass to asphalt/concrete.

The proposed realignment of Rathburn Road West shifts the roadway south by a maximum of approximately 7 m. The width of the realigned roadway will be approximately the same as that of the current roadway. Landscaped areas south of the existing roadway that will be converted to paved lanes in the proposed condition will be offset by increases in landscaped areas north of the realigned roadway. As such, the imperviousness and existing drainage patterns in and around Rathburn Road West will be generally maintained under the proposed conditions.

Design Criteria

Additional stormwater runoff from new pavement can impact receiving watercourses and cause flooding, erosion, and water quality impacts. Quantity and quality control measures to treat runoff should be considered for all new impervious areas and, where possible, existing surfaces. Stormwater Management (SWM) criteria for this project are based on the requirements of the CVC and the City of Mississauga.

- Quantity Control: The 10-year post development flow must be controlled to the 2-year pre-development peak (City Design Manual Table, 2.01.03.03c);
- Quality Control: Implement Enhanced Level (80 % Total Suspended Solids (TSS) Removal) water quality control for all new developments;
- Water Balance: The CVC SWM Criteria Table 2-2 requires providing a minimum post-development recharge of the first 5 mm for any precipitation event. The subject Site is considered a Low Volume Groundwater Recharge Areas (LGRA), which does not impact a sensitive ecological feature, or require a subwatershed study, or EIR. A 3 mm per precipitation event must be captured and infiltrated;
- Erosion and Sediment Control: CVC Section 4.2 requires on-site detention of 5 mm as a minimum for this Site where conditions do not warrant the detailed analyses; and
- Conveyance: The storm sewer system should be designed to capture and convey runoff generated by the 10-year storm event. The minimum initial time of concentration is to be 15 minutes (City of Mississauga).

8.2.2 Mitigation Measures

A series of best management practices and alternative SWM alternatives were assessed based on capital cost, level of treatment, maintenance requirements, space constraints and site-specific conditions to identify a recommended preliminary SWM design. The detailed evaluation is discussed in the Drainage and Stormwater Management Report, provided in **Appendix H** of this ESR. The recommended preliminary design is summarized herein

8.2.2.1 Quantity Control

The study area lies within the Mary Fix Creek Subwatershed, and it is required that the 10-year post development flow is controlled to the 2-year pre-development peak (City Design Manual, Table 2.01.03.03c).

Square One Drive

It is recommended that the required stormwater detention volume be provided primarily through an underground storage tank. It is proposed that this unit be located near the proposed roundabout. The size of the tank may be reduced using engineered soil cells. It is recommended that this option be explored further with the City during detailed design. At that point, it will be important to establish with the City the detention storage volume per m^3 of soil that will be accepted for quantity control. Opportunities to incorporate SWM features within the roundabout will be explored during detailed design.

Rathburn Road

The imperviousness and drainage area of the realigned Rathburn Road West will remain unchanged in the proposed condition; therefore, no quantity controls have been proposed.

8.2.2.2 Quality Control

Square One Drive

The study area currently does not include any water quality control measures to treat runoff before discharging into the storm sewer. The SWM criteria require the implementation of enhanced level water quality control (80% TSS removal) for all new developments.

An Oil Grit Separator (OGS) is recommended as a pre-treatment device or may be used as part of a multi-component (treatment train) approach to achieve Enhanced quality control. According to the City of Toronto Guidelines, OGS devices, operating alone at their original design capacities, can achieve a TSS removal efficiency of 50%. The proposed Square One Drive Extension is located within a completely urbanized area; with limited opportunities of SWM practices that can be applied to achieve the required 80% TSS removal.

Two design alternatives have been proposed. The first consists of an OGS installed at the outlet of the Site's storm sewer piping along with a shield on each CB. The second employs an inline filter unit installed at the outlet of the Site's storm sewer piping to meet the quality criterion. For both alternatives, the proposed Silva Cells will provide further treatment and enhance the performance of the proposed treatment train.

Rathburn Road West

According to the Rathburn Drainage Plan, under existing conditions, the storm sewer under Rathburn Road West immediately east (downstream) of the intersection with the Square One Drive Extension receives drainage from 9.2 ha. The area of Rathburn Road West that is being realigned totals 1.98 ha. Since the storm sewer in this area conveys flows from a significantly larger area than is being realigned, it is not feasible to provide centralized quality treatment on the storm sewer under Rathburn Road West.

It is proposed that CB shield devices be installed on all catch basins of the realigned road to provide 50-80% TSS removal.

8.2.2.3 Water Balance

Square One Drive

The CVC categorizes the Site area as being a "Low Volume Groundwater Recharge Area" and, therefore, requires a minimum of 3 mm per storm event to be captured and infiltrated. The Site includes approximately 0.71 ha of paved roadway which is unsuitable for infiltration without pre-treatment.

Soil Investigation results show that the existing soil is predominantly clayey silt till. Groundwater was encountered at a depth of 0.6 m and 0.9 m below ground surface at the two boreholes within the roadway area. Since the quality treatment of the runoff from the roadway will be accomplished with an inline treatment device installed in the storm sewer at the downstream end of the site, and due to the low permeability of the native soil and high ground water, infiltrating runoff from the road on-site is not feasible.

Rathburn Road West

The imperviousness and drainage area of the realigned Rathburn Road West will remain unchanged in the proposed condition; therefore, no water balance controls have been proposed.

8.2.2.4 Erosion and Sediment Control

CVC requires on-site detention of 5 mm as a minimum for this Site where conditions do not warrant the detailed analyses.

Square One Drive

The peak flow generated by the 5mm storm event over the 0.71 ha drainage area was calculated as 0.01 m3/s using PCSWMM software. The minimum allowable orifice size of 75 mm will release 0.02 m3/s, which exceeds the peak flow generated by the 5-mm storm event. Accordingly, 5 mm storage detention cannot be met by controlling the outflow from the road areas. Therefore, technologies should be considered during detailed design to achieve the erosion and sediment control targets by retaining and consuming the runoff generated by the 5-mm storm event through evapotranspiration (ET).

The total volume of planting soil is 90 m^3, which would provide a storage volume of 36 m^3, assuming 0.40 void ratio. The proposed Silva Cell system would capture and retain the first 12.5 mm of precipitation falling over the southern half of the roadway, which is equivalent to 5 mm over the total site area (0.71 ha).

Rathburn Road West

As with the Square One Drive Extension, it is proposed that erosion and sediment control requirements for the Rathburn Road West realignment (5 mm detention) be achieved using engineered soil cells.

The proposed system would capture and retain the first 9.7 mm of precipitation falling over the northern 24 m of the 40 m road right of way, which is equivalent to 5 mm over the total Rathburn Road West right of way area (1.98 ha).

8.2.2.5 Conveyance

Minor Flows

The proposed storm sewer for Square One Drive Extension is designed to discharge into the existing storm sewer along Rathburn Road West.

It is noted that the Storm Sewer under Rathburn Road West is flowing nearly at capacity and will likely require upsizing in the future. An assessment of the extent of the improvements required is beyond the scope of this report; however, it is recommended that the City investigate this further during detailed design.

Major Flows

Under existing conditions, the Site drains overland to CBs that connect to 250 mm pipes that graduate to 300 mm pipes then feed directly into the 1500 mm x 3000 mm box culvert without using the storm sewer line running along Rathburn Road West. The proposed road slopes from a high point of 159.14 m at the intersection with the Confederation Parkway, to a low point of 156.60 m at the intersection with Rathburn Road West. Accordingly, the major flow will be conveyed via the proposed roadway as overland flow towards Rathburn Road West. The overland flow route on Rathburn Road West will be maintained.

8.2.3 Erosion and Sediment Control

CVC requires on-site detention of 5 mm as a minimum for the study area where conditions do not warrant detailed analyses. The peak flow generated by the 5mm storm event over the 0.59 ha drainage area was calculated as 0.01 m^3/s. The minimum allowable orifice size of 75 mm will release 0.02 m^3/s, which exceeds the peak flow generated by the 5mm storm event. Accordingly, 5 mm storage detention cannot be met by controlling the outflow from the road areas. Therefore, Silva Cells® system is proposed to achieve the erosion and sediment control targets by retaining and consuming the runoff generated by the 5mm storm event.

Retention of an equivalent of 5mm rainfall event will be provided using Silva Cells® installed in the southern boulevard. Ten trees will be planted along the southern boulevard. The total volume of planting soil is 150 m^3, which will provide a storage volume of 60m^3, assuming 0.40 void ratio. The proposed Silva Cell system will capture and retain the first 10mm of precipitation falling over the southern half of the roadway, which is equivalent to 5mm over the total road area.

8.3 PAVEMENT AND GEOTECHNICAL DESIGN

GeoPro Consulting was retained to carry out a geotechnical investigation and pavement design to support the construction of the extension of Square One Drive, as well as associated intersection modifications. The methodology and findings of the investigation are documented within the Geotechnical Investigation and Pavement Design report provided in **Appendix J** of this ESR.

8.3.1 Existing Pavement Condition

In general, the existing pavement on Rathburn Road West at the proposed intersection of Square One Drive Extension is in good to fair condition. The most significant distresses are intermittent low to medium severity longitudinal and transverse cracking and low severity utility cut patching. The existing pavement on Confederation Parkway at the proposed intersection of Square One Drive Extension was observed to be in generally good condition. The existing roadways were designed and constructed to an urban cross-section (curb and catchbasins). The overall surface drainage within the project limits is generally considered to be good.

8.3.2 Pavement Design

The subgrade soils within the new road section generally consist of native clayey silt/shale complex. Based on the expected traffic on this road section and the type and strength of subgrade soil, the recommended pavement structures are briefly summarized below. The detailed construction procedures, including are described in the Geotechnical Investigation and Pavement Design Report, provided in **Appendix J** of this ESR.

Square One Drive

- 40 mm HL 3 surface course
- 100 mm HDBC (Heavy Duty Binder Course)
- 200 mm of 19 mm Crusher Run Limestone (CRL) Base Course (or Granular A Base)
- 300 mm Granular B Type II Subbase
- Prepared and Approved Subgrade

Rathburn Road West (Widening)

- 40 mm HL 1 surface course
- 100 mm (2 lifts) HDBC
- 200 mm of 19 mm Crusher Run Limestone (or Granular A Base)
- 400 mm Granular B Type II Subbase
- Prepared and Approved Subgrade

Roundabout on Rathburn Road West

- 40 mm HL 1 surface course
- 110 mm (2 lifts) HDBC
- 200 mm of 19 mm Crusher Run Limestone (CRL) Base Course (or Granular A Base)
- 400 mm Granular B Type Subbase Course
- Prepared and Approved Subgrade

Intersection of Confederation Parkway and Square One Drive

- 40 mm HL 1 surface course
- 120 mm (2 lifts) HDBC
- 200 mm of 19 mm Crusher Run Limestone (or Granular A Base)
- 460 mm Granular B Type II Subbase
- Prepared and Approved Subgrade

Any disturbed or damaged pavement resulting from the road connection and roundabout construction should be restored to match the existing pavement structure.

8.4 UTILITIES

Some minor relocations and adjustments to existing above and below ground utilities are expected due to the proposed alignment shift on Rathburn Road West along with the extension of Square One Drive. On Square One Drive, there will be a significant relocation required for the Alectra Utilities three (3) existing load centres, along with minor adjustments at Confederation Drive to allow for the new intersection to be built.

The following summarizes the existing utilities within the project corridor, along with conflicts for relocation/adjustment as part of the future detailed design assignment. The Composite Utility Plan is provided in **Appendix I.**

Alectra Utilities – Alectra Utilities has an existing substation located along the proposed extension of Square One Drive, adjacent to Zonta Meadows Park. This substation will remain in place; however, there are three (3) existing load centres which must be relocated (to a location which is still under discussion) to accommodate the extension of Square One Drive. Alectra also has existing underground infrastructure on the site of the City's designated right-of-way for the extension; it is expected that this existing underground infrastructure will remain in place beneath the proposed boulevard on the north side of Square One Drive.

There is also existing underground plant on the north side on Rathburn Road West that will remain unaffected by construction of the Square One Drive extension, as the alignment of Rathburn Road West will be shifted to the south. The existing underground plant running east/west on the south side of Rathburn Road West should be reviewed at the detailed design stage to review any conflicts and propose mitigation measures at that time. Specifically, an existing hydro station is located at the south-east corner of the existing entrance to Zonta Meadows Park from Rathburn Road West; this station is required to be relocated to accommodate the proposed

roundabout at Square One Drive & Rathburn Road West. It is expected that this relocation can take place within the proposed south boulevard of Rathburn Road West.

Watermains – There is an existing 400mm watermain running north/south on the west side of Confederation Parkway underneath the existing concrete layby. Adjustments to the valves may be required to accommodate the profile connection of the extension. A 300mm watermain runs east/west from the existing Square One Drive across Confederation Parkway terminating with a connection to the existing 400mm pipe. On Rathburn Road West there is an existing 600mm watermain on the north side of the road running east/west, this main terminates at Via Russo Ct. where a 150mm runs north into the court. The watermain on Rathburn is likely outside of the proposed construction zone and will remain in place.

Storm Sewer – There is an existing 375mm storm sewer running down the centre of existing Square One Drive terminating in the centre of Confederation Parkway where it then runs south in a larger diameter 525mm pipe. On Rathburn Road West there is an existing storm sewer running east/west down the centre of Rathburn sized from 300mm where it begins at Confederation Parkway increasing in diameter moving to the west. There is a proposed storm sewer sized 300-375mm running down the centre of the Square One Drive Extension that is to be connected into the existing storm sewer on Rathburn Road West.

Sanitary Sewer – There is an existing 375mm sanitary sewer running north/south along the west side of the CL alignment of Confederation Parkway. There is also an existing 250mm sanitary sewer running east/west along the CL of Rathburn Road West. Manhole adjustments will likely be required along Rathburn to account to the alignment shift. The manhole at the new intersection of Square One Drive and Confederation will also require very minor adjustments to adjust to the new pavement elevation.

Natural Gas – The existing gas mains are running east/west on Rathburn Road West along the south property line. Current utility mapping shows no existing gas mains located on Confederation Parkway.

Communications – (Rogers/Bell) Rogers has existing underground plant running east/west on Rathburn Road West on both the north and south sides of the road. Bell has existing underground plant also running east/west on Rathburn however only on the south side of Rathburn at the property line. Bell also has several above ground boxes on the south/east corner of Rathburn and the Zonta Meadows Park entrance. These boxes will conflict with the re-alignment of Rathburn Road West and will require relocation to be coordinated as part of the detailed design assignment. Both Rogers and Bell have existing underground plant running north/south on the east side of Confederation Parkway.

8.5 PROPERTY AND ACCESS

Acquisition of approximately 1,217 m^2 of private property (i.e., Alectra), and approximately 2,325 m^2 City-owned property (i.e., Zonta Meadows Park) will be required to accommodate the preferred design. In addition, the existing access to the 330/350 Rathurn Road West property will be relocated from Confederation Parkway to the new Square One Drive Extension. The City will continue to engage with the private property owners during detailed design.

8.6 PRELIMINARY COST ESTIMATE

The estimated cost associated with implementing the preferred design (including engineering design and contract administration costs and excluding utility relocations and property acquisition) has been divided into two (2) phases: Confederation Parkway to Amacon access (i.e., Phase I), and from the Amacon access to Rathburn Road West, including realignment of Rathburn Road West (i.e., Phase 2), as presented in **Table 8-1** and **Table 8-2** below.

Table 8-1: Phase 1 Cost Estimate

Description	Total Cost
Roadway	$ 348,296.60
Storm Sewer	$ 42,656.70
Landscaping & Streetscaping	$ 258,825.00
Signals and Streetlighting	$449,000.00
Miscellaneous/General (Mobilization/Demobilization, Construction Staging and Layout)	$ 50,000.00
Subtotal	**$248,780.00**
Contingency Allowance (30%)	$374,640.00
Engineering and Contract Administration (12%)	$194,810.00
TOTAL (Exclusive of HST)	**$1,818,230.00**

Table 8-2: Phase 2 Cost Estimate

Description	Total Cost
Roadway	$1,037,672.97
Storm Sewer B	$ 3,000.00
Landscaping & Streetscaping	$296,093.38
Signals and Streetlighting	$180,000.00
Miscellaneous/General (Mobilization/Demobilization, Construction Staging and Layout)	$ 500,000.00
Subtotal	**$2,086,770.00**
Contingency Allowance (30%)	$626,040.00
Engineering and Contract Administration (12%)	$325,540.00
Relocation of Alectra Load Centres (3)	$11,000,000.00
TOTAL (Exclusive of HST)	**$14,038,350.00**

The detailed cost estimate is provided in **Appendix N** of this ESR.

9.0 POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

9.1 NATURAL ENVIRONMENT

9.1.1 Potential Impacts

VEGETATION
The preferred design overlays an urban landscape that includes a cultural meadow community that is fragmented and disturbed by development, including active construction in Adjacent Lands to the south of the Study Area. Vegetation cover in the study area is common to urban environments. No designated natural areas, species at risk or provincially rare species (or their habitat) will be impacted by the preferred design.

Cultural woodland communities can likely be retained by the preferred design. This expectation will be confirmed when design details are available. Potential indirect impacts to natural areas that are adjacent to the preferred design include inadvertent vegetation disturbance, soil compaction, sedimentation, contamination from spills, noise and dust generation. These indirect impacts are associated with the construction phase of the Project and are temporary. Standard mitigation is available to prevent inadvertent encroachment into these areas, and provide sediment and erosion control.

9.1.2 Mitigation Measures

9.1.2.1 Erosion and Sediment Control

Mitigation measures for sedimentation, erosion, and dust control will be implemented to prevent sediment and dust from entering the adjacent natural areas and the local storm water management system. The primary principles associated with sedimentation and erosion protection measures are to: (1) reduce the duration of soil exposure; (2) retain existing vegetation, where feasible; (3) encourage re-vegetation; (4) divert runoff away from exposed soils; (5) keep runoff velocities low; and to (6) trap sediment as close to the source as possible. To address these principles, the following mitigation measures are proposed:

- Silt fencing and/or vegetation protection barriers will be used along all work areas adjacent to natural areas. Page wire hoarding with sediment control will be will implemented adjacent to the natural areas and vegetation within Zonta Meadows Park.
- No equipment will be permitted to enter beyond the vegetation protection fencing.
- All exposed soil areas will be stabilized and re-vegetated, through the placement of seed and mulching or seed and an erosion control blanket, promptly upon completion of construction activities.
- All sediment and erosion controls will be monitored and properly maintained, as required.
- In addition to any specified requirements, additional silt fence will be available on site, prior to grading operations, to provide a contingency supply in the event of an emergency.
- Controls are to be removed only after the soils of the work area have been stabilized and adequately protected or until cover is re-established.

- Soil, material storage and equipment refueling will occur 30 m away from natural areas to avoid potential impacts, to reduce potential for contamination.

9.1.2.2 Migratory Birds

The Primary Nesting Period (for the Study Area) is considered to fall between April 1 and August 15, although nesting also infrequently occurs outside of this period (Environment Canada 2014). No part of the work that could result in the incidental take of bird nests will be performed within the nesting period unless an avian biologist is retained to conduct nest sweeps of the work area a maximum of seven (7) days prior to works. If the Project is delayed beyond the seven day effective window for the nest sweep, a new sweep will be performed.

If a migratory bird nest is located within the work areas at any time, a no-disturbance buffer will be delineated. This buffer will be maintained for the entire duration of the nest activity, which will be determined using periodic checks by the avian biologist. The radius of the buffer generally varies from 5 m – 60 m depending on the sensitivity of the nesting species. Work will not resume within the nest buffer until the nest is confirmed to be no longer active.

An Information Gathering Form will be submitted to the MNRF to determine if authorization under the Endangered Species Act with regards to Species at Risk.

9.1.2.3 Species at Risk

Field investigations documented foraging Barn Swallow in the Study Area; however, no nests were observed and/or recorded. No other species at risk or provincially rare species were recorded. MNRF determines authorization requirements under the ESA; however, loss of foraging habitat is not anticipated to require authorization from the MNRF under the ESA. Consultation with MNRF is recommended via submission of an Information Gathering Form to confirm this expectation.

9.1.3 Individual Trees

In total, 283 individual trees were inventoried within the study area. A summary of the approximate number to trees to be retained; removed; and associated location is presented in **Table 9-1** below.

Table 9-1: Summary of Effects to Individual Trees

Item	Count
Trees to be Retained	121
Trees to be Removed	61
Trees to be Removed on City Property	56
Trees to be Removed on Private Property	5
Trees Affected by Realignment of Rathburn Road West	40

Eight of the Trees to be Retained are located on City property; however, they are a part of a line of trees that border the condominium property from the new road extension. The preliminary design identifies a 3.5 m multi-use trail located adjacent to these trees. It is recommended that these trees be retained, if possible, and, during detail design be surveyed and the stem locations the potential grading impacts and mitigation recommendations be reviewed.

9.1.3.1 Potential Impacts

Trees can be damaged during construction without showing signs of damage until some years later. Most of the impacts relate to the removal of roots that results in the slow death of the tree because of its inability to absorb sufficient water and nutrients.

Soil Complication and Root Damage
The leading cause of construction damage to trees is compaction of the soil around the roots or within the Tree Protection Zone (TPZ). The TPZ is the area around the tree or group of trees in which no grading or construction activity may occur (Harris 1992). Equipment entering a TPZ compresses the air pockets around the roots inhibiting the tree from absorbing nutrients and water. This damage ultimately reduces the health of the tree.

Mechanical Damage
Equipment can physically damage the trees through striking the trunk, limbs and/or roots. Felled trees can also cause damage during the tree removal stage of construction.

Root Damage
The success of tree preservation is dependent not only on protecting the root zone from compaction and damage, it is also contingent upon the ability to ensure that the structural roots within the root zone are not disturbed. Impacts to this area may result in the structural failure of these trees. Excavating soil 1 m outside a tree's dripline, or within a dripline if approved by an Arborist, can damage roots by tearing and splitting back to the stem. This damage can later lead to rot, which can kill the tree.

9.1.3.2 Mitigation Measures

Tree protection fencing shall be installed to protect trees identified for preservation. Tree protection fencing installation must conform to details and City of Mississauga standards. The Project Arborist shall review and approve the tree protection fencing and its location prior to commencement of any site work. This shall be coordinated with City staff for approval. The protection fencing shall remain intact throughout construction and inspected weekly and, if required, repaired.

All trees designated for preservation must be flagged in the field. All designated preservation areas must be left standing and undamaged during site works.

The TPZ is not to be used for any type of storage (e.g. storage of debris, construction material, surplus soils, and construction equipment). No trenching or tunneling for underground services shall be located within the TPZ. Construction equipment shall not be allowed to idle or exhaust within the TPZ.

Trees shall not have any rigging cables or hardware of any sort attached or wrapped around them, nor shall any contaminants be dumped within the protective areas. Furthermore, no contaminants shall be dumped or flushed where they may come into contact with the feeder roots of the trees. If roots from retained trees are exposed, or if it is necessary to remove limbs or portions of trees after construction has commenced, the Project Arborist shall be informed and the proper actions conforming to City Policies and By-laws shall be carried out.

The suggested Tree Protection Fencing (TPF) and the location of trees to be retained is illustrated on the Tree Protection Plan drawing provided as Appendix A of the Tree Inventory and

Assessment Report, provided in **Appendix D** of this ESR. The TPF details conform to the current City of Mississauga standard details.

9.1.4 Noise and Vibration Assessment

A traffic noise and vibration assessment was undertaken to identify the potential changes in noise and vibration levels associated with construction and operation of the extension of Square One Drive, and determine the need for mitigation, if any. The assessment considered the potential impacts to noise sensitive receptors, including the outdoor living areas (OLAs) of residential dwellings located along Square One Drive. The assessment also determined the expected impact of vibration levels to a nearby underground parking structure located at 330/350 Rathburn Road West.

9.1.4.1 Road Traffic Noise

According to the City's 09-03-03, "Noise Attenuation Barriers on Major Roadways" document dated April 2011, noise mitigation barriers are required if:

- The daytime average noise level is greater than 60 dBA.
- The residential area is adjacent to arterial and major collector roads, as designated in the Official Plan.

The City of Mississauga's Noise Policy is more stringent than the provincial noise guidelines (i.e., if the change in daytime sound levels is greater than or equal to 5 dBA, and/or the overall sound levels associated with a project is greater than or equal to 65 dBA). As such, the City's criteria were used to determine mitigations requirements for this project. Based on the traffic data used as part of this study, daytime sound levels were calculated at OLAs identified in proximity to the new roadway. In total, four (4) OLAs were considered representative of several dwellings located in the study area (with a similar setback).

Based on the findings of the assessment, traffic noise levels following construction and during operation of the new roadway will not exceed the City's 60 dBA objective noise level at any of the OLAs. As such, no noise mitigation is required in association with the project.

9.1.4.2 Construction Vibration

Vibration levels associated with heavy truck travel along the closest lane to the foundation of a nearby parking structure were estimated as part of this assessment. The findings of the assessment indicated that construction vibration with typical construction equipment is expected to be below the vibration limit, provided construction is undertaken at distances greater than 10 m. This should be reviewed when the construction equipment list is finalized. In addition, it is recommended that construction vibration monitoring be undertaken during construction activities completed within 10 m of the underground parking structure associated with 330/350 Rathburn Road West to verify that the construction vibration does not exceed the applicable standard.

A copy of the Road Traffic Noise and Vibration Assessment report is provided in **Appendix O** of this ESR.

9.1.5 Air Assessment

An air quality and greenhouse gas (GHG) assessment was undertaken to determine the change in air quality associated with the extension of Square One Drive. The assessment evaluated the

current background levels of air contaminants of concern (COC) in the study area, and included air modelling to predict future levels of COC associated with vehicle operations in the study area in 2041.

Sources of COCs expected to be associated with the extension of Square One Drive are related to changes in traffic and associated combustion gases from burning fossil fuels (e.g., gasoline and diesel) and fugitive dust. Combustion emissions depend on the type of combustion device (i.e., engine type), the fuel composition and consumption rate, and vehicle operating time. Fugitive dust emissions can be generated by road traffic during the movement of cars and trucks. The air contaminants assessed as part of the air quality assessment included nitrous oxide, carbon monoxide, Sulphur dioxide, benzene, 1,3-butadiene, acrolein, acetaldehyde, formaldehyde and benzo(a)pyrene. Levels of particulate matter were also measured as part of the assessment. GHGs are any gas that contributes to climate change and were also evaluated as part of this study, including carbon dioxide, methane, nitrous oxide, among other air contaminants.

Local air quality impacts were assessed by estimating concentrations of COC at the same sensitive receptors (residences) used as part of the noise assessment, and comparing them to applicable regulatory standards. Background concentrations of COCs were compared against the expected COC levels expected from the future traffic volumes associated with building the extension of Square One Drive (i.e., 'build scenario') and without building the extension of Square One Drive (i.e., 'no-build scenario').

The background concentrations were also used to evaluate the cumulative effects of the project in relation to other existing sources of air emissions in the study area, as the project has the potential to interact with other emission sources in the area.

Based on the findings of the assessment, the concentrations of COCs, including particulates, were below the applicable standard in the current and future build and no-build scenarios, with the exception of Beno(a)pyrene; however, benzo(a)pyrene is expected to decrease in the future build and no-build scenarios despite this exceedance, since even through the traffic volumes are expected to increase by 2041, advanced vehicle technology is expected to lower all emissions, including this contaminant.

Cumulative concentrations of contaminants are below the applicable standard, with the exception of particulate matter, benzene and beno(a)pyrene. Particulate PM2.5 is expected to be higher than the applicable standard; however, ambient concentrations are also considered high. In addition, cumulative concentrations of benzene were measured above the applicable standard; however, the concentrations are lower and/or the same as current concentrations, as well as the no-build scenario, as the ambient levels of benzene in Ontario are currently measured above the applicable standard. As such, benzene concentrations are the same in the build and no-build scenarios.

GHG emissions are higher in the future given both the build and no-build scenarios. However, this increase may be associated with the conservative approach used to complete the assessment and/or may be offset by a decrease in travel on other road that were not included in the study area for this assessment.

In general, when compared to the future no-build scenario, the project is expected to benefit local air quality to some degree.

9.1.5.1 Construction-Related Emissions

Sources of construction-related emissions are primarily related to heavy equipment engines and related hydrocarbon combustion. Fugitive dust from vehicle traffic over temporary unpaved surfaces is also anticipated.

Total construction related air emissions would be anticipated over several weeks to potentially months. Construction-related emissions can be mitigated by ensuring that well-tuned and maintained engines are provided with construction equipment, and that proper project planning and management ensures a short duration for potential unpaved vehicle traffic surfaces.

A copy of the Air Quality Assessment is provided in **Appendix P** of this ESR.

9.1.6 Archaeological Resources

No archaeological resources were identified during the Stage 2 Archaeological Assessment undertaken in June 2017. In addition, a response from the MTCS was received on October 4, 2017, indicating that the Stage 2 Archaeological Assessment report has been entered into the Ontario Public Register of Archeological Reports without technical review. As such, no further archaeological assessment is required for the study area.

A copy of the MTCS response is provided in **Appendix F** of this ESR.

9.1.7 Contaminated Property

Based on the findings of the Phase One ESA, Areas of Potential Environmental Concern (APECs) were identified in association with the existing presence of transformers and records of registered wastes being generated from the property (330 Rathburn Road West). Further site assessment activities are recommended to confirm or refute the presence contaminants of concern within the study area.

A limited chemical analysis of the soil material collected at the time of the geotechnical field program was also carried out as part of the investigation. Six (6) soil samples were collected from depths ranging from 0.2 m to 1.3 m below ground surface (bgs) and submitted for analysis of metals and inorganics or petroleum hydrocarbons (PHCs). The results of the analysis were compared to Tables 1, 2 and 3 of the Ministry of Environment's (MOE) "Soil, Ground Water and Sediment Standards for Use Under Par XV.1 of the Environmental Protection Act" (MOE Standards). Based on the results of the analysis, exceedances of MOECC Table 1, Table 2 or Table 3 standards for Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR) in the tested soil samples within 2 of the boreholes, and for copper, EC and SAR in one (1) of the coreholes advanced during the geotechnical drilling program.

The elevated EC and SAR levels are inferred to be associated with the application of de-icing salts to roadways. In addition, EC and SAR impacted soils are considered exempt when re-used within a highway (as defined by the Highway Traffic Act).

The material should be re-tested once excavated and stockpiled to better characterize the material before its re-use. If excess material is generated, available analytical data pertaining to the material should be forwarded to the potential receiver for review prior to the removal of the excavated material. Written authorization, indicating that these data was received and reviewed, and that the receiver accepts the excavated material, should be provided to the site

representative by the potential receiver. If excess soil fill and/or native materials vary from those tested as part of the geotechnical investigation, additional testing is recommended to determine suitability for disposal. A toxicity characteristic leachate procedure (TCLP) analysis completed in accordance with O.Reg. 558/00 may be required to determine the waste classification of the soil prior to disposal.

10.0 MONITORING, MITIGATION, AND COMMITMENTS

Table 10-1 summarizes the various environmental sensitivities/areas of concerns related to the Preferred Design concept that were identified during this study, and will serve as a reference during detailed design and construction. City of Mississauga contract administration staff should undertake normal supervisory activities with respect to the administration of environmental controls incorporated into the contract package, as well as ensuring their effective application in accordance with the spirit and intent of this report.

Table 10-1: Mitigation Measures, Detailed Design and Implementation Commitments

Item	Description
Vegetation	• A detailed sedimentation, erosion and dust control plan will be prepared during detailed design.
Individual Trees	• Tree protection fencing shall be installed to protect trees identified for preservation in accordance with City standards • The project arborist will review and approve the location of the fencing, prior to commencement of construction activities, in coordination with City staff approval. • Tree protection fencing will remain in place throughout construction activities and will be inspected weekly and repaired, if required. • All trees designated for preservation must be flagged in the field. All designated preservation areas must be left standing and undamaged during site works. • The TPZ is not to be used for any type of storage. No trenching or tunneling for underground services shall be located within the TPZ. Construction equipment shall not be allowed to idle or exhaust within the TPZ. • Trees shall not have any rigging cables or hardware of any sort attached or wrapped around them, nor shall any contaminants be dumped within the protective areas. • No contaminants shall be dumped or flushed where they may come into contact with the feeder roots of the trees. • If roots from retained trees are exposed, or if it is necessary to remove limbs or portions of trees after construction has commenced, the Project Arborist shall be informed and the proper actions conforming to City Policies and By-laws shall be carried out. • Upon completion of the tree removals, all felled trees will be removed from the site. No lumber or brush from the clearing will be stored on-site. Any chipping, cutting or brush cleanup will be completed outside of the bird nesting season.
Breeding Birds	• No construction activities/tree removals will take place during the primary nesting period for this area (i.e., between April 1 and August 15). • A no-disturbance buffer will be delineated and maintained for the duration of the nest activity, which will be determined using periodic checks by the avian biologist. Work will not resume within the nest buffer until the nest is confirmed to be no longer active.
Air Quality	• During construction, vehicles/machinery and equipment will be in good repair, equipped with emission controls, as applicable, properly maintained and operated within regulatory requirements. • A minimal number of machines operating in any one area shall be considered during construction activities. • Water and non-chloride dust suppressants will be applied during construction to protect air quality associated with dust.

Table 10-1: Mitigation Measures, Detailed Design and Implementation Commitments

Item	Description
Stormwater/ Drainage	• The final design of the stormwater drainage system will be completed in accordance with the City of Mississauga Guidelines. • An OGS combined with CB Shields® on all CBs or a Jellyfish® will be used to achieve the quality control target of 80 % TSS removal efficiency for the developed areas. • The volume of the recommended stormwater detention tank will be further explored during detailed design.
Excess Soil Management	• All excavated soils will be handled in accordance with the MOECC's guidance document entitled, "Management of Excess Soil – A Guide for Best Management Practices". • If required, a toxicity characteristic leachate procedure (TCLP) analysis will be completed in accordance with O.Reg. 558/00 to determine the waste classification of the soil prior to disposal. • Should any spills occur during construction, the Spills Action Centre of the Ministry of Environment and Climate Change will be contacted immediately. • All waste generated during construction will be disposed of in accordance with MOECC requirements.
Noise	• Standard noise mitigation measures shall be installed on construction equipment and equipment will be properly maintained. • Construction equipment shall be turned off when not in use (i.e., a no idling policy). • Construction activities will be completed in accordance with the City's Noise Control By-Law 360-79. • Where noise levels for construction equipment exceed the criteria in the MOECC noise guidelines and policies, the contractor shall provide equipment that complies with the MOECC noise criteria where reasonably available. • Instances where adherence to the local bylaws is not possible and mitigation is not feasible, an exemption should be obtained from the City, prior to construction.
Vibration	• Construction vibration monitoring related to construction activities within 10 m of the carpark structure associated with 330/350 Rathburn Road West, Mississauga will be carried out to verify that acceptable construction vibration levels are not exceeded.

Mitigation measures shall be implemented and maintained through on-site inspections by the City of Mississauga staff who will ensure that the natural, social, and economic environments are not impacted by the construction activities and/or that impacts are minimized. The inspection staff will also ensure that items such as sedimentation controls and appropriate signage are maintained throughout construction.

Appropriate signage shall be implemented to identify detour routes at the time of temporary roadway/sidewalk closures. In addition, closure events and restricted access to local residents and/or businesses shall be minimized to the greatest extent possible to facilitate vehicle and pedestrian movement during construction.

10.1 THIRD-PARTY APPROVALS AND PERMITS

Following the successful completion of the Class EA process documented in this ESR prepared under the Municipal Class EA (October 2000, as amended in 2015), all requirements will have been met. Other approval requirements will be addressed for the project during detail design and may include:

- Health and safety requirements during construction under Ontario's *Occupational Health and Safety Act*;
- Notifications/permissions from respective utilities with facilities in the area; and
- Ministry of the Environment and Climate Change, Environmental Clearance Approval (ECA) permit for new storm sewer and stormwater management facilities;
- Third-party utility companies and associated approval of designs/agreements required for the relocation of physical plant to accommodate construction of the Preferred Design Alternative.
- Consultation with the MNRF in the form of an Information Gathering Form submitted to the MNRF during detailed design to determine if ESA authorization is required in association with foraging Barn Swallows.

The Canadian *Environmental Assessment Act* (CEAA) was not triggered for this project.

Appendix A CONSULTATION

A.1 STUDY NOTIFICATIONS

A.2 PUBLIC INFORMATION CENTRES

A.3 PUBLIC SURVEY

A.4 AGENCY CORRESPONDENCE

A.5 STAKEHOLDER MEETINGS

A.6 INDIGENOUS CORRESPONDENCE

Appendix B TRANSPORTATION AND TRAFFIC ANALYSIS REPORT

Appendix C NATURAL HERITAGE MEMORANDUM

Appendix D TREE INVENTORY AND ASSESSMENT

Appendix E CULTURAL HERITAGE MEMORANDUM

Appendix F STAGE 1 AND STAGE 2 ARCHAEOLOGICAL ASSESSMENTS

Appendix G PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

Appendix H DRAINAGE AND STORMWATER MANAGEMENT REPORT

Appendix I COMPOSITE UTILITIES PLAN

Appendix J GEOTECHNICAL INVESTIGATION AND PAVEMENT DESIGN REPORT

Appendix K ALTERNATIVE DESIGN CONCEPTS

Appendix L PREFERRED DESIGN

Appendix M DESIGN CRITERIA

Appendix N COST ESTIMATE

Appendix O ROAD TRAFFIC NOISE AND VIBRATION ASSESSMENT

Appendix P AIR QUALITY IMPACT ASSESSMENT