

Region of Peel Working for you

Mavis Road

Municipal Class Environmental Assessment

Courtneypark Drive West to Ray Lawson Boulevard

ENVIRONMENTAL STUDY REPORT

Volume 1: Main Report



June 2017

THE PUBLIC RECORD

This Environmental Study Report is available for public review starting June 6, 2017 to July 5, 2017 during regular business hours at the following locations and through the City of Mississauga website: <u>www.mississauga.ca/mavisroadea</u>

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

The Region of Peel Clerk's Division

10 Peel Centre Drive Brampton ON L6T 4B9 Telephone: 905.791.7800 Monday-Friday: 8:30 am to 4:30 pm Weekends: Closed

Courtneypark Branch Library

730 Courtneypark Drive West Mississauga ON L5W 1L9 Telephone: 905.615.4745 Monday-Friday: 8:00 am to 9:00 pm Saturday: 9:00 am to 5:00 pm Sunday: 1:00 pm to 5:00 pm



CITY OF MISSISSAUGA NOTICE OF STUDY COMPLETION Municipal Class Environmental Assessment Study for Mavis Road

Region of Peel

The City of Mississauga, in partnership with the Region of Peel, has completed a Municipal Class Environmental Assessment (Class EA) study and preliminary design for the section of Mavis Road from Courtneypark Drive West, in the City of Mississauga, to Ray Lawson Boulevard, in the City of Brampton. The Study was conducted in accordance with the planning and design process for 'Schedule C' projects as outlined in the Municipal Engineers Association *Municipal Class Environmental Assessment* document, as amended in 2015, which is approved under the *Ontario Environmental Assessment Act*.

The study was undertaken to investigate the need for additional north-south capacity and address current and future needs to best serve a variety of users including motorists, transit users, pedestrians and cyclists. A context sensitive design approach was used in recognition of the multi-modal transportation needs of the area while protecting the established residential community and businesses.

The Preferred Design for Mavis Road generally includes the following key elements:

- Widening Mavis Road to 6 through-lanes;
- Reducing the posted speed from 70km/hr to 60 km/hr in the City of Mississauga;
- A sidewalk (east side) and multi-use trail (west side);
- Widening the Highway 407 Bridge to accommodate the additional lanes, sidewalk and multi-use trail;
- No impacts to natural features within the Fletcher's Creek valley;
- Intersection improvements;
- A southbound transit queue jump lane at Derry Road West intersection; and
- Streetscape/landscape mitigation and enhancements.

The Environmental Study Report (ESR) has been prepared to document the

planning and decision-making process for this study. By this Notice, the ESR is being placed on the public record for a thirty (30) day review period from and including June 6 to July 5, 2017 at the following locations and through the website <u>www.mississauga.ca/mavisroadea</u>:

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

The Region of Peel Clerk's Division 10 Peel Centre Drive Brampton ON L6T 4B9 Telephone: 905.791.7800 Monday-Friday: 8:30 am to 4:30 pm Weekends: Closed

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Interested persons may provide written comments to the City of Mississauga's Project Manager, Dana Glofcheskie (see contact information below). If concerns regarding this project cannot be resolved in discussions with the City of Mississauga and Region of Peel, a person or party may request the Minister of the Environment and Climate Change to make an order (referred to as a Part II Order) for the project to comply with Part II of the Environmental Assessment Act which addresses Individual Environmental Assessments. The written request must be received by the Minister within the thirty (30) calendar day review period, with a copy to the Director, Environmental Approvals Branch and the City of Mississauga Project Manager.

Honorable Glen Murray Minister of Environment and Climate Change 77 Wellesley Street West, 11th Floor Toronto ON M7A 2T5 Director, Environmental Approvals Branch Ministry of the Environment and Climate Change 135 St. Clair Avenue West, 1_{st} Floor Toronto ON M4V 1P5 City of Mississauga Project Manager Dana Glofcheskie, P. Eng. 201 City Centre Drive, Suite 800 Mississauga ON L5B 2T4 Tel: 905.615.3200 ext. 8243 dana.glofcheskie@mississauga.ca

Personal information is collected under the authority of the Environmental Assessment Act and will be used in the assessment process. With exception of personal information, all comments shall become part of the public records. Questions about this collection should be directed to the Project Manager listed in the notice. This Notice first issued on June 1, 2017.



EXECUTIVE SUMMARY

Introduction

Mavis Road is a north-south arterial road which runs through the Region of Peel between Queensway West and Steeles Avenue West (and continues north of Steeles Avenue as Chinguacousy Road). Mavis Road provides a connection between the Cities of Mississauga and Brampton, serving local residential/community traffic, commercial and commuter traffic, and provides access to Highway 401, Highway 403 and Highway 407. Mavis Road is under the jurisdiction of the City of Mississauga south of Highway 407 (i.e. the north City Limit), and the Region of Peel north of Highway 407, where it is designated as Regional Road 18.

Mavis Road consists of six-lanes from just north of Dundas Street to Courtneypark Drive West and four lanes north of Courtneypark Drive West to south of Ray Lawson Boulevard with a raised median, sidewalks on both sides and some sections of multi-use trails. North of Ray Lawson Boulevard, Mavis Road has recently been widened to six lanes by the Region of Peel, with a multi-use trail on the west side and sidewalk on the east side.

The section between Courtneypark Drive West and Ray Lawson Boulevard, where Mavis Road narrows to four-lanes, is reaching capacity during peak traffic hours. This is creating a bottleneck along the corridor that requires capacity and operational improvements to resolve.

The City of Mississauga and the Region of Peel have completed a Class Environmental Assessment (Class EA) Study for Mavis Road between Courtneypark Drive West and Ray Lawson Boulevard. The purpose of the study is to plan for a transportation network that provides the north-south arterial road and active transportation infrastructure necessary to address existing problems and opportunities as well as support the future population / employment growth planned in the Region of Peel by improving mobility within and among Mississauga and Brampton and connectivity to 400 series highways.

The Class EA Study was carried out in accordance with Schedule 'C' of the Municipal Class Environmental Assessment (Class EA) (October 2000, amended 2007, 2011, and 2015), which is an approved process under the Ontario Environmental Assessment Act. The Environmental Study Report (ESR) documents the decision making throughout the Class EA study.

Planning Context

The policy context is discussed in Chapter 2 of the ESR. The policy framework guides infrastructure and land use planning and strategic investment decisions to support City and Regional growth and transportation objectives. The key policies include:

- Growth Plan (2006 Office Consolidation June 2013, as amended 2015)
- Region of Peel Official Plan (as amended February 2013)
- Region of Peel Long Range Transportation Plan Update (2012)
- Region of Peel Strategic Goods Movement Plan (2012-2016)
- Region of Peel Active Transportation Plan (2011)
- City of Mississauga Official Plan (October 26, 2016 office consolidation)
- City of Mississauga Strategic Plan (2009, Updated 2014)
- City of Mississauga From Vision to Action Mississauga's Interim Transportation Strategy (2011)
- City of Mississauga Cycling Master Plan (2010)
- MiWay Five Service Plan (2016)
- City of Brampton Official Plan (2006)

Transportation Assessment

The assessment of existing and future traffic operations is presented in **Chapter 2** of the ESR. The existing traffic conditions can be summarized as follows:

- Average daily traffic volume is approximately 35,000 vehicles per day. Currently, traffic is operating at capacity, in particular during the morning and afternoon rush hours.
- Significant delays are being experienced at both the Derry Road and Courtneypark Drive West intersections during morning and afternoon rush hours.
- Due to traffic congestion on Mavis Road, intersecting local streets experience higher delays during rush hours.
- Delays at major intersections are causing drivers to divert through the surrounding residential communities.

- There are a relatively high number of collision incidents observed at Derry Road intersection.
- Mavis Road is six lanes, north and south of the study area. The four-lane roadway through the study area reduces efficiency of the overall road network.

The future traffic conditions can be summarized as follows:

- Based on the analysis, traffic volumes will exceed road capacity by 2021.
- If additional traffic capacity is not provided by this time:
 - Higher traffic volumes will result in more congestion during morning and afternoon rush hours, which will increase travel time;
 - Excessive queuing will block intersecting local roads through the study area;
 - Higher delays on Mavis Road could further increase traffic diversion through the surrounding residential communities; and
 - Higher traffics delays will increase idling time and emissions loadings.
- Even if more people choose transit or active transportation (walking and cycling), the other north-south roads such as Mississauga Road, McLaughlin Road and Hurontario Street will not able to accommodate the future transportation demand.

Needs and Opportunities

The Environmental Study Report sets out the transportation needs (Phase 1) by providing the transportation and planning policy context and the analysis of existing and future traffic conditions to identify the transportation deficiencies (**Chapter 2**). The problems and opportunities that have been identified through the Phase 1 work are highlighted below:

- Region of Peel is experiencing high population and employment growth that will continue over the next 20 years, and beyond.
- Average daily traffic volume is approximately 35,000 vehicles per day. Currently, traffic is operating at capacity, in particular during the morning and afternoon rush hours. Significant delays are being experienced at both the Derry Road and Courtneypark Drive West intersections during morning and afternoon rush hours. Traffic congestion impacts access to Mavis Road from local streets and also causes drivers to divert through the surrounding residential communities.
- Mavis Road is six lanes, north and south of the study area. The four-lane roadway through the study area reduces efficiency of the overall road network.

- Based on the analysis, traffic volumes will exceed road capacity by 2021. If additional traffic capacity is not provided by this time:
 - Higher traffic volumes will result in more congestion during morning and afternoon rush hours, which will increase travel time;
 - Excessive queuing will block intersecting local roads through the study area;
 - Higher delays on Mavis Road could further increase traffic diversion through the surrounding residential communities; and
 - Higher traffics delays will increase idling time and emissions loadings.
- Even if more people choose transit or active transportation (walking and cycling), the other north-south roads such as Mississauga Road, McLaughlin Road and Hurontario Street will not able to accommodate the future transportation demand.
- Improvements to Mavis Road will provide opportunities for an expansion of the active transportation infrastructure to support walking and cycling and will support a more efficient transit network, making this a more attractive choice for travel.

In summary: Mavis Road is an arterial road intended to carry higher traffic volumes, supporting both local and regional mobility. Existing traffic volumes are at capacity during the morning and afternoon rush hours. Projected traffic growth will worsen these conditions. There is an opportunity to improve Mavis Road to accommodate the existing and future traffic demands and provide better connectivity for all modes within the overall Region / City road network. This includes the implementation of Region / City strategic objectives which promote sustainable and safe multi-modal transportation options that provide residents with opportunity to walk, cycle or use public transit as well as an opportunity to improve community amenities / aesthetics for this corridor.

Alternatives and Evaluation

Preferred Planning Solution

The preferred planning solution includes a combination of the following solutions:

- Implementing intersection improvements;
- Providing multi-use trail and sidewalk connections; and
- Widening Mavis Road from 4 to 6 general traffic lanes between Courtneypark Drive West and Ray Lawson Boulevard.

Recognizing that the Cities of Mississauga and Brampton and the Region of Peel will continue to experience population and employment growth in the near future, the proposed improvements to intersections, additional traffic lanes / road capacity and improved active transportation and transit facilities on Mavis Road will better meet the projected transportation needs.

The benefits of the preferred planning solution include: supporting complete communities by providing safe walking and cycling opportunities and efficient transit network; connecting neighboring communities and accommodating more efficient local and regional trips; reducing delays for residents and commercial vehicles and better serve motorists, pedestrians, cyclists and transit users.

Preferred Road Cross-Section

In developing the road cross-section concept, a number of key constraints and design elements were considered:

- Compatibility with adjacent neighbourhoods and community features within the study area;
- Provisions for pedestrians and cyclists and future multi-use trail connections;
- Available existing right-of-way and minimizing property impacts;
- The desire to avoid widening Fletchers Creek Bridge and avoid impacts to the valley;
- A reduction in speed limit within the City of Mississauga and associated reduced cross-section (lane widths);
- Intersection and turning lane recommendations;
- Design requirements and constraints at the Highway 407 Bridge; and
- Geometric design requirements.

The road cross-section concept developed for Mavis Road is depicted in **Exhibit 5-1** (provided in **Chapter 5** and on the following page of the Executive Summary). It is noted that this depiction is 'concept' only and that the cross-section will vary depending on local conditions, constraints and intersection design. Actual cross-sections tied to specific locations along Mavis Road are provided as part of the Recommended Plan in **Chapter 6** of this ESR.



City of Mississauga and Region of Peel Mavis Road - Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report Exhibit 5-1 Road Cross-Section Concept (Mid-Block) There are several locations along the Mavis Road corridor where design alternatives or design iterations were developed in consideration of local conditions / constraints and public and agency feedback. These are described below:

Sombrero Way Intersection Design

During the study, a high level of public feedback was received about the Sombrero Way intersection. Comments primarily related to the following aspects:

- access from northbound Mavis Road to Sombrero Way (left turn queues are very long);
- left and right turn movements from Sombrero Way (not enough storage length); and
- increased traffic on Sombrero Way as a result of the closure of the Second Line West Bridge.

With respect to design alternatives for the access from northbound Mavis Road, a dual left turn lane is not feasible since Sombrero Way is a two lane collector road. However, the storage length for the left-turn lane on northbound Mavis Road was increased from 60 m to 150 m. The original recommendation was to increase storage length to 160 m. However, this was reduced to 150 m following discussions with the Ontario Ministry of Transportation (MTO), given the close proximity to the Highway 401 Interchange.

With respect to left and right turn movements from Sombrero Way; the City considered how the dedicated left turn and right turn lanes could be lengthened, increasing storage and reducing the delays caused by queuing back into the single lane. However, it was determined that any road widening to accommodate the longer turn lanes would result in substantial impacts to several properties, particularly along the south side of Sombrero Way, including encroachment into the boulevards and front yards. Given the property impacts, these potential improvements were set aside from further consideration.

The comments related to increased traffic resulting from the closure of Second Line West Bridge are beyond the scope of the Mavis Road Class EA study. As discussed in **Section 2.1.13**, a separate Class EA study and supporting traffic study was completed to address these comments. The transportation analysis completed as part of this study assumed the closure of the Second Line West Bridge.

Chapter 6 documents the final design of Mavis Road at Sombrero Way which includes:

- Providing Dual left-turn lane for southbound traffic on Mavis Road turning left;
- Lengthening northbound Mavis Road left turn lane at Sombrero Way;
- Providing a multi-use trail on west side of Mavis Road for cycling connections to the future Second Line West Pedestrian Bridge and local schools;
- Widening Mavis Road into the median to avoid property impacts; and
- Enhancing streetscape design.

It is noted that the multi-use trail on the west side of Mavis Road narrows approaching Sombrero Way to accommodate the bus shelter and pad. Cyclists will be required to dismount. This design avoids impacts to the adjacent residential property.

Local Street Intersection Designs

As discussed in **Section 2.2**, additional storage for left-turn lanes was proposed at each collector road intersection with Mavis Road. The technical recommendations based on traffic operations, as identified in **Section 2.2**, were considered in the context of each location. In each case, the recommended design reflects a balance between the technical recommendation and the primary objective to minimize property impacts. The Recommended Design discussed in **Chapter 6** provides for increased storage in left-turn lanes while avoiding / minimizing impacts to boulevards and properties.

Highway 407 Bridge Widening Alternatives

In order to accommodate proposed improvements through the Highway 407 Interchange, the existing bridge will need to be widened. An evaluation of widening alternatives was carried out, documented in **Appendix H** and summarized below.

The alternatives considered were:

- Widen entirely to the west;
- Widen to both sides, maintaining existing Mavis Road centreline;
- Widen to both sides, maintaining existing North to East (N-E)1 on-ramp; and
- Widen entirely to the east.

¹ Ramp naming convention is as follows: 'direction travelling from' - 'direction travelling to'. For example, the N-E ramp = travelling from the north (i.e. southbound) and to the east (eastbound).

The analysis and evaluation of widening alternatives considered the following factors:

- Road alignment and ramp impacts;
- Minimum Vertical Clearance of bridge above Highway 407;
- Durability;
- Constructability; and
- Cost.

Overall, it was determined that Alternative 1, widening entirely to the west, is most preferred. By widening the structure by 11 m to the less constrained west side, this alternative would maintain both the existing full parallel lane and South to West (S-W) on-ramp configuration to the east, as well as required vertical clearances to the west. Realignment of the larger N-E on-ramp would be required. It is noted that widening to the west will require more significant grading work in the vicinity of the N-E on-ramp and nearby Hydro One towers. Further consultation with Hydro One is required during the detailed design phase to ensure that their clearance and access requirements are met.

Preferred Road Widening Alternative

Typically, the approach to road widening will consider four basic design alternatives:

- Widening into the median;
- Widening out from the existing centreline;
- Widening to the east only (i.e., holding westerly property line); and
- Widening to the west only (i.e., holding easterly property line).

For much of the study area, there are existing constraints located along both sides of Mavis Road. Therefore, it was not considered reasonable to develop alternatives that widen "strictly" to the east or west, or on the existing centreline.

Furthermore, the existing Mavis Road was constructed with numerous areas of wide median and boulevard that protected for a potential future widening to six lanes.

Therefore, the approach widening was:

Widen into the median where available;

- Where space in the median is not present or is too narrow to accommodate the entire widening, then widen into the boulevard, while still minimizing property impacts; and
- Incorporate design mitigation measures (e.g. retaining wall) to further minimize property impacts.

The approach is essentially a "best fit", that is, widening the road in such a way that best accommodates the surrounding land uses and constraints. The 'best fit' design was developed on a block by block basis, taking into account local right-of-way, median and boulevard widths and surrounding constraints.

Recommended Plan

The Recommended Plan and Streetscape Concept Plan plates for Mavis Road from Courtneypark Drive West to Ray Lawson Boulevard are located at the end of Chapter 6 of the ESR. The Recommended Plan includes the following:

- Widening to 6 through-lanes;
- Reducing the posted speed from 70 km/hr to 60 km/hr within the City of Mississauga section of Mavis Road;
- A sidewalk on the east side and multi-use trail on the west side;
- Widening the Highway 407 Bridge to accommodate the proposed additional lanes, sidewalk and multi-use trail;
- Modifications to existing 407 ramps to accommodate widened road and bridge;
- No impacts to natural features within the Fletcher's Creek valley;
- Intersection design compliant with Accessibility for Ontarians with Disabilities Act (AODA);
- Improvements at local road intersections without impacting property;
- Intersection improvements;
- A southbound transit queue jump lane on southbound Mavis Road at the Derry Road West intersection;
- Streetscape / landscape enhancements that identify opportunities for landscaping, mitigation / replacement for street tree removals and other benefits amenities; and

 Minimized property impacts by design refinements including the use of retaining walls.

The results of the drainage assessment are as follows:

- Increase in flows resulting from the increased impervious area are nominal.
- The existing storm sewer system has adequate capacity.
- Increase headwater depth at all culverts is considered negligible.
- The Culvert CV7 outlet (west side of Mavis Road) will need to be modified to accommodate the extension of multiuse path. A culvert extension can likely be avoided by the use of wing wall or head wall. This will be confirmed during the detail design phase.
- Existing stormwater management facilities have adequate pool, storage volume to accommodate minor increases in road runoff.
- Low Impact Development (LID) measures are proposed in Section 6.4.9 for consideration during detailed design.

Property Requirements and Access

The Recommended Plan has been developed such that property impacts have been minimized to the extent possible. However, the Recommended Plan will still result in the need to private property in two locations and easements in other locations. The preliminary property impacts are summarized in the table below.

Small portions of two properties will need to be severed and purchased to accommodate the Recommend Plan:

- West side of Mavis Road from Station 11+852 to 11+922 impacted property is a privately owned townhouse/condominium strata (770 Othello Court) located in the northwest quadrant of the Mavis Road / Derry Road West intersection. The impact involves the reduction of the landscaped boulevard adjacent to the intersection, the relocation of the existing property line fence and removal of adjacent trees. It may be feasible to reduce or avoid this property impact by reducing or eliminating the boulevard separating the multi-use path from the roadway. However, this will not be determined until detailed design and the completion of the utility relocation plan.
- West side of Mavis Road from Station 12+840 to 12+980 impacted property is a privately owned townhouse/condominium strata located 7360 Zinnia Place,

adjacent to Mavis Road. The impact is limited to a reduction in the boulevard / common area between Zinnia Place and Mavis Road, and the removal of mature landscape plantings.

The Recommended Plan will also result in encroachments into City of Mississauga, Region of Peel and MTO properties in 13 locations. One MTO parcel is located at Station 13+680 to 13+760 adjacent to the Highway 407 N-W on-ramp. Although the full parcel will be impacted, it is not known whether this will be a purchased by the Region of Peel or if MTO will retain the property and issue and easement. The Region of Peel will determine the appropriate course of action (property purchase or easement) of the MTO property, in consultation with MTO during detailed design.

The Recommended Plan will result in the need for easements at four private properties in order to accommodate grading, remove landscape plantings where roots will be impacted by adjacent construction activity and reconstruct a noise barrier. Again, the City of Mississauga and Region of Peel will work closely with property owners during detailed design to confirm impacts and develop mitigation measures.

These property requirements, shown in the red dash line on the Recommended Plan plates in **Section 6.11**, are preliminary only and subject to further review and confirmation during detailed design.

Location ²	Preliminary Property Requirements (ha)	Nature of Impact
Private Property		
Condominium Corp: PSCC708	0.0022	Property: Minor edge encroachment into common area.
770 Othello Court, Mississauga ON L5W 1H3		The property line fence will need to be set back from its existing location and some landscape plantings will be removed. Buildings / residences will not be impacted.
C/O Larlyn Management Ltd., 7370 Bramalea Road, Suite 20 Mississauga ON L5S 1N6		Trees: 15 trees may require removal; and additional 2 trees may be impacted by grading. Potential for mitigation or replacements (per tree management plan) to be determined in detailed design.
		Temporary Easement: Additional property may be required on a temporary basis during construction for grading purposes; to be confirmed during detailed design. This easement is not included in the preliminary property requirement total.

² Stations are indicated on the Recommended Plan plates found at the end of Chapter 6 of this ESR

Location ²	Preliminary Property Requirements	Nature of Impact
	(ha)	
Condominium Corp: PSCC755 7360 Zinnia Place, Mississauga ON L5W 2A1	0.080	Property: 4 to 7 m encroachment into boulevard / common area between Mavis Road and Zinnia Place consisting of guard rail and landscape plantings. Buildings / residences will not be impacted.
C/O Downing Street Property Management Inc. 668 Millway Avenue, Unit 7, Vaughan ON L4K 3V2		Trees: 33 trees may require removal. The trees appear to be on private and public property. Potential for mitigation or replacements (per tree management plan) to be confirmed in detailed design.
		Temporary Easement: Additional property may be required on a temporary basis during construction for grading purposes; to be confirmed during detailed design. This easement is not included in the preliminary property requirement total.
Public Property (Municipal, Re	gional, & Provincial)
City of Mississauga property west of Mavis Road from Station 10+520 to 10+585 PIN: 132132885	0.018	Minor edge encroachment into landscaped area west of Mavis Road consisting of MiWay transit stop, noise wall berm, and plantings.
City of Mississauga property west of Mavis Road from Station 10+585 to 10+610 PIN: 132132894	0.006	Minor edge encroachment into landscaped area west of Mavis Road.
City of Mississauga property west of Mavis Road from Station 10+585 to 10+610 PIN: 132132888	0.001	Full parcel required to accommodate widening of Mavis Road and multi-use trail through this section.
City of Mississauga property west of Mavis Road from Station 10+610 to 10+665 PIN: 132132884	0.005	Minor edge encroachment into landscaped area west of Mavis Road.
City of Mississauga property west of Mavis Road from Station 11+660 to 11+690 PIN: 132131795	0.007	Minor edge encroachment into landscaped area west of Mavis Road.
City of Mississauga property west of Mavis Road at Station 11+680 PIN: 132131794	0.002	Minor edge encroachment into landscaped area west of Mavis Road.
City of Mississauga property west of Mavis Road from Station 12+750 to 12+795 PIN: 140843419	0.003	Minor edge encroachment into landscaped area west of Mavis Road consisting of fence line and plantings.

Location ²	Preliminary Property Requirements	Nature of Impact
City of Mississauga property	(ha)	Minor odeo operachment into landoconod orea west of
west of Mavis Road from Station 12+800 to 12+840 PIN: 140844882	0.007	Mavis Road consisting of fence line and plantings.
City of Mississauga property west of Mavis Road from Station 12+800 to 12+984 PIN: 140844884	0.006	Full parcel required to accommodate widening of Mavis Road and multi-use trail through this section.
MTO property west of Mavis Road from Station 12+978 to 12+984 PIN: 140845068	0.001	Minor edge encroachment into vegetated area adjacent to the Highway 407 E-N/S off-ramp intersection to accommodate widening of Mavis Road and multi-use trail through this section.
MTO property west of Mavis Road from Station 12+978 to 12+984 PIN: 140845070	0.004	Minor edge encroachment into vegetated area adjacent to the Highway 407 E-N/S off-ramp intersection to accommodate widening of Mavis Road and multi-use trail through this section.
Region of Peel property west of Mavis Road at Station 13+680 PIN: 140845450	0.001	Minor edge encroachment into landscaped area adjacent to the Highway 407 S-W on-ramp.
MTO property west of Mavis Road from Station 13+680 to 13+760 PIN: 140845082	0.039	Full parcel required to accommodate widening of Mavis Road and multi-use trail through this section.
Temporary Easements and Tre	ee Removals on Priv	vate Property
759 Sombrero Way, Mississauga ON L5W 1S8 PIN: 132132804	To be determined during detailed design	Temporary Easement : Access to property may be required on a temporary basis during construction for grading purposes and to reconstruct the noise wall; to be confirmed during detailed design.
766 Brass Winds Place, Mississauga ON L5W 1T4	To be determined during detailed	Temporary Easement: Access to property may be required on a temporary basis during construction for
PIN: 132132766	aesign	confirmed during detailed design
735 Twain Avenue, Mississauga ON L5W 1X1	To be determined during detailed design	Trees: 5 trees may require removal due to grading. Potential for mitigation or replacements (per Tree Management Plan) to be determined in detailed design.
PIN: 140843412		Temporary Easement: Access to property may be required on a temporary basis during construction for grading purposes and to construct a new sound wall; to be confirmed during detailed design.

Location ²	Preliminary Property Requirements (ha)	Nature of Impact
Condominium Corp: PSCC857	To be determined	Trees: 15 trees may require removal; one additional tree
Cailiff Street, Brampton ON L6Y 0P9	during detailed design	may be impacted due to grading. Potential for mitigation or replacements (per Tree Management Plan) to be determined in detailed design.
C/O Orion Management 7-17575 Trinity Drive, Mississauga ON L5T 1K4		Temporary Easement: Access to property may be required on a temporary basis during construction for grading purposes; to be confirmed in detailed design.

Existing access locations to collector streets, commercial businesses, institutions etc. are not anticipated to change with the Recommend Plan. Mississauga Station 121 (Fire Station) will continue to have full access. A gap in the raised median will be maintained in this location. Access for pedestrians and cyclists to Mavis Road will be enhanced through the proposed addition of mid-block access points at:

- Golden Farmer Way (Stations 11+190 and 11+350);
- Tassel Crescent (Station 11+700);
- Macbeth Heights (Station 12+360); and
- Magistrate Terrace (Station 12+930).

Consultation

The consultation program was extensive and is documented in **Chapter 7** of the ESR. External agencies, utilities, emergency service providers, municipalities and other stakeholders, as well as property owners in proximity to the study area were contacted during the study and requested to provide input and to comment on the study findings. Members of the general public were notified of the study through notifications in local newspapers, and invited contact the project team to join the project mailing list.

Aboriginal community engagement is documented in **Section 7.2**. The completed MOECC Preliminary Assessment Checklist is provided in **Table 7-4**. On the basis of First Nation community responses to date, and the completion of the checklist, no specific concerns have been identified to date that would trigger a formal 'Duty to Consult' process. The City of Mississauga remains flexible to accommodate and address any triggers that may be identified in future, the project moves forward.

Commitments to Further Work

Mitigation measures as well as environmental protection and enhancement measures will be employed during implementation of the Recommended Plan to reduce or avoid environmental impacts. **Table 8-4** in **Chapter 8** of the ESR summarizes the key concerns identified to date, and considerations / commitments to future work.

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- Appendix K: Highway 407 Interchange Design Criteria
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- **Appendix M: Noise Assessment**
- Appendix N: Air Quality Assessment

1 INTRODUCTION AND STUDY BACKGROUND

1.1 Introduction

Mavis Road is a north-south arterial road which runs through the Region of Peel between Queensway West and Steeles Avenue West (and continues north of Steeles Avenue as Chinguacousy Road). Mavis Road provides a connection between the Cities of Mississauga and Brampton, serving local residential/community traffic, commercial and commuter traffic, and provides access to Highway 401, Highway 403 and Highway 407. Mavis Road is under the jurisdiction of the City of Mississauga south of Highway 407 (i.e. the north City Limit), and the Region of Peel north of Highway 407, where it is designated as Regional Road 18.

Mavis Road consists of six-lanes from just north of Dundas Street to Courtneypark Drive West and four lanes north of Courtneypark Drive West to south of Ray Lawson Boulevard with a raised median, sidewalks on both sides and some sections of multi-use trails. North of Ray Lawson Boulevard, Mavis Road has recently been widened to six lanes by the Region of Peel, with a multi-use trail on the west side and sidewalk on the east side.

The section between Courtneypark Drive West and Ray Lawson Boulevard, where Mavis Road narrows to four-lanes, is reaching capacity during peak traffic hours. This is creating a bottleneck along the corridor that requires capacity and operational improvements to resolve.

The City of Mississauga and Region of Peel have completed a Class Environmental Assessment (Class EA) Study for Mavis Road between Courtneypark Drive West and Ray Lawson Boulevard. The purpose of the study is to plan for a transportation network that provides the north-south arterial road and active transportation infrastructure necessary to address existing problems and opportunities as well as support the future population / employment growth planned in Region of Peel by improving mobility within and among Mississauga and Brampton and connectivity to 400 series highways.

The Class EA Study was carried out in accordance with Schedule 'C' of the Municipal Class Environmental Assessment (Class EA) (October 2000, amended 2007, 2011, and 2015), which is an approved process under the Ontario Environmental Assessment Act. The Environmental Study Report (ESR) documents the decision making throughout the Class EA study. This is discussed further in **Section 1.2**.

1.2 Study Area

The study area extends for a distance of approximately 3.6 km from Courtneypark Drive West in the City of Mississauga, to Ray Lawson Boulevard in the City of Brampton, as depicted on the key map on this page and on **Exhibit 1-1**.

The southerly study limit will tie into the existing six-lane section of Mavis Road north of Highway 401, and the northerly study limit will tie into the existing six-lane section of Mavis Road south of Ray Lawson Boulevard.

Other relevant projects in the area include the Ministry of Transportation's Highway 401 widening including the removal of the existing Second Line West Bridge over Highway 401, and replacement with an active transportation structure. These are discussed further in **Section 2.1**.





Exhibit 1-1: Mavis Road Class EA Study Area Courtneypark Drive West to Ray Lawson Boulevard

1.3 Environmental Assessment Process

Municipal infrastructure projects are subject to the Ontario Environmental Assessment Act (EA Act). The Class Environmental Assessment (Class EA) is an approved self-assessment process under the EA Act for a specific group or "class" of projects. Projects are considered approved, subject to compliance with an approved Class EA process. The Municipal Class EA (Municipal Engineers Association October 2000, as amended in 2007, 2011 and 2015) applies to municipal infrastructure projects including roads, water and wastewater.

1.3.1 Municipal Class Environmental Assessment

The Municipal Class EA outlines a comprehensive planning process that provides a rational approach to consider the environmental and technical advantages and disadvantages of alternatives in order to determine a preferred alternative for addressing the problem or opportunity, as well as consultation with agencies, directly affected stakeholders, Aboriginal Communities and the general public throughout the process. The key principles of successful environmental assessment planning include:

- Consultation;
- Consideration of a reasonable range of alternatives;
- Consideration of effects on natural, social, cultural, and economic environments and technical components;
- Systematic evaluation;
- Clear documentation; and
- Traceable decision making.

Providing that the Class EA planning process is followed, a proponent does not have to apply for formal approval under the EA Act.

The Municipal Class EA process is shown on **Exhibit 1-2** and includes:

- Phase 1: identify the problem or opportunity;
- Phase 2: identify alternative solutions;
- Phase 3: examine alternative methods of implementing the preferred solution;
- Phase 4: prepare and file an Environmental Study Report; and
- Phase 5: proceed to detailed design, construction and operation.



City of Mississauga and Region of Peel Mavis Road - Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report Exhibit 1-2: Municipal Class Environmental Assessment Process The classification of projects and activities under the Municipal Class EA is as follows:

Schedule A: Includes normal or emergency operational and maintenance activities, which are limited in scale and have minimal adverse environmental effects. These undertakings are pre-approved and the proponent can proceed without further assessment and approval.

Schedule A+: Introduced in 2007, these projects are also pre-approved. The public is to be advised prior to the implementation of the project.

Schedule B: Includes projects that have the potential for adverse environmental effects. This includes improvements and minor expansions of existing facilities. These projects are approved subject to a screening process which includes consulting with stakeholders who may be directly affected and relevant review agencies.

Schedule C: Includes the construction of new facilities and major expansions to existing facilities. These undertakings have the potential for significant environmental effects and which must proceed under the planning and documentation procedures outlined in the Municipal Class EA document.

The Mavis Road Class EA Study has been identified as a Schedule 'C' under the Municipal Class EA (**Exhibit 1-2**). An Environmental Study Report (ESR) is required for Schedule 'C' projects to document the environmental assessment and decision-making process.

1.3.1.1 Environmental Study Report

This Environmental Study Report (ESR), prepared as part of this Schedule C Class EA, documents the process followed to determine the recommended undertaking and the environmentally significant aspects of the planning, design and construction of the proposed Mavis Road improvements. It describes: the problem being addressed, the existing social, natural and cultural environmental considerations, planning and design alternatives that were considered, a description of the recommended alternative and its environmental effects and proposed mitigation measures, and commitments to further work, consultation, and monitoring, associated with the implementation of the project.

For further information on the Municipal Class EA process, readers are referred to the Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 and 2015). The City of Mississauga Project Manager for this Class EA Study is also available to discuss this information and can be contacted as follows:

Dana Glofcheskie, P.Eng. City of Mississauga 201 City Centre Drive, Suite 800 Mississauga, ON L5B 2T4 Phone: 905-615-3200, Ext. 8243 Email: dana.glofcheskie@mississauga.ca

As required by the Municipal Class EA, this ESR is being made available to stakeholders, regulatory agencies, Aboriginal Communities and the general public for a 30 calendarday review period. A notice of ESR submission was placed in local newspapers and on the City's website, and letters were mailed to notify government agencies, Aboriginal Communities, affected property owners and members of the public on the study mailing list. **During the review period, parties with outstanding issues are encouraged to bring their project concerns to the attention of the City of Mississauga for resolution.**

If concerns are raised during the 30 calendar-day review period that cannot be resolved through discussions with the City, then stakeholders, agencies, Aboriginal Communities or members of the public may request the Minister of the Environment and Climate Change to issue a Part II Order (also referred to as a 'bump-up') for the project, thereby requiring an elevated scope of study.

1.3.1.2 Part II Order Request

The Municipal Class EA process includes an appeal provision to change the status of a project from being subject to the Municipal Class EA process to being subject to an Individual Environmental Assessment as per Part II of the Ontario EA Act.

A Part II Order request requires submission of a written request to the Minister of the Environment and Climate Change, prior to the end of the 30 calendar-day review period, outlining the unresolved issue and requesting the Minister to review the matter. Part II Order requests are submitted in writing to:

Minister Ministry of the Environment and Climate Change 77 Wellesley St. West, Floor 11 Toronto ON M7A 2T5 Fax: 416-314-8452
Copies of the request must also be sent to the City of Mississauga Project Manager (at the address provided above) and Director of the Environmental Approvals Branch at the Ministry of the Environment and Climate Change (MOECC) at the address below:

Director, Environmental Approvals Branch Ministry of the Environment and Climate Change 135 St. Clair Ave West, 1st Floor Toronto ON M4V 1P5

EAASIBgen@ontario.ca

The decision on whether a Part II Order (bump-up) is appropriate or necessary rests with the Minister of the Environment and Climate Change. If no Part II Order requests are outstanding by the end of the 30 calendar-day review period, the project is considered to have met the requirements of the Class EA, and the City may proceed to subsequent phases of design and construction subject to meeting any commitments documented in this ESR and obtaining the necessary environmental approvals.

For further information regarding Part II Order requests, including the specific submission requirements, please go to:

https://www.ontario.ca/environment-and-energy/class-environmental-assessments-partii-order

1.3.2 Infrastructure Ontario Class Environmental Assessment Process

Where lands owned or managed by Infrastructure Ontario (e.g. hydro corridor lands) may be impacted by a municipal project, the Ministry of Infrastructure (MOI) Public Works (MOI) Class EA may apply.

Based on the Recommended Plan (Chapter 6), no impacts to IO lands have been identified. This should be confirmed during detailed design. Where impacts to IO lands (e.g., disposition, easements etc.) may be identified, consultation with IO will be required in order to confirm and complete the Public Works Class EA requirements. This process will be triggered in detailed design, as appropriate.

1.3.3 Canadian Environmental Assessment Act

The new Canadian Environmental Assessment Act, 2012 (CEAA 2012) and associated regulations came into effect on July 6, 2012. Under CEAA 2012, a federal environmental assessment is required of "designated projects". A designated project includes one or

more physical activities that are set out in the regulations under CEAA 2012 or by order of the federal Minister of Environment.

The scope of the Mavis Road Class EA Study was reviewed against the federal Regulations Designating Physical Activities, and it was determined that the study is not "designated" and therefore will not require consideration of a federal environmental assessment. However, the project may still require federal permits / approvals to meet the requirements of other federal legislation. Any required federal approvals will be identified during this Class EA and will be obtained during the subsequent design phases.

1.4 Study Approach and Organization

While the general Municipal Class EA process is shown in **Exhibit 1-2** the main study stages and schedule of the Mavis Road Class EA is depicted in **Exhibit 1-3**.

The study team organization reflects the general administrative, consultation and technical needs of the study.

1.4.1 Core Project Team

The study was carried out under the direction of senior staff of the City of Mississauga and managed by WSP | MMM on behalf of the City. The Region of Peel provided direction on matters pertaining to the section of Mavis Road under their jurisdiction (between the City of Mississauga's north limits and Ray Lawson Boulevard, including Highway 407 interchange). Members of the Project Team include:

Member	Role
Dana Glofcheskie, P.Eng.	Project Manager, City of Mississauga
Leslie Green, P.Eng.	Manager, Transportation Projects, City of Mississauga
Gino Dela Cruz, P.Eng.	Project Manager, Region of Peel
Neil Ahmed, P.Eng.	Consultant Project Manager, WSP MMM
Heather Templeton, P.Eng.	Deputy Consultant Project Manager, WSP MMM
Gillian Thompson, MCIP RPP	Consultant Environmental Planner, WSP MMM
Keyur Shah, P.Eng.	Consultant Traffic Engineering, WSP MMM

1.4.2 Consultant Team

The team of consultant specialists and their associated roles included:

Member	Role
WSP MMM	Project Management / Consultation Class EA Process Transportation Planning / Traffic Analysis Roadway Design Bridge Engineering Active Transportation Design Drainage and Stormwater Management Natural Environment Effects and Mitigation Noise Analysis Utilities Landscaping / Streetscaping Geomatics
New Directions Archaeology Ltd.	Archaeological Assessment
Unterman McPhail Associates	Cultural Heritage Assessment
Thurber Engineering	Geotechnical Review
Novus Environmental	Air Quality Analysis

The project team recognized that there are many different interests within the study area. To provide all affected stakeholders with an opportunity to become involved the study, the consultation program included outreach and soliciting feedback from:

- Potentially directly affected property owners along Mavis Road and residents and business owners within the surrounding community;
- Aboriginal Communities;
- Technical Agencies (including Ministry of Transportation, 407ETR, Ministry of Natural Resources and Forestry, Credit Valley Conservation);
- Utilities (e.g., Enbridge, Alectra (formerly Enersource), Hydro One Networks Inc., Brampton Hydro); and the
- General public.

Consultation and engagement of these groups is documented in **Chapter 7** of this ESR.

Phase 1: Problem and Opportunity

 Identify and describe Problems and Opportunities

Phase 2: Alternative Planning Solution

- Identify transportation planning solutions
- Inventory the natural, social, economic and cultural environments
- Identify a Preliminary Preferred Planning Solution

Phase 3: Alternative Design Concepts for the Preferred Planning Solution

- Assess and evaluate the design alternatives with consideration of environmental and technical impacts
- Identify a Preliminary Preferred Design

Phase 4: Environmental Study Report

- Complete the Environmental Study Report (ESR) that documents all of the activities undertaken and the decision making process
- Place the ESR on public record for 30 day public review period

Notice of Commencement April 2016

PIC # 1 June 14, 2016

- Existing conditions
- Problems and Opportunities
- Transportation
 Planning Alternatives

PIC # 2 November 9, 2016

- Preliminary Preferred Design Plan
- Streetscape
 Concepts

Notice of Study Completion Spring 2017

Phase 5: Implementation

2 NEED AND JUSTIFICATION

2.1 Planning Context

The policy framework and context used in reviewing and assessing the existing infrastructure and future requirements of Mavis Road is discussed in this section. The policy framework guides infrastructure and land use planning and strategic investment decisions to support City and Regional growth and transportation objectives. These policies are in place with the goal of sustaining and improving the quality of life of residents while considering the broader municipal interests. The assessment and evaluation of the study area problems and opportunities is carried out with due consideration to the policy framework in order to ensure that the Recommended Plan is consistent with the policies and objectives of the various levels of government (i.e., municipal, regional, provincial). The relevant municipal plans and policies are highlighted in the following subsections.

2.1.1 Growth Plan (2006 Office Consolidation June 2013, as amended 2015)

The Places to Grow Act, 2005 provides the legal framework necessary to implement the Province's vision for managing growth within the Greater Golden Horseshoe (GGH). The Act enables the government to plan for population growth, economic expansion and the protection of the environment, agricultural lands and other resources in a coordinated and strategic manner. The Growth Plan for the Greater Golden Horseshoe (2006) was prepared under the Places to Grow Act. The Plan guides decisions on transportation, infrastructure planning, land-use planning, urban form, housing, natural heritage and resource protection. To ensure sustainable growth, Section 3.2.2 of the Growth Plan addresses the infrastructure required to support growth.

The Transportation Planning system within the GGH will be planned and managed to:

- a) provide connectivity among transportation modes for moving people and for moving goods;
- b) offer a balance of transportation choices that reduces reliance upon any single mode and promotes transit, cycling and walking;
- c) be sustainable, by encouraging the most financially and environmentally appropriate mode for trip-making;
- d) offer multi-modal access to jobs, housing, schools, cultural and recreational opportunities, and goods and services; and
- e) provide for the safety of system users.

Growth within the Region of Peel and the City of Mississauga is mandated by the Province's Growth Plan. The Region and City Official Plans comply with the Province's plan and include both new and infill / intensification developments. It is the responsibility of both the Region and City to ensure that the transportation network can support planned growth and provide for efficient movement both locally, on a neighbourhood level, as well as regionally.

The planning of Mavis Road improvements is consistent with direction in the Growth Plan, which is to provide connections among and between communities, support efficient transit services, support multi-modal uses through provisions for pedestrians and cyclists, increase efficiency and flexibility of the transportation network, reduce delays for residents and businesses, and to relieve and diffuse demands on arterial roads.

2.1.2 Region of Peel Official Plan (as amended February 2013)

The Region of Peel Official Plan (ROP) is a long-term plan used to assist the Region in managing growth and development. The main purpose of the Plan is to: provide a long-term regional strategic policy framework for guiding growth and development in Peel while having regard for protecting the environment; and to outline a regional structure that manages this growth within Peel in the most efficient manner. The over-arching theme of the plan is sustainability supported by environmental, social, economic and cultural imperatives that are reflected through the specific policies. With respect to transportation, the ROP's general objectives include: providing sustainable, safe, efficient and integrated multi-modal transportation system; providing improved mobility and choice; promoting increased use of public transit; and optimizing the use of existing infrastructure.

2.1.3 Region of Peel Long Range Transportation Plan Update (2012)

The Region of Peel Long Range Transportation Plan (LRTP) considers region-wide planned population and employment growth (land use, geographic distribution), demographics and health trends, to identify the key challenges that the Region of Peel expects to face over the next several decades. Such challenges include: population growth; increasing traffic congestion; dependence on cars; increasing work trip lengths; Intra-regional trips; need to increase transit modal share; need to maintain economic competitiveness; aging population; and environmental impacts of transportation and the promotion of walking, cycling and transit. The LRTP sets out a number of ongoing and planned transportation and transit initiatives to address the key challenges.

2.1.4 Region of Peel Strategic Goods Movement Plan (2012-2016)

The Region of Peel is one of Canada's most important multi-modal goods movement hubs. Peel's central location within a significant consumer market and its proximity to Toronto Pearson Airport, numerous 400-series highways and two intermodal rail / truck facilities make it a significant attractor for goods movement activity. Formed in 2009, the Peel Goods Movement Task Force's mission is to support business with a transportation system that moves goods and delivers services quickly and efficiently. The Peel Goods Movement Strategic Plan (2012-2016) identifies a plan of action to improve how goods are moved within and through Region of Peel which includes: pursuing infrastructure improvements; and optimization of existing infrastructure. The Goods Movement Network includes: Highways 401 and 407 as part of the provincial truck network; Derry Road as a primary truck route; and Mavis Road from Queensway to Courtney Park Drive as a primary truck route. While not identified as part of the strategic goods movement network, Mavis Road within the Mavis Road Class EA study limits plays an important role in supporting the broader network.

2.1.5 Region of Peel Active Transportation Plan (2011)

The Region of Peel Active Transportation Plan provides a framework for how the Region will increase the share of trips by walking and cycling, enhance modal integration (e.g. linking active modes of transportation with transit); and create a pedestrian and cycling friendly environment.

The Plan sets out policies that direct the practices of the Region to support:

- more walking and cycling;
- active transportation improvements to the existing cycling and pedestrian networks; and
- strategies / programs to shift travel behavior.

Improvements that make walking and bicycling viable transportation choices will be important to achieve the Region of Peel's objectives for long-term growth and for healthy and livable communities. The Plan builds upon existing and ongoing plans from the area municipalities, neighbouring municipalities and other agencies.

In terms of existing or planned routes within the Mavis Road Class EA study area, the Region of Peel Active Transportation Plan (2011) includes the following which are depicted on **Exhibit 2-1**:

Multi-use trail along Mavis Road, north of Highway 407 (recently constructed);

- Linkage to a future east-west multi-use trail on Steeles Avenue; and
- Multi-use trail along Derry Road (some portions have been constructed).

The Mavis Road Class EA has given careful consideration to these facilities and how they may benefit from improvements to Mavis Road (i.e., providing cycling connections among these facilities along Mavis Road).

2.1.6 City of Mississauga Official Plan (October 26, 2016 office consolidation)

The City of Mississauga Official Plan provides planning policies to guide the City's development to the year 2031. The Official Plan provides policies to manage and direct the physical change of the City and the effects of such change on the social, economic, cultural and natural environment.

In terms of transportation, Chapter 8 of the Official Plan sets out policies to create a multimodal transportation system comprised of the following modes of travel: transit, vehicular (e.g. cars and trucks), active transportation (e.g. walking and cycling), and rail and air (passenger and freight). The policy areas addressed are: **Multi-Modal Network** including policies on corridor protection, road network, transit network and active transportation; **Transportation Infrastructure Design** including road design, transit design; cycling and pedestrian design; **Parking**; **Transportation Demand Management** and measures to encourage people to take fewer and shorter vehicle trips to support transit and active transportation choices; **Mobility Hubs** that encourage land use development that is mixed, concentrated and connected by a variety of modes of transportation; **Goods Movement**; **Rail Corridors**; and **Airport**. Key aspects of the Official Plan in the context of the Mavis Road Class EA study are summarized as follows:

- Schedule 8 Designated Right-of-Way Widths and Table 8-1 (Exhibit 2-2) designates a 35 m right-of-way for Mavis Road, which is the City's standard for a six-lane arterial roadway. In keeping with this, Mavis Road to the south of the study area is already six lanes while Mavis Road to the north of the study area has recently been widened from four to six lanes by the Region of Peel. Widening Mavis Road from four to six lanes through the study area would close this gap and help to achieve the long-term capacity and operational requirements of the corridor as outlined in the City's Official Plan.
- While arterial roads are to be designed as principle transportation corridors for high volumes of people and goods, the design of these thoroughfares must be sensitive to surrounding land uses.
- Emphasize opportunities for transit and active transportation: The local transportation system will focus on the day to-day travel needs of those who live,



Existing Cycling Facilities

-Multi-Use Trail

Region Capital Program and Other Facilities[^] ••• Planned Multi-Use Trail

- ••• Planned Paved Shoulder
- Municipal Path*
- Planned Municipal Path*

ARegion Capital Program is based on 2011 Region Capital Plan

Proposed Cycling Facilities

- Segregated Bicycle Lane
- Paved shoulder
- -Bicycle Lane
- -Multi-Use Trail
- www.Signed/Marked Share Lanes

City of Mississauga and Region of Peel Mavis Road - Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report Exhibit 2-1: Peel Region Active Transportation Plan





Schedule 8 **Designated Right-of-Way Widths**

67 m
 65 m
60 m
 55 m
 50 m
45 m
44.5 m
43.5 m
 42 m
40 m
36 m
 35 m
 30 m-50 m
30 m
 27.5 m
26 m
 23 m-26 m
 22 m
 20 m-26 m
 20 m

APPEALS

The information on this schedule reflects Council adopted amendments. The following amendments are under appeal and affect this schedule: No appeals at time of consolidation.

For in effect mapping information refer to the Consolidation Tables and MOPA document.

1. These are considered basic rights-of-way. At intersections, grade separations or major physical topographical constraints, wider rights-of-way may be required to accommodate necessary features such as embankments, auxiliary lanes, additional pavement or sidewalk widths, transit facilities, cycling facilities, or to provide for necessary improvements for

2. These right-of-way widths are intended to accommodate the Higher Order Transit Corridors, Bus Rapid Transit facility and Bus Rapid Transit stations shown schematically on Schedule 6, as well as transit stations along Higher Order Transit Corridors, automobile, truck and other vehicular movements. Where as a result of further studies the land areas required to accommodate these rights-of-way are deemed to be insufficient, the City may acquire additional rights-of-way in excess of the basic right-of-way widths shown on Schedule 8. Portions of the Bus Rapid Transit facility are protected under the Parkway Belt West Plan. In addition, the City may acquire lands for a public transit right-of-way along Higher Order Transit Corridors and the Bus Rapid Transit Corridor where the creation of a public transit right-of-way separate from, adjacent to, or in addition to a road right-of-way is deemed appropriate. 3. While it is intended that this Schedule provide a basis for retaining or acquiring rights-of-way for current or possible future transportation purposes, it is not intended to imply that all

Exhibit 2-2: City of Mississauga Official Plan Schedule 8 - Road Rights-of-Way

- work or play in Mississauga, and will primarily be accommodated on City roads and multi-use trails. Schedule 7 Long Term Cycling Routes identifies existing and future cycling routes.
- Mavis Road is not identified within the Official Plan as a rapid transit corridor, however transit on Mavis Road will support access to mobility hubs and higher order transit facilities.
- Section 8.3.1 of the Official Plan indicates the following with respect to road design to optimize the operational safety and efficiency of the multi-modal transportation system:
 - The City will ensure that the design of roads promotes safety and comfort for all users. Roads will also be designed to complement and minimize impacts to adjacent land uses and communities.
 - 8.3.1.1 The City will design its roads in a manner that:
 - has regard for the safe movement of all road users, including transit, cyclists, pedestrians and motorists;
 - is context sensitive having regard for existing and planned land uses, urban design, community needs and funding availability;
 - minimizes the disruption to the Natural Heritage System and preserves, where appropriate, existing tree canopies; and
 - is sensitive to local cultural heritage resources.
 - 8.3.1.2 Within Intensification Areas and Neighbourhoods, the design of roads and streetscapes will create a safe, comfortable and attractive environment for pedestrians, cyclists and motorists by:
 - reducing lane width, where appropriate;
 - providing streetscaping to reduce the apparent width of the right-of-ways;
 - locating sidewalks and cycling facilities where conflicts with motorized traffic are minimized; and
 - creating safe road crossings for pedestrians and cyclists.
 - 8.3.1.3 Where feasible and appropriate, the widths of lanes dedicated to vehicular traffic may be reduced to accommodate transit facilities and pedestrians, enhance streetscapes and pedestrian and cycling facilities.

2.1.7 City of Mississauga Strategic Plan (2009, Updated 2014)

This plan directs the City's strategic decision-making based on the five "Strategic Pillars for Change: Move, Belong, Connect, Prosper, and Green." These include plans to:

- make transit a faster and more affordable alternative to the automobile, one that is frequent, clean, safe, reliable and convenient, with a transit stop within walking distance of every home and an intricate web of higher order transit;
- add capacity to the transportation system through strategic investments in transit, additional links in the street network and active mobility choices;
- direct growth by supporting transit-oriented development policies and deliberate civic actions;
- contribute to environmental responsibility by reducing private automobile use and developing compact mixed-use development;
- develop walkable, connected neighbourhoods to develop compact, mixed-use neighbourhoods that will give residents the ability to engage safely in all aspects of their everyday lives, within walking distance and easy access. Evaluate all development and infrastructure projects against a test of "pedestrian-first"; and
- provide mobility choices to provide all with the choice to walk, cycle and use transit or active modes of transportation in all seasons, because it is convenient, connected, desirable and healthy.

2.1.8 City of Mississauga From Vision to Action – Mississauga's Interim Transportation Strategy (2011)

The City of Mississauga's Interim Transportation Strategy envisions a safe and connected multimodal transportation system that enhances the City's environment, supports the local economy, and connects people to places and moves goods to market. Key strategic directions are as follows:

- Advance the development of a multi-modal transportation network through design and implementation of transit, cycling and pedestrian facilities.
- Enhance system capacity through design, network linkages, and new roads.
- Build intelligent transportation systems (ITS) into the transportation network to improve safety and efficiency.
- Improve the integration of transportation and land use.
- Pursue partnerships to accelerate the development of a multi-modal transportation network.

Undertake research and continuous improvement.

The Mavis Road Class EA is premised upon the strategic direction of the Transportation Strategy.

2.1.9 City of Mississauga Cycling Master Plan (2010)

Mississauga's Cycling Master Plan outlines a strategy to develop more than 900 km of on and off-road cycling routes in the city over the next 20 years. The vision is to make Mississauga a city where people choose to cycle for recreation, fitness and for their daily transportation needs. When implemented, the plan will provide an integrated multi-modal approach to transportation throughout the city. This will connect destinations and place 95 per cent of the City's population within one kilometre of a primary cycling route.

The existing and proposed cycling network in the vicinity of the study area is depicted on **Exhibit 2-3** and described in more detail in **Section 2.2.1**.

Within the existing plan, the following is generally identified:

- Proposed primary boulevard routes along Derry Road West, and Courtneypark Drive West (multi-use trail exists along Derry Road West);
- Proposed primary off-road route within the Fletcher's Creek valley.
- Proposed secondary routes crossing Mavis Road at: Sombrero Way, Crawford Mill Avenue / Novo Star Drive, Old Derry Road, Envoy Drive / Kaiser Drive, Knotty Pine Grove / Twain Avenue.
- An existing boulevard multi-use trail along Mavis Road from Highway 407 to Derry Road;
- Municipal connections between the Cities of Brampton and Mississauga at Second Line West;
- New active transportation crossing of Highway 401 at Second Line West.

An update to the City's Cycling Master Plan is currently underway.

The Mavis Road Class EA has given careful consideration about these facilities and how they may benefit from improvements to Mavis Road (i.e., providing cycling connections along Mavis Road).



Exhibit 2-3: City of Mississauga Cycling Master Plan

2.1.10 MiWay Five Service Plan

Mavis Road has traditionally been serviced by MiWay Routes 42, 61, 61A, and 57, and Brampton Transit Routes 6 and 53. The Brampton transit routes provide connection to Brampton Zum at Steeles Avenue. The existing transit network and service is described in greater detail in **Section 2.2.1**.

The MiWay Five Service Plan (2016-2020) recommends changes for routes in and around the study area which will change where and when transit operates on Mavis Road. The changes include the following which are depicted on **Exhibit 2-4**:

- extending Route 61 north along Mavis Road, into the City of Brampton;
- elimination of Route 61 A; and
- changes to Routes 57 and 42 on Derry Road West and Old Derry Road around Meadowvale Village.

2.1.11 Natural Heritage and Urban Forestry Policies

City of Mississauga Natural Heritage and Urban Forest Strategy (2014) and Urban Forest Management Plan (2014)

The City of Mississauga's Natural Heritage and Urban Forest Strategy (NH&UFS) will guide the management of Mississauga's Natural Heritage System and Urban Forest for the next 20 years and will ensure that they are protected, enhanced, restored and expanded for future generations.

The City of Mississauga's Urban Forest Management Plan (UFMP) actions are intended to improve the health, sustainability and performance of the urban forest on both private and public lands through administration, health and risk management, expansion, protection and stewardship. The Plan includes some of the following objectives for municipal operations and capital projects:

- Increase effectiveness of tree preservation;
- Creation of better 'plant-able' areas; and
- Avoid last minute retrofitting of designs to try and accommodate trees.

Planning principles from these documents were considered during the Mavis Road Class EA. The tree inventory and tree management plan / streetscape concept reflect the approach to management based on the City's direction.



Existing Mississauga Transit Network



Mississauga Transit Network

Mississauga Natural Area Survey

The Natural Areas Survey (NAS) identifies the natural areas system, which includes 144 sites representing the best remaining natural features in the City. The intent of the NAS is to provide the current status of natural areas and updated information on flora, fauna, impacts, boundary changes and management needs.

There are two Natural Areas within the Mavis Road Class EA study limits:

- Meadowvale Station Woods and Fletcher's Creek (MV2): this natural area is comprised of the various forest, meadow and wetland vegetation communities / habitats within the Fletcher's Creek valley. Mavis Road crosses Fletcher's Creek within the study limits.
- Natural Area MV12: this natural area extends west of Mavis Road, just south of Highway 407 and follows the wooded valley of a tributary of Fletcher's Creek.

These features were considered in the Mavis Road Class EA. Additional information as it pertains to this study is provided in **Chapter 3**.

2.1.12 City of Brampton Official Plan (2006)

The City of Brampton Official Plan 2006, Consolidated November 2013, directs land use decision-making within the municipality to 2031. Like the City of Mississauga's Official Plan, it guides development and infrastructure decisions. A significant portion of the City's overall planned population and employment growth will occur primarily in west Brampton, in the following Secondary Plan Areas:

- Bram West (Secondary Plan Area 40);
- Huttonville North (52);
- Mount Pleasant (51); and
- Mount Pleasant West (53)

The Mavis Road Class EA considers future growth in Brampton / northwest Region of Peel and plans for an enhanced (higher capacity, better operations) for a multi-modal transportation network.

2.1.13 Other Related Studies and Plans

2.1.13.1 Highway 401 Improvements

The Ontario Ministry of Transportation (MTO) is widening Highway 401 from east of McLaughlin Road to east of the Credit River. The contract (2015-2018) includes the following improvements:

- Widening of Highway 401 from its current six lanes to a 12-lane core/collector system from, including construction of HOV lanes in both directions;
- Opening of the HOV lanes from west of Mavis Road to east of Highway 410 following construction completion;
- New structures carrying the proposed collector lanes over Fletcher's Creek; stormwater management, high mast illumination and pavement reconstruction.
- Reconstruction / extension of the Mavis Road interchange (including the widening of the crossing structure from four to six lanes) Completed Summer 2016; and
- Removal of the Second Line West Bridge over Highway 401 to accommodate the highway widening and replacement with a new active transportation bridge at the same location – bridge removal completed in Fall 2016.

Construction began in spring 2016 and is expected to be completed by fall 2019. Improvements proposed through the Mavis Road EA Study will tie into these interchange improvements. The removal of the Second Line West Bridge is discussed in the following section.

2.1.13.2 Second Line West Bridge

The Second Line West Bridge across Highway 401 was removed by MTO in the fall of 2016 to accommodate the widening of Highway 401. The need to remove the bridge was documented by the MTO in a Transportation Environmental Study Report for the ultimate widening of Highway 401 from the Highway 403/410 interchange to the Credit River, with environmental approval in 2007. The City of Mississauga anticipated the removal of the vehicular crossing through the planning and development of subdivisions and the road network adjacent to Second Line West.

In 2010, the City of Mississauga's Cycling Master Plan identified a plan for a Second Line West pedestrian/cyclist bridge across Highway 401. The City of Mississauga completed a Class Environmental Assessment (Class EA) (approved in 2015) for a pedestrian/cyclist

bridge across Highway 401 as well as a multi-use trail from Sombrero Way to Donway Drive.

As a separate supporting study to the Class EA, the City conducted a Neighbourhood Traffic Study in 2014. The traffic study reviewed the existing traffic conditions and assessed the anticipated future conditions following removal of the Second Line West vehicle bridge. The following conclusions were made:

- In general, the analysis indicated that traffic volumes within the study area for the future scenarios (i.e. with and without the vehicle bridge) would be similar with a marginal increase associated with the removal of the bridge. With the removal of the bridge, traffic will re-distribute e.g., northbound through and right turn traffic on Second Line West as well as left turn traffic from Sombrero Way will no longer be travelling along this section of the network.
- The study area has a built out condition with little opportunity for new development. Should a development application be received, it will be subject to comprehensive Transportation Impact Studies for the immediate study area, including impacts and mitigation measures.
- The future trip distributions have been estimated based on the existing travel patterns which are considered to be the more accurate representation of the future traffic movement on the road network.
- The high level analysis of the future traffic conditions shows that the removal of the vehicular crossing on Second Line West would lead to:
 - Elimination of northbound vehicle traffic from the south and southbound vehicle traffic from the north of Highway 401;
 - Decrease of ~80 vehicles during the morning peak hour in the westbound direction on Sombrero Way; and
 - Increase of ~60 vehicles during the morning peak hour in the eastbound direction on Sombrero Way.

Given that MTO's removal of the Second Line West Bridge coincided with the Mavis Road Class EA study, significant community interest in the Second Line West traffic study was rekindled and directed to the Mavis Road Class EA project team. It is emphasized that the Mavis Road Class EA is a separate and distinct undertaking. The improvements proposed for Mavis Road will contribute to additional north-south traffic capacity which is deemed beneficial to the local community. This is discussed further in **Chapter 7**.

2.1.13.3 Region of Peel Mavis Road Widening

In August 2015, the Region of Peel completed the widening of Mavis Road from Steeles Avenue to just north of Highway 407 (near Ray Lawson Boulevard). These improvements were in accordance with a Class EA Study completed by the Region in December 2009 (approved January 2010) and included the following:

- Widening Mavis Road from four to six lanes (tapering down to four lanes north of the Highway 407 crossing structure);
- Road reconstruction and intersection improvements at Clementine Drive and Ray Lawson Boulevard;
- Installation of a multi-use trail along the west side of Mavis Road;
- Extension of sidewalk along the east side of Mavis Road;
- Modification to the existing storm sewer system on Mavis Road south to Ray Lawson Boulevard and a new storm sewer system south of Ray Lawson Boulevard to Highway 407; and
- Installation of noise walls on the east side of Mavis Road from Steeles Avenue to Ray Lawson Boulevard.

Improvements proposed through the current Mavis Road EA Study will tie into the Region's road widening design.

2.1.13.4 407 Transitway Corridor Protection

As part of the Transitway Corridor Protection Study (1998), a conceptual transitway alignment was identified and property protected along the south side of Highway 407 through the Mavis Road interchange area. This timing of transitway implementation along this part of the 407 corridor is not known. The Recommended Plan presented in Chapter 6 of this ESR is not expected to have any impacts on the future transitway. The works required at the Highway 407 ramps and bridge will not significantly extend beyond the existing interchange footprint / property and should not disrupt other land uses in the Parkway Belt West area.

2.2 Transportation Assessment

As part of the Mavis Road Class EA study, a detailed traffic analysis was undertaken to:

- assess the existing traffic operations in the study area for Year 2015;
- identify the future (2041) and interim (2021 and 2031) conditions;
- identify network/geometric improvements for existing intersections;
- conduct a safety performance analysis to identify safety-related concerns;
- assess the future capacity and level of service with the recommended improvements.

The Traffic Analysis Report (**Appendix B**) provides detailed documentation of the methodology and existing and future conditions modelling results. A summary of the findings is provided in this section.

The study area boundaries for the traffic operational analysis and travel demand analysis are presented in **Exhibit 2-5**.

The study area for the traffic operational analysis includes the section of Mavis Road from Sombrero Way / Courtneypark Drive West in City of Mississauga to the north ramp terminal of Highway 407 in City of Brampton (near Ray Lawson Boulevard).

The Region of Peel completed a separate Class EA study and has recently widened Mavis Road from Ray Lawson Boulevard to Steeles Avenue in Brampton to six lanes, which also included improvements at the Ray Lawson Boulevard intersection.

The study area for the travel demand analysis was expanded to conduct a transportation screenline assessment. Existing and future north-south capacity deficiencies within a broader area were assessed using the City's travel demand model (EMME based). The study area for the travel demand analysis extends from Mississauga Road in the west to Hurontario Street in the east, Highway 401 in the south and Highway 407 in the north.



Exhibit 2-5: Travel Demand Analysis Study Area

2.2.1 Existing (2015) Transportation Network

2.2.1.1 Road Network

The existing road network is depicted on **Exhibit 2-6** and is summarized below.

- Mavis Road is an arterial road providing north-south connections between City of Mississauga and City of Brampton, serving local residential/community traffic, commercial and commuter traffic; providing connections to Highway 401, Highway 403 and Highway 407.
- The segment of Mavis Road from the Courtneypark Drive West intersection to just south of Highway 407 is under the jurisdiction of the City of Mississauga. The segment from just south of Highway 407 north to Ray Lawson Boulevard is under the jurisdiction of the Region of Peel and designated as Regional Road 18.
- Within the study area, the posted speed limit on Mavis Road is 70 km/hr.
- Within the study limits, Mavis Road is four lanes. Immediately north and south of the study limits, Mavis Road is six lanes.
- Derry Road West (Regional Road 5) is an east-west arterial road under the jurisdiction of the Region of Peel. Derry Road West is operating with a six-lane cross-section and dedicated turning lanes at the Mavis Road intersection. The posted speed limit for Derry Road West is 70 km/hr within the study area. Derry Road provides access to Halton Region (Milton) in the west and City of Toronto (Etobicoke) in the east, and provides an alternative route to Highway 401. This corridor attracts large volumes of commuting traffic travelling eastbound in the morning peak hour and westbound in the afternoon peak hour.
- Courtneypark Drive West is a four-lane arterial road under the jurisdiction of the City of Mississauga that provides east-west connection between Mavis Road and Dixie Road, and has a posted speed limit of 60 km/hr. Courtneypark Drive West provides access to two secondary schools (St. Marcellinus Secondary School, and Mississauga Secondary School), residential units, and also provides access to an industrial area located east of McLaughlin Road. West of Mavis Road, Courtneypark Drive West becomes Sombrero Way, a minor collector road. As such, there are heavy westbound left and right turn traffic demands at the Mavis Road intersection.
- Highway 407 is an east-west Express Toll Route through the Greater Toronto Area. Within the study area, it has eight general purpose lanes and on/off-ramps

from Highway 401 and the Mississauga Road Interchanges. The posted speed limit is 100 km/hr within the study area.

- All the other roadways intersecting with Mavis Road are either local roads or minor collector roads providing access to the local residential areas, with a posted speed limit of 50 km/hr.
- The existing (2015) intersection lane configurations, posted speed limits and intersection control types are presented in Exhibit 2-7.

2.2.1.2 Transit Network

As discussed in **Section 2.1**, three MiWay bus routes (Route # 61, 61A, 57, and 42) and two Brampton Transit routes (Route # 6 and 53) currently operate on Mavis Road.

MiWay Route 61 operates seven days a week between City Center Transit Terminal and Financial Drive; additional service (Route 61A) is provided Monday to Friday between City Center Transit Terminal and Sheridan College Brampton Campus, which is located northeast of the study area. This route is one of the main transit corridors and carries approximately 4,900 passengers daily during weekdays. This transit route provides 13 minute frequencies during weekday peak period and 20 minute during weekday mid-day.

MiWay Route 57 operates during weekday rush hours only, and provides connection between Courtneypark Drive West and Envoy Drive on Mavis Road; with approximately 30 minute frequencies during weekday peak period and weekday mid-day. Route 42 is an east-west bus route on Derry Road West, providing services in weekdays and weekends. Within the study area, MiWay Route 42 operates on Mavis Road between Derry Road West and Crawford Mill Avenue intersections, with approximately 10 minute frequencies during weekday peak period and 20 minutes during weekday mid-day. Considering all routes during peak periods, overall bus headways are approximately 9 minutes during peak hours.

Brampton Transit Route 53 operates seven days a week between the Brampton Gateway Terminal and James Potter Road, and provides a connection to Brampton Zum at Steeles Avenue, with approximately 25-30 minute frequencies. Within the study area, this route stops at the Mavis Road and Ray Lawson Boulevard intersection.

Brampton Transit Route 6 operates seven days a week between the Hurontario and Highway 407 Park and Ride in Mississauga and Queen Street West in Brampton. This route provides a connection to Brampton Zum at Steeles Avenue, and operates on approximately 20-30 minute frequencies. Within the study area, this route operates on Mavis Road between Ray Lawson Boulevard and Derry Road West.

2.2.2 Cycling and Pedestrian Network

Building on the discussion in **Section 2.1**, the study area includes the following Active Transportation (cycling and pedestrian) facilities:

- 1.5 m sidewalk on east side of Mavis Road from Courtneypark Drive West to 220 m north of Twain Avenue, and 330 m north of Highway 407 to Ray Lawson Boulevard;
- 1.5 m sidewalk on west side of Mavis Road from Courtneypark Drive West to Derry Road;
- > 2.0 m sidewalk on both sides of Mavis Road on Highway 407 Bridge; and
- Multi-use trail on the west side of Mavis Road from Derry Road West to 310 m north of Twain Avenue.

Designated cycling facilities are not currently available over Highway 407 (between 220 m north of Twain Avenue and 330 m north of Highway 407). Boulevard trails have been implemented on Derry Road West and are proposed for Courtneypark Drive West as indicated in the City of Mississauga Cycling Master Plan. Additional secondary routes are proposed on intersecting city roads (e.g. Knotty Pine Grove/Twain Avenue, Crawford Mill Avenue/Novo Star Drive) connecting local residential areas.



Transit Stop

4-Lanes

6-Lanes

Cycling Routes

- Second Line Pedestrian Bridge (to be constructed by 2019)
- On-Road Signed Bike Route / Shared Roadway
- On-Road Bike Lane Route
- Off-Road Multi-use Trail
- In Boulevard Multi-Use Trail

Other Infrastructure



Hydro Lines Enbridge Gas Line Parkway Belt West

Noise Walls

City of Mississauga and Region of Peel Mavis Road - Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report

Exhibit 2-6: Existing Transportation Network



Exhibit 2-7: Existing (2015) Intersection Lane Configurations

2.2.3 Existing (2015) Traffic Conditions

2.2.3.1 Traffic Volumes

Traffic counts for the study area intersections were provided by the City of Mississauga, Region of Peel and 407ETR. Turning movement counts were collected between 2010 and 2015. The signal timing plans for the signalized intersections were also received from the City. A full description of the data compiled and the analysis methodology are provided in **Appendix B**.

Based in the compilation of data inputs and the analysis, the Annual Average Daily Traffic (AADT) volume on Mavis Road is approximately 35,000 vehicles per day. The existing traffic volumes for the morning and afternoon peak hours are presented in **Exhibit 2-8**.

2.2.3.2 Roadway Capacity

The four-lane cross-section of Mavis Road within the study area results in bottlenecks in both directions at the transition points from the six lane sections north (Ray Lawson Boulevard) and south (Highway 401) of the study area. This causes higher delays to both through and local traffic during peak periods (southbound is the peak direction on Mavis Road during morning peak hour and northbound is the peak direction during afternoon peak hour).

A roadway (link) level capacity analysis for the existing condition was conducted using the volume to capacity (v/c) ratio. Through this analysis, it was determined that existing traffic on Mavis Road north of Sombrero Way / Courtneypark Drive West to Highway 407 is operating at 'Very-Congested' conditions (with v/c ratio over 1.0) in the northbound and southbound direction during the afternoon and morning peak hours, respectively. In addition, the segment from Sombrero Way/Courtneypark Drive West to Highway 401 is operating at 'very congested' condition (with v/c ratio over 0.80). This analysis is illustrated on **Exhibit 2-9** and **Exhibit 2-10**.

The existing roadway capacity analysis illustrates the need for additional capacity on Mavis Road to provide an acceptable level of service for the existing conditions and accommodate future traffic demand.



XX (YY): Existing Morning (Afternoon) Peak Hour Volumes

Exhibit 2-8: Existing (2015) Weekday Peak Hour Traffic Volumes

	Southbound					Northbound
	Link Volume Capacity		Mavis	Road		Link Volume Capacity
	1800 2311 2 lanes (capacity: 900 vph/lane)		2311 (1.28)	754 (0.42)		754 1800 2 Ianes (capacity: 900 vph/lane)
	1800 2375 2 lanes (capacity: 900 vph/lane)		40 00 2375 (1.32)	716 vd/ (0.40) ¹	– Highway 407 WB Off-Ramp	716 1800 2 Ianes (capacity: 900 vph/lane)
	1800 1971 2 lanes (capacity: 900 vph/lane)	Highway 407 - EB Off-Ramp	1971 (1.10)	899 (0.50)		899 1800 2 lanes (capacity: 900 vph/lane)
	1800 1994 2 lanes (capacity: 900 vph/lane)	Knotty Pine Grove	1994 (1.11)	887 (0.49)	- Iwain Avenue	887 1800 2 lanes (capacity: 900 vph/lane)
	1800 1980 2 Ianes (capacity: 900 vph/lane)	Envoy Drive	1980 (1.10)	784 (0.44)	- Kaiser Drive	784 1800 2 Ianes (capacity: 900 vph/lane)
	1800 1901 2 lanes (capacity: 900 vph/lane)	Derry Road West	1901 (1.06)	979 (0.54)	-	979 1800 2 Ianes (capacity: 900 vph/lane)
	1800 2255 2 lanes (capacity: 900 vph/lane)	Crawford Mill Avenue	2255 (1.25)	906 (0.50)	 Novo Star Drive 	906 1800 2 lanes (capacity: 900 vph/lane)
	1800 2466 2 lanes (capacity: 900 vph/lane)	Craig Carrier Court	2466 (1.37)	921 (0.51)	- Western Skies Way	921 1800 2 Ianes (capacity: 900 vph/lane)
	2700 2704 3 lanes (capacity: 900 vph/lane)	Sombrero Way	Ча 2704 00 (1.00) 22	1173 ⁴ d _A (0.43) 0027	- Courtneypark Drive West	1173 2700 3 Ianes (capacity: 900 vph/lane)
	2700 2917 3 lanes (capacity: 900 vph/lane)		2917 (1.08)	1404 (0.52)	 Highway 401 WB Off-Ramp 	1404 2700 3 Ianes (capacity: 900 vph/lane)
	2700 1950 3 lanes (capacity: 900 vph/lane)	EB Off-Ramp	1950 (0.72)	1323 (0.49)	,	1323 2700 3 Ianes (capacity: 900 vph/lane)
l						
				Leg XX AM (YY) AM	gend Peak Volume Peak V/C	V/C Operating Condition V/C < 0.80

Exhibit 2-9: Roadway Capacity (V/C) Analysis for Existing (2015) AM Peak Hour Condition

Southbound					Northbound
Link Volume Capacity		Mavis	Road		Link Volume Capacity
1800 941 2 lanes (capacity: 900 vph/lane)		941 (0.52)	2321 (1.29)		2321 1800 2 lanes (capacity: 900 vph/lane)
1800 1326 2 lanes (capacity: 900 vph/lane)	Hichway 407 -	4d ∧ 1326 00 1326 11 (0.74)	1992 000 (1.11) 192	– Highway 407 WB Off-Ramp	1992 1800 2 Ianes (capacity: 900 vph/lane)
1800 1211 2 lanes (capacity: 900 vph/lane)	EB Off-Ramp	1211 (0.67)	2071 (1.15)	- Twain Avenue	2071 1800 2 Ianes (capacity: 900 vph/Iane)
1800 1195 2 lanes (capacity: 900 vph/lane)	Envoy Drive	1195 (0.66)	2102 (1.17)	- Kaiser Drive	2102 1800 2 lanes (capacity: 900 vph/lane)
1800 11114 2 lanes (capacity: 900 vph/lane)	Dorn/Pood Wort	1114 (0.62)	2042 (1.13)	Kaiser Drive	2042 1800 2 lanes (capacity: 900 vph/lane)
1800 1363 2 lanes (capacity: 900 vph/lane)	Crowford Mill	1363 (0.76)	2017 (1.12)	- Novo Star Driva	2017 1800 2 Ianes (capacity: 900 vph/lane)
1800 1401 2 lanes (capacity: 900 vph/lane)	Avenue	1401 (0.78)	2194 (1.22)	- Novo star Drive	2194 1800 2 Ianes (capacity: 900 vph/lane)
1800 1423 2 lanes (capacity: 900 vph/lane)	Craig Carrier Court	1423 (0.79)	2372 (1.32)	- western skies way	2372 1800 2 lanes (capacity: 900 vph/lane)
2700 2038 3 lanes (capacity: 900 vph/lane)	Sombrero Way	4 2038 0027 (0.75)	2182 ⁴ d (0.81) 00/2	West	2182 2700 3 lanes (capacity: 900 vph/lane)
2700 2316 3 lanes (capacity: 900 vph/lane)	Hichway 401 -	2316 (0.86)	2608 (0.97)	- Highway 401 WB Off-Ramp	2608 2700 3 Ianes (capacity: 900 vph/lane)
2700 2283 3 lanes (capacity: 900 vph/lane)	EB Off-Ramp	2283 (0.85)	2492 (0.92)		2492 2700 3 Ianes (capacity: 900 vph/lane)
	_		Leg XX PM (YY) PM	gend Peak Volume Peak V/C	V/C Operating Conditi V/C < 0.80

Exhibit 2-10: Roadway Capacity (V/C) Analysis for Existing (2015) PM Peak Hour Condition

2.2.3.3 Existing Intersection Operations

An analysis of existing intersection operations was conducted using Synchro software. The results of this analysis are detailed in **Appendix B** and summarized below.

The evaluation elements include average delays, Level of Service (LOS), volume to capacity ratio (v/c) and queue length. **Table 2-1** presents the intersection delay criteria for stop-controlled and signalized intersections. **Table 2-2** presents the results of the intersection analysis.

Capacity is defined as the maximum number of vehicles that can pass over a particular road segment or through a particular intersection within a set time duration. Capacity is combined with a level of service (LOS) to describe the operating characteristics of a road segment or intersection. LOS is a qualitative measure that describes operational conditions within a traffic stream. The Highway Capacity Manual (HCM) defines six levels of service, LOS 'A' through LOS 'F'. LOS 'A' represents the lower average delay and LOS 'F' represents the higher average delays.

The highest possible rating is LOS 'A', under which the average total delay on a movement, approach or intersection is less than 10 seconds per vehicle. When the average delay exceeds 50 seconds at unsignalized intersections, or 80 seconds at signalized intersections, the movement is classified as LOS 'F'. Up to LOS 'D' is generally considered as an acceptable level of service for signalized intersections in urban areas. LOS 'E' is the point at which remedial measures are considered, depending on the nature and extent of the delays.

During both peak hours, all the study area intersections are operating at an overall level of service (LOS) 'D' or better, except for the Mavis Road intersections at Derry Road West and Sombrero Way / Courtneypark Drive West, which are operating at an overall LOS 'E/F' during both peak hours. Many movements at these two intersections are operating at an unacceptable LOS 'F' with high delays, mainly due to the heavy traffic volumes and limited capacity. Higher delays at major intersections are causing drivers to divert through the surrounding residential community and raising concerns about safety and environmental effects. This has been observed for the northbound left turn movement at Derry Road West, traffic uses Crawford Mill Avenue as an alternate route due to high delays.

At the Derry Road West intersection, the southbound left and through movements during morning peak hour, northbound left and through movements during afternoon peak hour

and eastbound through movement during morning peak hour are operating at an unacceptable level of service.

At the Sombrero Way / Courtneypark Drive West Intersection, the eastbound right, westbound left, northbound left and southbound left turn movements are operating at LOS 'F' during morning peak hour; and westbound left and northbound left turn movements are operating at LOS 'F' during the afternoon peak hour. It is noted that due to the proximity of two schools at this intersection, high pedestrian volumes were observed during the morning peak hour.

During the morning peak hour, traffic entering from the side-streets (e.g. Envoy Drive, Crawford Mill Avenue / Novo Star Drive, and Western Skies Way) experience higher delays. This is mainly due to the longer cycle length required for signal coordination to provide sufficient capacity for traffic traveling along Mavis Road corridor, and limited green time assigned to the side streets.

The existing traffic operational analysis indicates that currently Mavis Road is operating at/over its capacity at critical intersections and confirms the requirement for improvements.

Level of	Intersection (seconds	Traffic Operation	
Service	Signalized Stop- Controlled/Roundabout		
Α	≤ 10	≤10	
В	> 10.0 and ≤ 20.0	> 10.0 and ≤ 15.0	Accentable exercises
С	> 20.0 and ≤ 35.0	> 15.0 and ≤ 25.0	
D	> 35.0 and ≤ 55.0	> 25.0 and ≤ 35.0	
E	> 55.0 and ≤ 80.0	> 35.0 and ≤ 50.0	Marginally Acceptable – occasional queuing
F	> 80.0	> 50.0	Unacceptable – persistent queuing

Table 2-1: Intersection Operation Level of Service Criteria

Source: Highway Capacity Manual 2000

Levels of Service								
Location/Movement	Weel	kday Morn	ing Peal	k Hour	Weekday Afternoon Peak Hour			
	V/C	Delay (s)	LOS	Queue ³ (m)	V/C	Delay (s)	LOS	Queue (m)
Highway 407 North Ramp Terminal		12	В			37	D	
Westbound Left	0.39	63	E	17	0.58	48	D	73
Westbound Right	0.06	61	Е	14	1.27	196	F	>2264
Northbound Through	0.24	2	А	33	0.82	13	В	159
Southbound Through	0.87	11	В	244	0.41	9	А	70
Highway 407 South Ramp Terminal		6	Α			8	А	
Eastbound Left	0.58	65	Е	45	0.61	64	E	41
Eastbound Right	0.55	65	E	29	0.03	55	D	5
Northbound Through	0.22	1	Α	3	0.70	7	Α	167
Southbound Through	0.72	2	Α	56	0.46	2	Α	43
Knotty Pine Grove /Twain Avenue		21	С			36	D	
Eastbound Left	0.52	57	Е	39	0.61	64	E	39
Eastbound Through/Right	0.53	56	Е	59	0.38	56	Е	40
Westbound Left	0.87	95	F	>72	0.79	79	E	59
Westbound Through/Right	0.58	57	Е	64	0.67	64	E	64
Northbound Left	0.73	69	Е	>38	0.28	7	Α	8
Northbound Through/Right	0.37	6	А	57	0.85	11	В	114
Southbound Left	0.32	6	Α	19	2.32	669	F	>84
Southbound Through/Right	0.79	15	В	276	0.47	7	Α	92
Envoy Drive /Kaiser Drive		13	В			13	В	
Eastbound Left	0.81	82	F	60	0.74	71	E	61
Eastbound Through/Right	0.47	56	Е	50	0.53	57	E	58
Westbound Left	0.45	56	Е	34	0.20	52	D	17
Westbound Through/Right	0.50	56	E	55	0.34	54	D	38
Northbound Left	0.39	30	С	3	0.17	1	А	1
Northbound Through/Right	0.33	2	А	17	0.83	9	А	19

Table 2-2: Existing (2015) Intersection Operations

City of Mississauga and Region of Peel

Mavis Road – Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report | WSP | MMM Group | June 2017

 ³ Queue length reflects 95th percentile conditions
 ⁴ Calculated queue length is expected to be over (i.e., >) a specific value. However, the exact queue length could not be estimated/calculated due to the congestion

	Levels of Service							
Location/Movement	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
	V/C	Delay (s)	LOS	Queue ³ (m)	V/C	Delay (s)	LOS	Queue (m)
Southbound Left	0.06	2	А	2	0.62	47	D	>26
Southbound Through/Right	0.83	5	А	78	0.49	5	А	45
Derry Road West		101	F			109	F	
Eastbound Left	0.33	28	С	18	0.92	77	E	49
Eastbound Through	1.07	91	F	>238	0.68	48	D	105
Eastbound Right	0.23	1	Α	0	0.19	1	А	0
Westbound Left	0.59	68	E	23	0.69	64	E	51
Westbound Through	0.57	39	D	81	1.02	77	Е	>208
Westbound Right	0.08	1	Α	0	0.25	1	А	0
Northbound Left	1.36	247	F	>105	1.73	383	F	>183
Northbound Through	0.69	25	С	78	1.36	212	F	>368
Northbound Right	0.12	1	Α	0	0.11	1	А	0
Southbound Left	1.17	134	F	>157	1.10	165	F	>57
Southbound Through	1.35	197	F	>377	0.75	30	С	93
Southbound Right	0.06	0	Α	0	0.08	1	А	0
Crawford Mill Avenue /Novo Star Drive		52	D			14	В	
Eastbound Left	0.53	45	D	56	0.59	64	E	42
Eastbound Through/Right	1.00	93	F	>198	0.48	59	Е	44
Westbound Left	1.87	483	F	>114	0.70	75	Е	43
Westbound Through/Right	0.38	42	D	58	0.24	56	Е	25
Northbound Left	1.68	395	F	>73	0.87	31	С	>72
Northbound Through/Right	0.42	4	Α	13	0.82	11	В	147
Southbound Left	0.25	4	А	2	0.84	73	Е	>30
Southbound Through/Right	0.93	20	С	29	0.54	2	А	11
Craig Carrier Court /Western Skies Way		17	В			12	В	
Eastbound Left	0.10	51	D	12	0.29	62	Е	18
Eastbound Through/Right	0.75	70	Е	71	0.10	60	Е	16
Westbound Left	0.77	81	F	47	0.57	70	Е	31
Westbound Through/Right	0.03	51	D	10	0.17	61	Е	14
Northbound Left	0.78	75	Е	>16	0.60	9	А	7
Northbound Through/Right	0.39	3	А	99	0.86	12	В	120

	Levels of Service								
Location/Movement	Weel	kday Morn	ing Peal	k Hour	Week	Weekday Afternoon Peak Hour			
	V/C	Delay (s)	LOS	Queue ³ (m)	V/C	Delay (s)	LOS	Queue (m)	
Southbound Left	0.06	4	А	2	0.89	104	F	>35	
Southbound Through/Right	0.94	15	В	>401	0.54	2	А	42	
Sombrero Way /Courtneypark Drive West		113	F			72	Ε		
Eastbound Left	0.25	40	D	31	0.38	50	D	30	
Eastbound Through	0.69	49	D	126	0.22	47	D	31	
Eastbound Right	1.23	180	F	>209	0.28	48	D	36	
Westbound Left	1.03	91	F	>126	1.43	246	F	>316	
Westbound Through	0.20	25	С	>46	0.67	40	D	130	
Westbound Right	0.15	25	С	>15	0.88	57	Е	164	
Northbound Left	3.50	1215	F	>133	0.97	93	F	>160	
Northbound Through/Right	0.75	39	D	>83	0.98	39	D	>183	
Southbound Left	1.62	321	F	>191	0.74	60	E	>72	
Southbound Through/Right	0.95	39	D	>260	0.75	54	D	140	
Highway 401 North Ramp Terminal		12	В			19	В		
Westbound Left	0.75	62	E	70	0.74	52	D	94	
Westbound Right	0.54	56	E	60	0.79	60	Е	108	
Northbound Through	0.29	5	А	41	0.60	8	А	64	
Southbound Through	0.74	5	А	89	0.60	15	В	137	
Highway 401 South Ramp Terminal		13	В			27	С		
Eastbound Left	0.13	45	D	17	0.15	39	D	23	
Eastbound Right	0.80	67	E	94	0.95	81	F	>175	
Northbound Through	0.41	8	Α	84	0.89	25	С	264	
Southbound Through	0.53	7	Α	95	0.65	19	В	91	
2.2.3.4 Collision Data Analysis and Safety Performance Review

Collision data for the study area intersections and mid-blocks were collected from the City and the Region of Peel for a five-year period (from 2010 to 2014 for Derry Road West and Mavis Road intersection and Highway 407 Ramps, and from 2009 to 2013 for all the other intersections and mid-blocks).

Collisions at Intersections

Within a five-year period, 364 out of the 387 total collisions (approximately 94%) were recorded at the intersections. Most of the intersection collisions occurred under a 'clear' weather condition (80%). The primary impact type was a 'rear-end' (53%). 'Turning movement' and 'angle' accounted for 18% and 11%, respectively. Approximately 15% of the collisions resulted in 'Injury' (i.e. non-fatal). One 'fatal' collision occurred at Sombrero Way/Courtneypark Drive West due to 'rear end' collision in May 2013. The collision record indicates that the weather was clear and the road surface was dry on that day. Approximately 54% of the total intersection collisions occurred at the Derry Road West intersection. The details of collision data for the study area intersections are available in **Appendix B**.

Using the number of collisions and traffic volumes entering the respective intersections, a collision rate for each intersection was calculated, reflecting an average number of collisions per million vehicles approaching the intersection. The Mavis Road and Derry Road West intersection has experienced 197 collisions during the 5-year period (2010 to 2014), which resulted in a collision rate of 1.68. The collision rates for other study area intersections are all less than 0.60 for the 5-year period from 2009 to 2013, which indicates a relatively low compared to the Derry Road West intersection. The high collision rate at the Derry Road West intersection may be due to the horizontal curve on Derry Road and heavy traffic demand. The Derry Road West intersection ranks 14th in Region of Peel's network screening for 'Potential for Safety Improvement' in year 2009.

For Derry Road West and Mavis Road Intersection:

- 90 collisions occurred in the north-south directions (46%); 93 collisions were related to east-west directions (47%).
- The primary impact type was 'rear-end' (122 collisions) accounted for 62%, followed by 'turning movement' (44 collisions) and 'angle' (14 collisions) accounted for 22% and 7%, respectively.
- Out of 122 'rear-end' collisions, 42 collisions occurred for the southbound traveling vehicles (34% of the 'rear-end' collisions), followed by 31 collisions happened related to westbound traveling vehicles (25%).

Out of 44 'turning movement' collisions, 29 collisions happened between eastbound left and westbound through movements (66%).

The collision data for Highway 407 interchange ramps were collected for the 5-year period from 2010 to 2014. A total of 15 collisions were recorded at Highway 407 ramp terminals. The primary initial impact type was 'Single Moving Vehicle/Other' (60%). Approximately 13% of the collisions resulted in 'non-fatal' injury. Approximately half of the collisions occurred under the 'clear' weather condition (47%) and one-third (33%) occurred under the 'snow' weather condition. No pedestrian-related collision was observed during the 5-year period at the Highway 407 ramp terminals.

Collisions at Mid-Blocks

Within the 5-year period (from 2009 to 2013), a total of 23 collisions were recorded at within mid-blocks (not at intersections). The primary impact type for study area mid-blocks were 'rear-end' (74%). Approximately 17% of the collisions resulted in 'non-fatal' injury. Most of these collisions occurred under 'clear' weather condition (87%). The collision data summary for the study area mid-blocks is presented in **Appendix B**.

Safety Performance Review

In addition to the collision analysis, the safety performance of six study area intersections was also reviewed. This review was based on the most recent collision data, traffic volume and physical characteristics for the following study area intersections:

- Knotty Pine Grove / Twain Avenue
- Envoy Drive / Kaiser Drive
- Derry Road West
- Crawford Mill Avenue / Novo Star Drive
- Craig Carrier Court / Western Skies Way
- Sombrero Way / Courtneypark Drive West

The analysis methodology and detailed results are provided in **Appendix B**. Results indicate that five of the six intersections present higher than expected annual collision frequencies. This suggests these intersection locations have some potential for road safety improvement. Of the five underperforming intersections, the Derry Road West intersection appears to offer the greatest potential for road safety improvement.

2.2.3.5 Geometric Review for Derry Road West Intersection

Considering the high collision rate for the Derry Road West and Mavis Road Intersection, existing turning sight distance was reviewed. The safe turning distance requirement for the right turn movement was identified using the Transportation Association of Canada (TAC) Geometric Design Guideline, 1999. The safe turning distance requirement for the left turn movement was identified using the Geometric Design of Highways and Streets Guideline, 2011 published by AASHTO.

Sight Distance Requirement for Right Turns

The technical aspects of the sight distance review are provided in **Appendix B**.

Based on the review, the southbound right turn movement for vehicle travelling from Mavis Road to Derry Road West on a channelized right turn has limited sightline due to the horizontal curve on Derry Road. Similarly, the eastbound left-turn movement from Derry Road West to Mavis Road may not find sufficient gap time / sight distance to clear the intersection.

Considering the geometry of the Derry Road intersection, the channelized southbound right turn is recommended to be replaced with a conventional right turn and restricting right turns on a red light. Similarly, the eastbound left turn movement is recommended to operate under a protected traffic signal phase only (i.e. provide a dedicated left turn signal).

2.2.4 Future Traffic Conditions

2.2.4.1 Screenline Analysis

To estimate the future traffic growth in the planning horizon years of 2021, 2031 and 2041, a Screenline Analysis was conducted using the City's travel demand model for both morning and afternoon peak hour conditions. The extended study area for the Screenline Analysis is depicted on **Exhibit 2-5**.

The following two scenarios were considered for the Screenline Analysis:

- Scenario 1: Four-lane cross-section on Mavis Road ('Do-nothing' conditions); and
- Scenario 2: Six-lane cross-section on Mavis Road (widening of Mavis Road within the study area).

The travel demand model considers all the planned and proposed network improvements for each future planning horizons (e.g. removal Second Line West Bridge over Highway 401, widening of Highway 401 within Mississauga, etc.).

The screenlines consider traffic volumes and arterial capacities on four major arterial corridors: Mississauga Road, Mavis Road, McLaughlin Road, and Hurontario Street at three locations: south of Highway 407; south of Derry Road West and north of Highway 401.

The Screenline Analysis results indicate that:

- Southbound direction is the peak direction during the morning rush hour and the Northbound direction is the peak direction during the afternoon rush hour;
- Without Mavis Road widening, the volume to capacity (v/c) ratios for all northsouth corridors will increase by 2021 and traffic conditions on the north-south corridors will deteriorate to 'very congested' conditions; and
- The screenline analysis results for Scenario 2 confirms that the proposed widening of Mavis Road would reduce the congestion and provide much needed transportation capacity in the north-south direction.

2.2.4.2 Future Traffic Volumes

Average annual growth rates were used to forecast the future (2021, 2031 and 2041) traffic volumes for the morning and afternoon peak hour conditions. Future weekday peak hour turning movement volumes for all three planning horizons are provided in **Appendix B**. **Exhibit 2-11** depicts the turning movement volumes for 2041. The residential areas along Mavis Road are fully developed and no further background growth is expected. Therefore, no further traffic growth rates were assumed for the local streets connecting to the residential areas.

The annual growth rates were estimated for the two major arterials intersections at Derry Road West and at Sombrero Way/Courtneypark Drive West, using the future model volumes. Since the calculated traffic growth rates for Courtneypark Drive West indicated unstable growth (negative growth for the first decade and unreasonably high growth for the second decade), the traffic growth rates estimated for Derry Road West were used to forecast the future traffic volumes on these two major arterials. The future turning demand from the Highway 401 and Highway 407 ramps were estimated using the growth rates estimated for Mavis Road. The future weekday peak hour traffic volumes for 2021, 2031, and 2041 conditions are presented in **Appendix B**.

The above analysis results confirm that the interim (2031) traffic demand will be not be accommodated, and that without additional traffic capacity by 2031, the following will be observed:

- Higher traffic volumes will result in more congestion during morning and afternoon peak periods, which will increase travel time;
- Excessive queueing will block intersecting local road through the study area;
- Higher delays on Mavis Road could further increase traffic diversion through the surrounding residential communities; and
- ► Higher traffic delays will increase idling time and vehicle emission.

Even with the projected mode shift towards transit and active transportation (walking and cycling), other north-south corridors such as Mississauga Road, McLaughlin Road and Hurontario Street will not be able to accommodate the future traffic demands.

These results present the needs and justification for additional capacity on Mavis Road with intersection improvements to accommodate the growing traffic demand.

2.2.4.3 Preliminary Intersection Lane Configurations

Based on the existing condition analysis and preliminary intersection capacity analysis for the future conditions, the project team identified the following general improvements for the study area intersections, also presented in **Exhibit 2-12**:

- Widening of Mavis Road within the study area to a six-lane cross-section;
- At Derry Road West intersection:
 - provision of dual lanes for the northbound and southbound left turn movements;
 - o operate eastbound left turn movement under protected phase only;
 - o removal of channelized right turn movements to improve safety;
 - o do not allow 'right turn on red' for the southbound right turn movement;
 - o provision of southbound transit queue jump lane; and
 - o enhanced streetscape design and pedestrian and cycling connections.
- At Sombrero Way / Courtneypark Drive West:
 - o provision of dual lanes for the southbound left turn movement;
 - \circ extended storage lane length for the northbound left turn movement; and
 - enhanced streetscape design.

- Extended storage length for eastbound and westbound left turning lanes at the following Mavis Road intersections:
 - Knotty Pine Grove/Twain Avenue;
 - Envoy Drive/Kaiser Drive;
 - o Crawford Mill Avenue/Novo Star Drive; and
 - Craig Carrier Court/Western Skies Way.



City of Mississauga and Region of Peel Mavis Road - Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report Exhibit 2-11: Future (2041) Weekday Peak Hour Turning Movement Volumes



Exhibit 2-12: Preliminary Future Lane Configurations

2.2.4.4 Future Intersection Operational Analysis

Future intersection capacity was examined for the planning horizon year (2041). The evaluation elements include average delays, level of service (LOS), volume to capacity ratio (v/c) and queue length. As per the City's requirements, the analysis results are summarized using the Highway Capacity Manual 2000 methodology. The intersection operations for the future (2041) traffic conditions, with no road improvements, are presented in **Table 2-3** and details are provided in **Appendix B**.

Based on the intersection capacity analysis for the future (2041) planning horizon year, intersection lane configurations including turning lane requirements and storage length requirements are identified for the study area intersections, as discussed below in **Section 2.2.3.6**.

Similar to the existing (2015) traffic conditions, with the additional traffic growth in the future conditions, Mavis Road intersections at Derry Road West and at Sombrero Way / Courtneypark Drive West are expected to operate at overall LOS 'E/F' during both peak hours. Many movements at these two intersections are expected to operate at LOS 'F' with higher delays, mainly due to the heavy traffic volumes and limited capacity.

At the Derry Road West intersection, all the conflicting peak hour peak direction traffic is expected to operate at LOS 'F'. The southbound through movement conflicts with the northbound left movement, and the eastbound through movement conflicts with the westbound left movement during the morning peak hour condition, with the opposite conditions during the afternoon peak hour condition (i.e. the northbound through movement conflicts with the southbound left movement, and the westbound through movement conflicts with the southbound left movement, and the westbound through movement conflicts with the southbound left movement, and the westbound through movement conflicts with the southbound left movement.

At the Sombrero Way / Courtneypark Drive West intersection, the southbound through and right turn movements are expected to operate at LOS 'F' during both peak hours. The high traffic demand for the westbound left turn movement at this intersection is expected to generate long queues on Courtneypark Drive West approach during both the peak hours. The northbound through movement is expected to operate at LOS 'F' during afternoon peak hour.

During the morning peak hour, traffic entering from the side-streets (e.g. Twain Avenue, Envoy Drive, Crawford Mill Avenue/Novo Star Drive, and Western Skies Way) may expect to operate at capacity (LOS 'E'/'F').

The future traffic operational analysis indicates that Mavis Road is expected to operate at / over its capacity and would require higher modal shares for transit and active transportation.

	Levels of Service							
Location/Movement	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
	V/C	Delay (s)	LOS	Queue (m)	V/C	Delay (s)	LOS	Queue (m)
Highway 407 North Ramp Terminal		9	A			29	С	
Westbound Left	0.45	64	Е	21	0.43	33	С	77
Westbound Right	0.08	61	Е	15	0.98	74	Е	>245
Northbound Through	0.22	3	А	22	0.95	22	С	219
Southbound Through	0.81	8	А	183	0.51	21	С	106
Highway 407 South Ramp Terminal		6	A			4	А	
Eastbound Left	0.61	64	Е	53	0.67	67	Е	51
Eastbound Right	0.66	68	Е	38	0.13	56	E	10
Northbound Through	0.21	1	А	3	0.65	1	А	12
Southbound Through	0.69	3	А	97	0.45	3	А	41
Knotty Pine Grove /Twain Avenue		17	В			16	В	
Eastbound Left	0.51	56	E	37	0.58	62	E	38
Eastbound Through/Right	0.42	53	D	48	0.37	54	D	39
Westbound Left	0.86	90	F	62	0.76	75	Е	58
Westbound Through/Right	0.57	56	Е	62	0.55	58	E	54
Northbound Left	0.47	36	D	17	0.52	17	В	>10
Northbound Through/Right	0.37	7	Α	46	0.89	14	В	105
Southbound Left	0.36	6	Α	>12	0.69	49	D	>50
Southbound Through/Right	0.82	12	В	95	0.46	4	Α	115
Envoy Drive /Kaiser Drive		13	В			9	Α	
Eastbound Left	0.82	82	F	60	0.75	71	Е	61
Eastbound Through/Right	0.52	56	Е	54	0.53	57	Е	58
Westbound Left	0.45	56	Е	34	0.20	53	D	17
Westbound Through/Right	0.51	56	Е	55	0.37	54	D	41
Northbound Left	0.43	44	D	>7	0.31	2	А	1
Northbound Through/Right	0.31	17	В	98	0.76	6	А	>23

Table 2-3: Future (2041) Intersection Operations Without Improvements

City of Mississauga and Region of Peel

Mavis Road – Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report | WSP | MMM Group | June 2017

	Levels of Service							
Location/Movement	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
	V/C	Delay (s)	LOS	Queue (m)	V/C	Delay (s)	LOS	Queue (m)
Southbound Left	0.08	2	А	1	0.62	48	D	>26
Southbound Through/Right	0.77	3	А	26	0.48	3	А	33
Derry Road West		101	F			118	F	
Eastbound Left	0.66	74	E	34	1.54	336	F	>101
Eastbound Through	1.15	123	F	>269	0.70	47	D	111
Eastbound Right	0.51	33	С	76	0.42	29	С	47
Westbound Left	1.09	182	F	>34	0.85	78	E	>63
Westbound Through	0.72	48	D	96	1.11	108	F	>241
Westbound Right	0.09	21	С	7	0.67	42	D	108
Northbound Left	1.29	231	F	>66	0.97	79	Е	>96
Northbound Through	0.72	37	D	80	1.33	202	F	>330
Northbound Right	0.19	4	Α	2	0.19	37	D	24
Southbound Left	0.82	63	Е	84	1.41	289	F	>46
Southbound Through	1.26	149	F	>343	0.98	56	Е	>181
Southbound Right	0.14	11	В	>10	0.24	18	В	17
Crawford Mill Avenue /Novo Star Drive		44	D			9	А	
Eastbound Left	0.44	38	D	52	0.58	63	E	42
Eastbound Through/Right	0.73	47	D	135	0.20	56	Е	26
Westbound Left	1.09	150	F	>96	0.69	74	E	42
Westbound Through/Right	0.32	36	D	53	0.12	56	E	18
Northbound Left	0.62	84	F	>29	0.72	52	D	>40
Northbound Through/Right	0.42	4	А	17	0.81	3	А	5
Southbound Left	0.39	7	А	>3	0.42	37	D	>6
Southbound Through/Right	1.10	54	D	>40	0.62	4	А	>188
Craig Carrier Court /Western Skies Way		15	В			11	В	
Eastbound Left	0.10	51	D	12	0.29	62	Е	18
Eastbound Through/Right	0.75	69	Е	72	0.10	60	Е	16
Westbound Left	0.74	75	Е	47	0.57	70	Е	31
Westbound Through/Right	0.03	50	D	10	0.03	60	Е	9
Northbound Left	0.78	61	E	>10	0.60	31	С	>12
Northbound Through/Right	0.36	2	А	>35	0.83	6	А	>45

City of Mississauga and Region of Peel Mavis Road – Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report | WSP | MMM Group | June 2017

	Levels of Service							
Location/Movement	Weekday Morning Peak Hour				Weekday Afternoon Peak Hour			
	V/C	Delay (s)	LOS	Queue (m)	V/C	Delay (s)	LOS	Queue (m)
Southbound Left	0.09	5	А	>2	0.39	28	С	>13
Southbound Through/Right	0.86	13	В	>108	0.58	9	А	120
Sombrero Way /Courtneypark Drive West		153	F			145	F	
Eastbound Left	0.32	46	D	35	0.35	56	Е	18
Eastbound Through	0.91	75	Е	>157	0.14	52	D	18
Eastbound Right	1.23	170	F	>206	0.30	31	С	46
Westbound Left	1.75	388	F	>237	1.75	392	F	>393
Westbound Through	0.17	30	С	37	0.85	56	E	167
Westbound Right	0.27	18	В	38	0.98	72	Е	>227
Northbound Left	0.97	98	F	>92	0.86	56	E	>148
Northbound Through/Right	0.96	50	D	>172	1.23	147	F	>400
Southbound Left	0.93	74	Е	>106	0.57	47	D	>51
Southbound Through/Right	1.39	210	F	>427	1.18	132	F	>269
Highway 401 North Ramp Terminal		29	С			17	В	
Westbound Left	0.82	63	Е	87	0.84	54	D	132
Westbound Right	0.58	56	Е	71	0.89	69	Е	>161
Northbound Through	0.37	6	А	38	0.86	3	А	>13
Southbound Through	1.01	32	С	>101	0.81	11	В	>64
Highway 401 South Ramp Terminal		16	В			85	F	
Eastbound Left	0.13	42	D	19	0.18	38	D	28
Eastbound Right	0.86	69	E	120	1.19	156	F	>251
Northbound Through	0.54	13	В	126	1.21	125	F	>496
Southbound Through	0.75	11	В	>130	0.84	19	В	175

Interim (2021 and 2031) Intersection Operational Analysis

In addition to the analysis undertaken for the planning horizon of 2041, an intersection operational analysis was undertaken for 2021 and 2031. Similar to the future 2041 conditions, the intersection operational analysis conducted for 2021 and 2031 indicate that a higher level of congestion is expected at the Derry Road West and Sombrero Way

/ Courtneypark Drive West intersections. The delays during interim conditions are slightly lower than future (2041) conditions.

Based on the results, and considering the existing (2015) traffic conditions and interim traffic conditions for 'do-nothing' scenario, a six-lane widening of Mavis Road is recommended by 2021.

2.2.4.5 Sensitivity Analysis for Eastbound Left Turn at Derry Road West

As discussed above, the eastbound left turn movement has limited sightline and therefore, this turning movement is recommended to operate under a protected phase only. This improvement will increase delays for this movement compared to the existing conditions where eastbound left turn movement is operating under protected plus permitted phases. However, delays for this movement could be reduced by providing dual lanes for the eastbound left turn movement.

The existing geometry of the intersection may allow for dual lanes for the eastbound left turn lanes. To assess the potential benefits of dual left turn lanes for the eastbound left turn movement, an intersection capacity analysis with dual eastbound left turn lanes was conducted for the future 2041 peak hour traffic volumes.

The above analysis results indicate that with dual eastbound left turn lanes, delay for the eastbound left movement is expected to decrease from 74 seconds to 68 seconds during morning peak hour, from 336 seconds to 263 seconds during afternoon peak hour conditions. The provision of dual eastbound left turn lanes are expected to reduce the overall intersection delays by 15 seconds during future (2041) afternoon peak hour conditions.

2.2.4.6 Proposed Intersection Lane Configurations

Based on the future (2041) intersection operation, review of the existing available road right-of-way and the desire to avoid impacts to properties, the final proposed intersection lane configurations with six-lane cross-section on Mavis Road include:

- At Derry Road West:
 - dual lanes for northbound and southbound left turn movements, with storage lengths of 160 m for the northbound left movement and 175 m for the southbound left movement;
 - removal of channelized right turn movements, and provide dedicated right turn lanes with a storage length of 100 m for the northbound right turn movement, 85 m for the southbound right turn lane;

- \circ do not allow 'right turn on red' for the southbound right turn movement; and
- o provision of southbound transit queue jump lane.
- At Sombrero Way/Courtneypark Drive West:
 - provision of dual lanes for the southbound left turn movement with a storage length of 140 m; and
 - increasing storage length (approximately 150 m) for the northbound left turn lane.
- Increasing storage length for the eastbound and westbound left turn movements at:
 - At Knotty Pine Grove/Twain Avenue intersection providing storage length of 40 m for the eastbound left turn lane and 65 m for westbound left turn lane;
 - At Envoy Drive/Kaiser Drive intersection providing storage length of 45 m for the eastbound left turn lane and 35 m for westbound left turn lane;
 - At Crawford Mill Avenue/Novo Star Drive intersection providing storage length of 50 m for the eastbound left turn lane and 60 m for the westbound left turn lane;
 - Craig Carrier Court/Western Skies Way providing storage length of 20 m for the eastbound left turn lane and 25 m for westbound left turn lane.

It should be noted that the final recommendations presented here differ from the technical recommendations presented at Public Information 2.

The Initial technical recommendations were based on traffic modeling only and did not take into account other factors such impact to private property. The final lane configuration recommendations are based on the technical review but also consider the available road right-of-way and the desire to avoid impacts to properties.

The future lane configuration with proposed intersection improvements is presented in **Exhibit 2-13.** This configuration is carried forward into the Recommended Plan, detailed in **Chapter 6**.



City of Mississauga and Region of Peel Mavis Road - Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report Exhibit 2-13: Proposed Intersection Lane Configuration

2.2.4.7 Traffic Assessment Findings

The following summarizes the findings related to existing (2015) traffic conditions:

- Southbound is the peak direction during the morning rush (peak) hour, and northbound is currently the peak direction during the afternoon rush hour.
- During the morning rush hour, the southbound traffic is operating at 'Very-Congested' conditions.
- During the afternoon rush hour, the northbound traffic is operating at 'Very-Congested' condition. The segment from Sombrero Way/Courtneypark Drive West to Highway 401 is operating as 'Unstable'.
- The existing (2015) traffic conditions indicate that Mavis Road is operating at a saturated level, and would not able to accommodate any future traffic growth.
- Existing intersection operational analysis indicates that during both morning and afternoon rush hour, all the study area intersections are operating at an overall level of service (LOS) 'D' or better, except for the intersections at Derry Road West and Sombrero Way / Courtneypark Drive West, which are operating at an overall LOS 'E'/'F' during both rush hours. Many movements at these two intersections are operating at LOS 'F' with high delays. Higher delays at major intersections are causing drivers to divert through the surrounding residential community. This has been observed for the northbound left turn movement at Derry Road West, traffic uses Crawford Mill Avenue as an alternate route due to high delays.
- At the Derry Road intersection, many movements are operating at unacceptable level of service (LOS 'F'), including the eastbound through, northbound left, southbound left, and southbound through movements for the morning rush hour, and the northbound left, northbound through, and the southbound left movements during the afternoon rush hour.
- At the Sombrero Way / Courtneypark Drive West Intersection, the eastbound right, westbound left, northbound left and southbound left turn movements are operating at LOS 'F' during the morning rush hour; and westbound left and northbound left turn movements are operating at LOS 'F' during the afternoon rush hour. It is noted that due to the proximity of two schools at this intersection, the pedestrian volumes are relatively higher during morning rush hour.
- During the morning rush hour, traffic entering from the side-streets (e.g. Envoy Drive, Crawford Mill Avenue/Novo Star Drive, and Western Skies Way) experiences higher delays.

- The existing traffic operational analysis indicates that Mavis Road is currently operating at / over its capacity at critical intersections which confirms the need for improvements to address existing deficiencies and provide for future traffic demand.
- Within a five-year period, a total of 387 collisions were recorded in the study area corridor including 364 collisions at intersections and 23 collisions at mid-blocks. Approximately 54% of the total intersection-related collisions occurred at the intersection at Derry Road West. This intersection has experienced 197 collisions during a five-year period (from 2010 to 2014).
- Considering the high collision rate at the Derry Road West intersection, the existing turning sight distance was reviewed. The southbound right turn movement for vehicle travelling from Mavis Road to Derry Road West on a channelized right turn may not able to find sufficient sight distance due to the horizontal curve on Derry Road. Similarly, the eastbound left turn movement from Derry Road West to Mavis Road may not able to find sufficient gap time / sight distance to clear the intersection.
- The safety performance analysis conducted for the Mavis Road EA Study indicates that improvement at the Derry Road West intersection could offer the greatest potential for road safety improvement within the study area. The Derry Road and Mavis Road Intersection ranks 14th in the Region of Peel network screening for 'Potential for Safety Improvement' in year 2009.
- Considering the geometry constraints at the Derry Road intersection, the channelized southbound right turn is recommended to be replace with a conventional right turn and not allowing turning right on red. The eastbound left turn movement is recommended to operate under a protected phase only.

The following summarizes the findings related to future traffic conditions:

- The results of the screenline analysis confirms that widening of Mavis Road would provide much needed additional transportation capacity for the north-south direction. The analysis of interim conditions (2021 and 2031) provide justification for improvements well in advance of the 2041 planning horizon. The interim traffic analysis confirms:
 - Higher traffic volumes will result in more congestion during morning and afternoon rush periods, which will increase travel time;
 - Excessive queueing will block intersecting local road through the study area;
 - Higher delays on Mavis Road could further increase traffic diversion through the surrounding residential communities; and

- Even with the projected mode shift towards transit and active transportation (walking and cycling), other north-south corridors such as Mississauga Road, McLaughlin Road and Hurontario Street will not be able to accommodate the future traffic demand.
- Similar to the existing (2015) traffic conditions, with the additional traffic growth in the future conditions, Mavis Road intersections at Derry Road West and at Sombrero Way/Courtneypark Drive West are expected to operate at overall LOS 'E/F' during both rush hours. Many movements at these two intersections are expected to operate at LOS 'F' with higher delays, mainly due to the heavy traffic volumes and limited capacity.
- At the Sombrero Way/Courtneypark Drive West intersection, the southbound through and right turn movements are expected to operate at LOS 'F' during both rush hours. The high traffic demand for the westbound left turn movement at this intersection is expected to generate long queues on Courtneypark Drive West approach during both the rush hours. The northbound through movement is expected to operate at LOS 'F' during the afternoon rush hour.
- During the morning rush hour, traffic entering from the side-streets (e.g. Twain Avenue, Envoy Drive, Crawford Mill Avenue/Novo Star Drive, and Western Skies Way) may expect to experience at capacity (LOS 'E'/'F').
- The future traffic operational analysis indicates that Mavis Road is expected to operate at/over its capacity and would require higher modal shares for transit and active transportation.

3 EXISTING CONDITIONS

3.1 Socio-Economic

3.1.1 Land Use

The designated land use within the Mavis Road Class EA study area is depicted in **Exhibit 3-1.** Land use designations reflect the City of Brampton and City of Mississauga Official Plans and are summarized as follows:

- Lands within the study area are almost entirely built out;
- Lands are primarily low density residential with some pockets of medium density along Mavis Road (townhome / condominium developments).
- There are two convenience / commercial properties along the east side of Mavis Road; one within Mississauga and one within Brampton.
- A portion of Fletcher's Creek and a tributary of the Credit River valley lands are found along Mavis Road. These areas are designated as Greenlands.

Lands within the Parkway Belt West are reserved for infrastructure and major utilities. Limited agricultural production may remain in some areas within the Parkway Belt West. Limited agricultural production may remain in some areas within the Parkway Belt West.

The residential areas have been developed such that there are no frontages directly onto Mavis Road; residences either front onto local streets adjacent to Mavis Road, or back onto Mavis Road.

3.1.2 Community Features

There are numerous community features along Mavis Road or directly accessible / serviced by Mavis Road:

- St. Marcellinus Secondary School;
- Courtneypark Library;
- Mississauga Secondary School;
- St. Veronica Elementary School;
- David Leeder Middle School;
- Meadowvale Village Public School;
- Ray Lawson Public School; and

Hickory Wood Public School.

Meadowvale Cemetery is located on the west side of Mavis Road, north of Highway 407 and is accessible via Chinguacousy Road. The Cemetery will not be impacted by the Recommended Plan.

3.2 Cultural Environment

3.2.1 Archaeology

A Stage 1 Archaeological Assessment was undertaken in support of the Mavis Road Class EA study. The report is included in **Appendix C**.

The Stage 1 assessment was undertaken for Mavis Road and areas adjacent (within 50 m) that were considered as having some potential to be impacted by the study. The Stage 1 assessment included a background study and visual assessment to determine the potential of the subject corridor for recovering archaeological resources.

The Mavis Road right-of-way has been subject to significant disturbance related to the construction of the road, utility installation, and residential and commercial development. The right-of-way has clearly been landscaped, built up, or ditched. Sidewalks are present on both sides of the road, and traffic lights and telephone poles have been installed. Furthermore, a large portion of the study corridor has been previously disturbed by the construction of multiple subdivisions.

A survey of the Ministry of Tourism, Culture and Sport (MTCS) archaeological site registry database revealed that there are three archaeological sites within 50 m of the study corridor and 33 registered sites within 1 km of the subject corridor. These sites have been found through archaeological assessments undertaken in support of the previous land and infrastructure developments.

Of the three nearby sites, one was identified within the study corridor boundaries and two were identified within 50 m of the study corridor. The AjGw-150 site was identified in 1989 by the Museum of Indian Archaeology and Robert Pearce, and is located with the project boundaries. Euro-Canadian materials were encountered during a test pit survey of the property, with 156 artifacts recovered in total. The site was interpreted as a Post-Contact midden. While no further information could be obtained about this site, given its location within a current subdivision, it is likely the site was deemed to have no further cultural heritage value or interest, and no further assessment was completed.

Site AjGw-151 was located within 50 m of the study corridor. Identified in 1989 by the Museum of Indian Archaeology and Robert Pearce, 16 Euro-Canadian artifacts were

encountered during a pedestrian survey. This site did not hold cultural heritage value or interest, and no further assessment was conducted. Similar to AjGw-150, a subdivision has been constructed at the location of this site.

Site AjGw-165 was located within 50 m of the study corridor. Identified in 1989 by the Museum of Indian Archaeology and Robert Pearce, 75 Euro-Canadian artifacts were collected during a pedestrian survey. This site did not hold cultural heritage value or interest, and no further assessment was conducted. A commercial building now stands at the location of the site.

The Stage 1 assessment resulted in the identification several features of archaeological potential within the vicinity of the study corridor. Most prominent is Fletcher's Creek, with traverses the south half of the study corridor.

Based on the Stage 1 assessment, the following recommendations are made:

- The portions of the study corridor located along Mavis Road that have been previously disturbed by road work and traffic and utility infrastructure do not hold archaeological potential and require no further assessment. Additionally, the portions of the study corridor that are currently comprised of subdivisions and residential roads no longer hold archaeological potential and require no further assessment.
- The remainder of the study corridor contains archaeological potential and requires a Stage 2 archaeological assessment prior to any ground disturbing activities:
 - Since the remainder of the study corridor is located primarily within over grown grasslands and down steep slopes, access by plough is severely restricted and is not feasible. The two small areas of manicured grass located south of Derry Road appear to be small parkettes, and so ploughing is also not feasible within these areas. Finally, manicured lawn of a residential property is located west of Mavis Road, and south of Ray Lawson Boulevard, and cannot be ploughed. As a result, it is recommended that the portions of the study corridor containing archaeological potential be subject to a test pit survey as per Section 2.1.2 of the Standards and Guidelines for Consultant Archaeologists (MTCS 2011:31).

The Project Team received confirmation on October 6, 2016 that the Stage 1 Archaeological Assessment Report for the Mavis Road Class EA has been entered into the Ontario Public Register of Archaeological Reports without technical review (MTCS Project Information Number P018-0776-2016, MTCS File Number 0004639).

3.2.2 Built Heritage and Cultural Heritage Landscapes

A cultural heritage resource assessment was carried out to identify built heritage resources and cultural heritage landscapes within the study area. The Cultural Heritage Assessment Report (CHAR) is provided in **Appendix D** and the findings are summarized below:

- There are no listed or designated properties located on the Mavis Road study corridor on the City of Mississauga Heritage Register.
- The Mavis Road study corridor is not included in the City of Mississauga Cultural Heritage Landscape Inventory.
- It is noted the Meadowvale Heritage Conservation District (HCD) is located to the west of Mavis Road at Second Line West and Old Derry Road. The west side of Mavis Road from Fletcher's Creek north to Derry Road West forms the western boundary of the extended village precinct associated with the Meadowvale HCD (depicted on Exhibit 3-1).
- There are no listed or designated properties located on or adjacent to the Mavis Road study corridor on the City of Brampton's Municipal Register of Cultural Heritage Resources Designated under the Ontario Heritage Act (April 2016) or its Municipal Register of Cultural Heritage Resources, 'Listed' Heritage Properties (April 2016).
- Unterman McPhail Associates undertook a windshield survey of the Mavis Road study corridor to identify heritage resources older than 40 years of age. The lands within and adjacent to the study corridor were reviewed and no individual cultural heritage landscapes or built heritage resources of 40 years of age and older were identified. The Meadowvale Cemetery on Mavis Road was opened in 1981.





COMMUNITY PARK CONVENIENCE RETAIL PARKWAY BELT WEST



Natural System Areas Natural Areas

> Special Management Areas Natural Hazards

Land Use Designations

Residential Low Density I Residential Low Density II Residential Medium Density **Residential High Density** Mixed Use



City of Mississauga and Region of Peel Mavis Road - Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report

Convenience Commercial Motor Vehicle Commercial Business Employment Public Open Space

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Parkway Belt West

Employment Area Meadowvale Village Heritage District Public School Catholic School

Exhibit 3-1: Land Use

3.3 Natural Environment

The Mavis Road Class EA study area is located entirely within the Credit River Watershed. The majority of the existing lands are residential however, there are two natural areas. One feature is located at the south end of the study area and is associated with Fletcher's Creek found within 'Fletcher's Flat', as identified in the City of Mississauga's Natural Areas Survey. Fletcher's Creek flows west, through the study area, under an existing bridge at Mavis Road.

The other natural feature is located on the west side of Mavis Road at the Highway 407 Interchange. This feature is associated with an intermittent tributary of the Credit River and its associated deciduous forest valley land.

These natural areas form part of the City of Mississauga's overall Green System and the Region's Greenlands System in Peel as well as the City's Significant Natural Site and a Core Area of the Greenlands System. These ecological features are protected by both the City and Region's policies and are under the jurisdiction of Credit Valley Conservation.

3.3.1 Approach

Background information sources were reviewed to develop an understanding of the general character of the natural features in the study area, and to identify potential constraints and sensitivities. Background natural environment information collection included the following sources:

- Topographic mapping and Google satellite mapping (timeframe between 2003 and 2016);
- Liaison with the Aurora District Ministry of Natural Resources and Forestry (MNRF) and Credit Valley Conservation (CVC) staff to gather existing natural environment information in the vicinity of the study area, including information concerning Species at Risk (SAR) and Species of Conservation Concern (SCC) presence / potential;
- MNRF Natural Heritage Information Centre (NHIC) Database;
- Fisheries and Oceans Canada (DFO) Distribution of Fish SAR mapping;
- Land Information Ontario (LIO) Database; and,
- Credit River Fisheries Management Plan (CRFMP).

Field investigations augmented the secondary source information to assess sensitivity and significance of natural features and functions within the study area. Aquatic investigations were conducted on June 16, 2016. Field data collection focused on the stream reaches within the study area (Fletcher's Creek and Tributary of the Credit River), with general assessment approximately 50 to 100 m upstream and downstream to provide context. A drainage feature, approximately 400 m south of Ray Lawson Boulevard, was identified on Google satellite imagery as well as the LIO Database. Field investigations indicated that there is no connection to a downstream direct fish habitat, as such it is not discussed further.

Fish community sampling was not undertaken as it was assumed that data would be available from the agencies. Fish community data was obtained from CVC and the LIO database. Information collected encompassed the following aquatic habitat parameters:

- Aquatic habitat mapping;
- Channel dimensions, general gradient and profile, bank character (e.g. height and erosion);
- General flow characteristics (permanent, intermittent, dry, pooling) including evidence of groundwater discharge;
- General morphology (flats, pools, riffles);
- Substrates;
- Instream / overhead cover opportunities (e.g. woody debris, undercut banks, boulders, vegetation);
- Riparian vegetation;
- Physical barriers to fish movement;
- Identification of potential critical or specialized habitat areas or features (e.g. potential spawning areas, nursery cover); and
- Observations of habitat alterations / land use (e.g. channel modification, potential pollutant point sources).

Vegetation field investigations were conducted on May 30, 2016 to provide data on spring flora. This information was augmented by observations made during breeding bird and incidental wildlife investigations conducted on July 2, 2016. Vegetation communities were classified using the Ecological Land Classification (ELC) System for Southern Ontario (Lee et. al. 1998). Vegetation investigations occurred between approximately 30 m and 80 m of Mavis Road, depending on the quality of the feature. Areas with street trees and lawn, only, were not included as street trees were assessed as part of the tree inventory (**Section 3.5**). Investigations also involved searching for rare plant species including SAR and their habitat.

Wildlife field investigations were conducted on May 30 and July 2, 2016 consistent with the Ontario Breeding Bird Atlas (OBBA) protocol, which recommends two surveys between May 24 and July 10; after dawn and before 10 a.m.; and during conditions that are dry, clear and with no or low wind (less than 19 km per hour) (Cadman et.al. 2007; Bird Studies Canada 2001). Surveys were conducted within the same study area as the vegetation surveys. Incidental wildlife and wildlife evidence observed during breeding bird and vegetation investigations were also recorded. Special effort was made to note SAR wildlife habitat and the nests of birds, particularly those under bridges.

3.3.2 Environmental Designations

There are several designated areas in the area, generally. The majority of these features are located south of Mavis Road and not within the study area. The natural features include wetlands, forests and riparian corridors associated with the watercourses. A brief summary of identified designations is provided below:

- Churchville-Norval Provincially Significant Wetland Complex associated primarily with the floodplain of the Credit River, and includes a number of old abandoned river channels. Portions of the Churchville-Norval PSW Complex are located approximately 700 m south of the study area.
- Meadowvale Station Woods Area of Natural and Scientific Interest (ANSI) is centred on Fletcher's Creek and its associated tablelands. It is located approximately 600 m south of the southern limits of the study area and extends on either side of Highway 401.
- Greenlands System The Region of Peel Official Plan and the City of Mississauga Official Plan classify two features within the study area as part of a Greenlands System. The components of the Greenlands System consist of lands designated as Core Greenlands and Significant Natural Site. The policies require that their form and functions be protected, and where possible, enhanced. The purpose of the Greenlands System policies are to maintain and enhance an interconnected system of natural open space, agricultural lands and enhancement areas and linkages that will preserve these areas of significant ecological value. In turn, these policies provide opportunities to improve biodiversity and connectivity of natural features as well as ecological function.
- Mississauga Natural Area Survey There are two Natural Areas within the Mavis Road Class EA study limits:
 - Meadowvale Station Woods and Fletcher's Creek (MV2): this natural area is comprised of the various forest, meadow and wetland vegetation communities

/ habitats within the Fletcher's Creek valley. Mavis Road crosses Fletcher's Creek within the study limits.

- MV12: this natural area extends west of Mavis Road, just south of Highway 407 and follows the wooded valley of a tributary of Fletcher's Creek.
- Areas Regulated under the Conservation Authorities Act (1990) Portions of the lands in the study area are regulated by the CVC under Ontario Regulation 160/06 Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. Generally, the regulation applies to the watercourses and their associated floodplains.
- Habitat for Redside Dace Regulated under the Endangered Species Act associated with Fletcher's Creek.

3.3.3 Vegetation Communities

Natural vegetation communities are associated primarily with Fletcher's Creek and with the Tributary of the Credit River and consist of a mix of upland deciduous forest, thicket and meadow vegetation communities described below and depicted on **Exhibit 3-2**.

FOD-5-1: Dry-fresh Sugar Maple Deciduous Forest Type

This unit occurs southeast of the Fletcher's Creek Bridge and is dominated by a canopy of Sugar Maple. It is a mature forest with trees ranging in size up to 50 cm diameter-atbreast-height (dbh) and with various native ground flora; however the quality of the forest is undermined by an abundance of Common Buckthorn, an exotic shrub in the understorey layer. Native ground cover species include Bloodroot (Sanguinaria canadensis), Broad-leaved Goldenrod (Solidago flexicaulis), seedlings of Choke Cherry (Prunus virginiana), Riverbank Grape (Vitis riparia), Kidney-leaved Buttercup (Ranunculus abortivus) and aster (Symphoricarpos sp.) but as infrequent occurrences. Exotic shrub seedlings, Common Buckthorn and Tatarian Honeysuckle, accompany the native ground flora. Eighty percent of the ground is bare.

FOD6-5: Fresh-moist Sugar Maple Hardwood Deciduous Forest Type

This unit occurs in the valley land of the Tributary of the Credit River. The canopy is dominated by Sugar Maple and contains occasional Northern Red Oak. Staghorn Sumac (Rhus typhina) and Common Buckthorn are abundant in the understorey of this forest edge and Garlic Mustard is an abundant ground cover species. Riverbank Grape is an occasional ground cover species.

FOD7: Fresh-moist Lowland Deciduous Forest Ecosite

This unit occurs on the valleyland slope northeast of the Fletcher's Creek Bridge. It contains American Basswood (Tilia americana) in the canopy and sub-canopy. There are also occasional American Beech (Fagus grandifolia) trees in the sub-canopy. Common Buckthorn is an abundant understorey species with occasional Tatarian Honeysuckle. There is a sparse ground cover of occasional Common Buckthorn.

FOD7-2: Fresh-moist Ash Lowland Deciduous Forest Type

This unit occurs in the Fletcher's Creek floodplain bordering the watercourse on both sides of Mavis Road. It contains young Green Ash, which are occasional in canopy and abundant in the sub-canopy and understorey. Willow is another occasional canopy species. Though trees are primarily less than 25 cm dbh, there is a Green Ash at approximately 60 cm dbh and an American Elm at 30 cm dbh. Common Buckthorn is abundant in the understorey and occurs with occasional Tatarian Honeysuckle. The ground layer consists of abundant Garlic Mustard, and Clover-root, and occasional Common Buckthorn seedlings. Enchanter's Nightshade (Circaea lutetiana), a native species, is present but as a rare occurrence.

FOD8-1: Fresh-moist Poplar Deciduous Forest Type

This unit occurs in a drainage ditch immediately south of the hydro corridor. Trembling Aspen (Populus tremuloides) is abundant in the canopy and occasional in the sub-canopy layer. Other species include Bur Oak (Quercus macrocarpa), Northern Red Oak, American Elm, Green Ash and Black Locust (Robinia pseudoacacia). The understorey contains abundant Common Buckthorn and occasional Black Walnut (Juglans nigra), Red-osier Dogwood (Cornus stolonifera), Staghorn Sumac, Choke Cherry and hawthorn (Crataegus sp.). Ground flora species are Red Raspberry (Rubus idaeus), avens (Geum sp.), Virginia creeper (Parthenocissus sp.), Riverbank Grape and Northern Bush Honeysuckle (Diervilla Ionicera).

CUT1-4: Gray Dogwood Cultural Thicket Type

This unit borders the stormwater management pond west of Mavis Road. It is dominated by Gray Dogwood (Cornus racemosa) and contains occasional Common Buckthorn. Green Ash is an occasional canopy species.

CUM1-1: Dry-moist Old Field Meadow Type

This unit occurs throughout the study area: in the Highway 407 right-of-way, Mavis Road right-of-way, hydro corridor, Fletcher's Creek floodplain and on vacant land north of the

stormwater management pond east of Mavis Road (north of Highway 407). Much of this community is regularly mowed. Typical species include: Kentucky Bluegrass and Smooth Brome; patches of Crown-vetch, goldenrod and Canada Anemone; and occasional Common Teasel (Dipsacus fullonum), Dames Rocket (Hesperis matronalis), Red Clover (Trifolium repens), Common Dandelion (Taraxacum officinale), Tufted Vetch (Vicia cracca), Creeping Thistle, Garlic Mustard, Greater Burdock, Red Raspberry, Eurasian Quackgrass (Thinopyrum ponticum), Black Medic (Medicago lupulina), Queen Anne's Lace (Daucus carota) and aster.

Bordering the east pond is a narrow community with abundant Poison Ivy (Rhus radicans), Red Raspberry, goldenrod and New England Aster (Symphyotrichum novaeangliae); and occasional sow thistle (Sonchus sp.), Reed Canary Grass (Phalaris arundinacea), Virginia Creeper, Garlic Mustard, Great Burdock (Arctium lappa) and Creeping Thistle (Cirsium arvense). There are also occasional Nannyberry (Viburnum lentago) and rare occurrences of Manitoba Maple (Acer negundo), Austrian Pine (Pinus nigra), Sugar Maple and Bur Oak.

There are two narrow, marsh inclusions in this unit. One is in a ditch in the hydro corridor in the southwest quadrant of the Highway 407 Interchange and is dominated by Common Reed and Narrow-leaf Cattail (Typha angustifolia). The other is in the drainage feature west of Mavis Road, north of Highway 407, and contains Manitoba Maple, willow, goldenrod and Narrow-leaf Cattail.

SWDM3-3: Swamp Maple Mineral Deciduous Swamp Type

This unit occurs in a depression in the southeast quadrant of the Highway 407 Interchange. It has a sub-canopy dominated by Freeman's Maple (Acer x freemanii) and with occasional Green Ash. There is an understorey with abundant Nannyberry; occasional White Spruce, Red Osier Dogwood, Narrow-leaved Meadowsweet (Spiraea alba) and willow; and rare occurrences of Bebb's Willow (Salix bebbiana).

OAO: Open Aquatic Community Series

This unit is the open water community in a constructed pond within the Fletcher's Creek floodplain, west of Mavis Road. There is a sparse cover of the floating plant, Common Water-flaxseed (Spirodela polyrhiza), but the dominant component is open water. Narrow-leaf Cattail at the margin of this unit is also too limited in area to constitute a separate community.

The following communities are noted as being present in the constructed stormwater management pond located east of Mavis Road, south of Ray Lawson Boulevard:

- MAS2-1: Cattail Mineral Shallow Marsh Type dominated by Broad-leaved Cattail (Typha latifolia).
- SAF1-3: Duckweed Floating-leaved Shallow Aquatic Type
- THDM2-1: Sumac Deciduous Thicket Type an area of landscape plantings / screening around the stormwater management pond dominated by Staghorn Sumac and contains abundant Tatarian Honeysuckle.

3.3.4 Wildlife and Habitat

Wildlife potential in the study area is limited by the extensive and dense urban development and the close proximity of Highways 401 and 407, Mavis Road and other parts of the road network. Habitat is associated exclusively with the Fletcher's Creek valley, Tributary of the Credit River and with the open fields of the Parkway Belt West. Species that tolerate high levels of human disturbance can be expected to be found here, with the Fletcher's Creek valley providing the most notable refuge, breeding and staging habitat. Habitat is available for species that frequent forest, thicket, meadow and small wetland areas. It should be noted that an extensive trail network in Fletcher's Creek valley may add to the disturbance levels within the habitat.

Birds, amphibians, mammals and insects were noted during the field investigations. During the breeding bird survey, 24 species were recorded on May 30, 2016 and 20 species were recorded on July 2, 2016; primarily in the Fletcher's Creek valleyland. Nests of two of these species were observed including nine Cliff Swallow (Petrochelidon pyrrhonota) nests under the Fletcher Creek Bridge and 24 Rock Pigeon (Columba livia) nests under the Highway 407 Bridge.

One of the bird species observed, Barn Swallow (Hirundo rustica), is a SAR designated Threatened under the ESA (2007). Two Barn Swallows were seen on July 2, 2016 repeatedly collecting mud from the ditch on the west side of Mavis Road south of Ray Lawson Boulevard and flying in the direction of the houses on Cedar Lake Crescent on the east side of Mavis Road. Barn Swallows use mud to construct their nests and the two birds can be assumed to be a breeding pair that is nesting beyond the study area. An individual Barn Swallow was observed foraging over the ponds in the Fletcher's Creek valley, west of Mavis Road.

Additional wildlife species noted include:

- Great Blue Heron (Ardea herodias) flying over the study area on June 16, 2016;
- Amphibians: American Toad (Anaxyrus americanus) and Green Frog (Lithobates clamitans); mammal, White-tailed Deer (Odocoileus virginianus);

Insects: Common Whitetail (Plathemis lydia), bluet species (Enallagma sp.), Eastern Forktail (Ischnura verticalis), Ebony Jewelwing (Calopteryx maculata), Widow Skimmer (Libellula luctuosa), Cabbage White (Pieris rapae), Canadian Tiger Swallowtail (Papilio canadensis), Clouded Sulphur (Colias philodice), Common Ringlet (Coenonympha tullia) and Spring Azure (Celastrina ladon).

3.3.5 Species of Conservation Concern

In this report, the term Species of Conservation Concern (SCC) includes:

- Species at Risk (SAR) (i.e., species that are "designated" Threatened, Endangered or Special Concern by COSEWIC⁵ and/or listed under SARA and species "designated" Threatened, Endangered or Special Concern by COSSARO⁶, including Endangered and Threatened species listed and regulated under Ontario's ESA (2007);
- provincially rare species identified by Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Information Centre (NHIC S-rank of S1 to S3);
- regionally rare based on species lists for the Greater Toronto Area (GTA) and Region of Peel; and
- ▶ locally rare species (Tier 1 3, as indicated by CVC).

MNRF confirms that Fletcher's Creek is regulated and managed as Occupied Habitat for Redside Dace. Redside Dace is designated as Endangered under the ESA (2007), but remains listed as Special Concern under the federal Species at Risk Act (SARA), pending up-listing.

A search of NHIC records identified records for two SAR within one kilometre of the study area including Henslow's Sparrow (Ammodramus henslowii) and Jefferson Salamander (Ambystoma jeffersonianum). The record for Henslow's Sparrow indicates that the species is extirpated from the vicinity and as such it will not be given further consideration. Jefferson Salamander was last observed in 2005 near Fletcher's Creek. Its presence was not confirmed during the 2016 field investigations (i.e. no targeted surveys were conducted). Jefferson Salamander inhabits deciduous or mixed woods in small mammal burrows, rock fissures, tree stumps, leaf litter, logs and woody debris on the forest floor. For overwintering, it requires vertical fissures and burrows that extend below the frost line and for breeding, which occurs over a period of a few days, it requires high-quality, vernal, woodland pools that dry up in late summer (COSEWIC 2010). This species may be

⁵ COSEWIC - Committee on the Status of Endangered Wildlife in Canada

⁶ COSSARO - Committee on the Status of Species at Risk in Ontario

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present in the Fletcher's Creek valley but is not expected to occur near Mavis Road where access is limited, habitat conditions are poor (forest floor is generally compacted and bare) and no vernal pools were found.

Field investigations completed during the Class EA study confirmed the presence of 16 SCC in the general area:

- ► Two SAR:
 - Barn Swallow (*Hirundo rustica*) Designated as Threatened by COSEWIC and COSSARO; protected through listing as Threatened under ESA but not listed under SARA. Observed foraging over the pond in the Fletcher's Creek floodplain; and a pair was observed collecting mud for nest-building in the ditch adjacent to the pond east of Mavis Road. This pair carried the mud in the direction of the townhomes on the opposite side of Mavis Road but the nest site was not confirmed.
 - Butternut (*Juglans nigra*) Designated as Endangered by COSEWIC and COSSARO; protected through listing as Endangered under ESA and SARA. The MNRF identified Butternut as a SAR that may occur in the vicinity of Fletcher's Creek, an observation that was confirmed during field investigations. Four trees were found in the forest adjacent to Fletcher's Creek Bridge.
- Nine wildlife species listed as SCC by the CVC:
 - **Belted Kingfisher** (*Megaceryle alcyon*) Tier 3. Observed foraging along the Fletcher's Creek immediately west of the bridge.
 - **Black-billed Cuckoo** (*Coccyzus erythropthalmus*) Tier 2. Observed and heard singing in a tree northwest of the Fletcher's Creek Bridge.
 - Cliff Swallow (*Petrochelidon pyrrhonota*) Tier 3. Confirmed nesting under Fletcher's Creek Bridge. Nine nests were visible and individuals were foraging over the pond west of Mavis Road.
 - **Eastern Kingbird** (*Tyrannus tyrannus*) Tier 3. Observed in the south quadrants of Highway 407 Interchange.
 - Gray Catbird (*Dumetella carolinensis*) Tier 3. Heard singing in southeast quadrant of Highway 407 Interchange and along the creek northeast of the Fletcher's Creek Bridge.
 - **Great-crested Flycatcher** (*Myiarchus crinitus*) Tier 3. Heard calling in forest northwest of the Fletcher's Creek Bridge.
 - **Killdeer** (*Charadrius vociferus*) Tier 3. Observed in field north of the stormwater management pond east of Mavis Road, north of Highway 407.

- Northern Cardinal (Cardinalis cardinalis) Tier 2. Heard singing northeast of Fletcher's Creek Bridge and by the stormwater management pond east of Mavis Road, north of Highway 407.
- **Tree Swallow** (*Tachycineta bicolor*) Tier 3. Approximately 25 individuals foraging over the pond in the Fletcher's Creek floodplain.
- Five plant species listed as SCC by the CVC:
 - American Beech (Fagus grandifolia) Tier 3. Observed in FOD7.
 - Bebb's Willow (Salix bebbiana) Tier 3. Observed in SWDM3-3.
 - **Common Water-flaxseed** (*Spirodela polyrhiza*) Tier 2. Observed in OAO.
 - Gray Dogwood (Cornus racemosa) Tier 3. Observed in CUT1-4.
 - Narrow-leaved Meadowsweet (*Spiraea alba*) Tier 3. Observed in SWDM3-3.

3.3.6 Aquatic Habitat Existing Conditions

Fletcher's Creek

Fletcher's Creek is a major tributary of the Credit River that flows westerly through the study area under the existing bridge at Mavis Road to its confluence with the Credit River approximately 4 km downstream. The watercourse is bound by a defined valleyland / riparian corridor approximately 280 m in width (at the existing bridge crossing). Residential subdivisions surround the valleyland.

Within the assessed reach, Fletcher's Creek has a moderately meandering channel form with some evidence of bank erosion up and downstream of the Mavis Road crossing. The embankments both up and downstream of Mavis Road are steep and are generally vegetated with cultural meadow species such as Kentucky Bluegrass (Poa pratensis) and Smooth Brome (Bromus inermis); patches of Crown-vetch (Coronilla varia), goldenrod (Solidago sp.) and Canada Anemone (Anemone canadensis). The embankments under the bridge consist of rip-rap beyond the channel and crushed gravel / sand. The bridge pier is located on the south side of the creek with a trail on the north side, both are beyond the bankfull channel.

The wetted channel width under the bridge was approximately 12 m, at the time of the field investigation. Wetted channel widths up and downstream of the bridge narrow slightly to approximately 5 - 6.5 m on average. Bankfull widths average approximately 9 m. Water depths averaged 0.2 m deep during the field investigation, and bankfull depth is approximately 0.4 m. Water clarity was clear during the investigation.

Throughout the assessed reach, the channel is characterized by a mixed morphology consisting of runs (40%), riffles (35%), pools (15%), and flats (10%). Substrates are dominated by mainly coarse materials consisting of gravel (50%) and cobble (30%), with some clay (15%) and boulder (5%).

There is abundant instream cover (40%) both up and downstream of the bridge, consisting of cobble / boulders and woody debris. Riparian cover throughout the up and downstream reaches is dominated by grasses and the assessed reach had a shaded canopy cover of approximately 60%.

Riparian vegetation consists of young Green Ash (Fraxinus pennsylvanica), Willow (Salix sp.), American Elm (Ulmus americana), Common Buckthorn (Rhamnus cathartica), Tatarian Honeysuckle (Lonicera tatarica), Garlic Mustard (Alliaria petiolata), and Cloverroot (Geum urbanum).

There are three pedestrian bridges that cross Fletcher's Creek in the vicinity of the study area associated with the trail system; one in the upstream and two in the downstream reaches. The trail was observed to be used frequently by local residents and their pets.

Fishery

Fletcher's Creek supports a relatively diverse range of sport / forage / pan / and bait fish species that are common to southern Ontario. The following sport fish species has been documented within this system: Rainbow Trout (Oncorhynchus mykiss). In addition, a variety of forage / pan / and bait fish species have also been documented: White Sucker (Catostomus commersonii), Northern Hog Sucker (Hypentelium nigricans), Hornyhead Chub (Nocomis biguttatus), Common Shiner (Luxilus cornutus), Bluntnose Minnow (Pimephales notatus), Fathead Minnow (Pimephales promelas), Blacknose Dace (Rhinichthys atratulus), Longnose Dace (Rhinichthys cataractae), Creek Chub (Semotilus atromaculatus), Pumpkinseed (Lepomis gibbosus), Rainbow Darter (Etheostoma caeruleum), Jonny Darter (Etheostoma nigrum), Carp (Cyprinus carpio), Johnny Darter (Etheostoma nigrum), Golden Shiner (Notemigonus crysoleucas), Redside Dace (Clinostomus elongates) and Rock Bass (Ambloplites rupestris). Fletcher's Creek is managed by the CVC as a coldwater fishery.

Tributary of the Credit River

The Tributary of the Credit River is an intermittent drainage feature that flows southwesterly through the Highway 407 Interchange. It originates as surface flows in a Common Reed (Phragmites austalis) swale west of Mavis Road and north of the Highway 407 eastbound off-ramp where it is conveyed through a 200 mm Corrugate Steep Pipe

(CSP) and through a 400 mm diameter concrete pipe under Zinnia Place. Downstream of Zinnia Place, the watercourse has a defined channel within a forested valley to its confluence with the Credit River approximately 1 km downstream. The habitat description below is described as north of the Highway 407 eastbound off-ramp ('upstream reach') and southwest of the Highway 407 eastbound off-ramp ('downstream reach').

Upstream

The upstream reach is approximately 180 m in total length and is characterized as a constructed drainage swale, collected and conveying drawing from within the Highway Interchange and a portion of Mavis Road. Substrates consists of gravel, sand and rock. Vegetation consists of cultural meadow species that is regularly maintained for the hydro corridor that pass through this area. This reach was dry at the time of investigation.

Downstream

The road embankment in the downstream reach is steep at the culvert outlet and is armored with gabion baskets. No defined flow path was evident at the time of investigation as the outlet was choked with vegetation. The concrete pipe is perched 0.3 m, which would act as a permanent barrier to fish movement, if any fish are present. It appears that the feature continues through the concrete pipe for approximately 35 m where it eventually outlets south of Zinnia Place in a deep valley surrounded by large armour stones 6 to 7 m high. This valley was gated and therefore not accessible. However, orthoimagery shows a highly meandering, defined channel through the valley. As the upstream reach and culvert outlet was dry at the time of investigation, it is assumed that the channel downstream reach receives other flow inputs e.g. stormwater outfalls etc.

Fishery

No fish data was available from background sources or though agencies for this feature. Based on the conditions observed in the field i.e. dry, the feature is likely intermittent and indirectly contributes to direct fish habitat further downstream through flows and allochthonous inputs.



City of Mississauga and Region of Peel Mavis Road - Courtneypark Drive West to Ray Lawson Boulevard Environmental Study Report Exhibit 3-2: Plate 1 Natural Environmental Features


Region of Peel
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Courtneypark Drive to Ray Lawson Boulevard
Class Environmental Assessment Study

Exhibit 3-2: Plate 2 Natural Environmental Features





 Region of Peel Working for you
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Class Environmental Assessment Study



Exhibit 3-2: Plate 3 Natural Environmental Features



3.4 Tree Inventory

A tree inventory was conducted along Mavis Road to record the species, size and condition of all street trees that could potentially be impacted by the proposed improvements. The Arborist Report / Tree Management Plan is provided in **Appendix E.** The existing conditions are summarized below:

- ► A total of +/- 920 trees are located within the study area.
- A total of +/- 843 located between Courtneypark Road West and Highway 407 were inventoried (368 on the east side of Mavis Road and 475 on the west side).
- A further 77 (approximately) are located north of Highway 407 between the highway on-ramp and Ray Lawson Boulevard and were not inventoried or assessed in the field.
- A total of 208 trees are located on private property and 711 are located on public property, including street trees along Mavis Road and adjacent streets, the Highway 407 ramps and Fletcher's Flats green space.
- A total of 250 trees were individually tagged. Approximately 562 trees were assessed in 105 groupings.
- A total of 30 trees were individually assessed but not tagged owing to barriers to access and/or private ownership.
- Trees range in size from 5-25 cm diameter at breast height (DBH).
- Trees were found to be in mostly fair to good condition. Vegetation found to be in fair to poor condition showed signs and symptoms of weakly formed unions, poor form due to abnormal development of scaffold branches causing injury to other branches, co-dominant stems, included bark, trunk wounds, winter/environmental damage, scorched and/or undersized leaves, sprouting, exfoliating bark, sucker growth, suppression, broken branches and deadwood ranging between 10-70%.
- The majority of trees on site are planted three or more metres apart and have adapted to the wind-swept conditions common to major corridors. Several privately-owned trees are located behind chain link or privacy fencing.
- > The breakdown of trees inventoried on and adjacent to the study area includes:
 - Colorado Spruce (*Picea pungens*)
 - Norway Maple (Acer platanoides)
 - Silver Maple (Acer saccharinum)
 - Austrian Pine (*Pinus nigra*)

- Thornless Honeylocust (Gleditsia triacanthos var. inermis)
- Crabapple species (*Malus sp.*)
- Ornamental Pear (*Pyrus sp.*)
- American Elm (Ulmus americana)
- Manitoba Maple (Acer negundo)
- Zelkova (Zelkova serrata)
- Basswood (Tilia americana)
- Celtis occidentalis (Celtis occidentalis)
- Norway Spruce (*Picea abies*)
- Red Oak (Quercus rubra)
- Littleleaf Linden (*Tilia cordata*)
- White Oak (*Quercus alba*)
- Eastern White Cedar (*Thuja occidentalis*)
- Ash species (*Fraxinus sp.*)
- White Mulberry (*Morus alba*)
- Burr Oak (Quercus macrocarpa)
- Pawpaw (Asimina triloba)
- Juniper species (Juniperus sp.)
- No rare or at risk trees are present.

The assessment of impacts and recommended mitigation is provided in the Arborist Report in **Appendix E** and is summarized in **Chapter 8** of this ESR. The mitigation recommendations are integrated with the overall Streetscape Concept, presented in **Chapter 6**.

3.5 Drainage and Stormwater Management

A drainage assessment was undertaken in support of the Mavis Road Class EA. The Drainage and Stormwater Management Report, provided in **Appendix F**, documents the existing drainage characteristics, hydrologic analysis, hydraulic analysis, drainage and SWM issues and design, acceptable opening sizes of major crossing structures, and a feasible SWM strategy for the proposed roadway.

3.5.1 Background Information and Site Investigation

The following background information and reports were reviewed during the drainage assessment:

- Stormwater Management Study for Mavis Road Widening, from Steeles Avenue to Highway 407(ETR), prepared for City of Brampton and Regional Municipality of Peel by Schaeffers Consulting Engineers (August 2009);
- Design Report Fletcher's Creek Stormwater Management Facility No. 5, prepared for Meadowvale Village Secondary Plan Area, by Rand Engineering Corporation, (December 1996);
- Stormwater Management Implementation Report, Arrowsmith Subdivision Phases 4 and 5 (21T-95007) Fletcher's Creek SWM Facility No. 4, prepared for Meadowvale Village Secondary Plan Area, by Rand Engineering Corporation (June 2000);
- Existing contract drawings of Highway 401, Courtneypark Drive West, Mavis Road and Highway 407 within the study limit, received from the City of Mississauga;
- Storm Sewer Network Book, by City of Mississauga (2015);
- Storm Drainage Design Chart, Mavis Road from Highway 407 to Derry Road, Sheet 1 of 1, by City of Mississauga (April 1997);
- Storm Drainage Plans, Mavis Road from Highway 407 to Derry Road, by City of Mississauga (April 1997);
- Storm Drainage Design Chart, Heritage Estates, All 10 sheets, by Urban Engineering Consultants, no date information available;
- Storm Drainage Design Chart, Arrowsmith Village, All 3 sheets, by RAND Engineering Corporation (April 1997);
- Storm Drainage Design Chart, Gooderham Estate, Sheet 5 of 7, by Urban Engineering (July 1996);

- Fletchers Creek Restoration Study Characterization Report, Credit Valley Conservation (February 2012);
- Fletchers Creek Subwatershed Plan, Study Report, City of Brampton, prepared by Paragon Engineering Limited et al. (August 1995).

Field investigation of the existing drainage features were conducted on August 12 to14, 2016. The purpose of the field investigation is to review the existing drainage conditions of the area, confirm the drainage patterns and observe the conditions of existing culverts. A photographic inventory of the study area is provided in **Appendix F**.

3.5.2 Design Criteria

The majority of the drainage area in the study limit lies within the Fletcher's Creek subwatershed, which is a major tributary to the Credit River and falls under the jurisdiction of Credit Valley Conservation (CVC). The City of Mississauga Transportation and Works Department, Development Requirements Manual has stipulated stormwater management (SWM) criteria:

- SWM Quality Control Criteria: Water quality controls are to be implemented on applications in accordance with the applicable Master Drainage Plan or Subwatershed Plan and the City Stormwater Quality Study prepared by R.E. Winter dated January, 1996 Stormwater Management Practices Planning and Design Manual, MOEE.
- SWM Quantity Control Criteria: Vary depending upon the watershed, and in some cases, the storm sewer shed. The type of control for Fletcher's Creek is downstream storage and required by master drainage or subwatershed plan. A stormwater management report will be required.
- Extended Detention/Erosion Control Criteria: SWM facilities shall include an additional storage volume for extended detention to reduce/mitigate the potential erosion impact on the receiving watercourse. Where appropriate, extended detention shall be included in the SWM facilities.

The following design objectives were established to minimize the potential impacts on the surrounding environment:

- Provide an effective/efficient drainage system;
- Minimize risk to public safety;
- Maintain flow paths for upstream lands;
- Maintain or enhance the quality of storm runoff;

- Maintain or reduce flood risk for lands within and surrounding the transportation corridor;
- Minimize future maintenance requirements; and
- Situate SWM measures on lands available in the transportation corridor.

3.5.3 Hydrologic Analysis

3.5.3.1 Existing Land Use and Drainage

As noted above, the study area lies predominantly within the Fletcher's Creek subwatershed (refer to report in **Appendix F** for the subwatershed boundary). Existing land use along Mavis Road is predominantly residential and includes a small portion of commercial area. Natural areas and other unpaved areas are associated with Fletcher's Creek valley, Credit River tributary, the Highway 407 Interchange and small patches of grass / turf and roadside landscaping. Soil type is mainly Chinguacousy clay loam with a small portion of Oneida clay loam. In general, the surface drainage pattern is from north to south for areas located north of Fletcher's Creek and from south to north for areas located south of Fletcher's Creek.

Mavis Road – South of Highway 407 to Courtneypark Drive West

The existing condition drainage mosaics are shown on **Exhibit 3-3** through **Exhibit 3-6**. The minor system runoff from Catchment A1 to A13 drains to the Mavis Road storm sewer system between South of Highway 407 and Old Derry Road. The total drainage area conveyed to this section of Mavis Road storm sewer system is 10.46 ha. This section of Mavis Road storm sewer system combined with Old Derry Road storm sewer system. From Catchment A13, the storm sewer runs westerly to collect runoff from Catchment E1, E2A and E2B, which ultimately discharges to the Fletcher's Creek Stormwater Management Facility No. 5. The major system runoff from these catchments flows overland to SWM Facility No. 5 which ultimately drains to Fletcher's Creek.

Runoff from Catchment A24 to A26 drains to the Mavis Road storm sewer system between Old Derry Road and Crawford Mill Ave. The total drainage area conveyed to this section of Mavis Road storm sewer system is 1.21 ha. This section of Mavis Road storm sewer system combines with the runoff from Catchments E4A and E4B (combined drainage area of 7.01 ha) and drains to the Crawford Mill Avenue storm sewer system. This storm sewer then joins with the storm sewer from Old Derry Road at Node 2 and runs southerly to Node 7 collecting runoff from Catchment E5 before discharging to the Fletcher's Creek Stormwater Management Facility No. 5. The major system runoff from these catchments flows overland to SWM Facility No. 5. Runoff from Catchment A30 to A31 and A34 to A36 drains to the Mavis Road storm sewer system between Crawford Mill Avenue and Fletcher's Creek Bridge at Mavis Road. The total drainage area conveyed to this section of Mavis Road storm sewer system is 1.96 ha. This section of Mavis Road storm sewer system combines with the runoff from Catchment E6A and E6B (combined drainage area of 35.98 ha) and drains to the Golden Farmer Way storm sewer system. This storm sewer combines with another storm sewer at Node 7 and discharges to the Fletcher's Creek Stormwater Management Facility No. 5 from a single outlet point. The major system runoff from these catchments flows overland to SWM Facility No. 5.

Runoff from Catchment C1 drains to the Mavis Road storm sewer system between Fletcher's Creek Mavis Road Bridge and Kazoo Court. The total drainage area conveyed to this section of Mavis Road storm sewer system is 0.57 ha. This section of Mavis Road storm sewer system combines with the runoff from Catchment E7 (drainage area of 2.19 ha) and drains to the Kazoo Court storm sewer system. Runoff from Catchment E8 (drainage area of 2.05 ha) combines with the runoff from Catchment E8 (drainage area of 37.52 ha) and drains to the Mavis Road storm sewer system between Kazoo Court and Highway 401. The total drainage area conveyed to this section of Mavis Road storm sewer system is 20.6 ha. This section of Mavis Road storm sewer system also drains to the Kazoo Court storm sewer system, then the Kazoo Court storm sewer system combined with Catchment E9 and discharge to the Fletcher's Creek SWM Facility No. 4. The major system runoff from these catchments flows overland to Fletcher's Creek.

Mavis Road consists of an urban road cross-section on both east and west sides. Under existing conditions, the major storm runoff flows overland along Mavis Road towards the road low point, which is ultimately captured by catch basins and conveyed to SWM Facilities No. 4 and 5 via storm sewers.

Fletcher's Creek Stormwater Management Facility No. 4 and No. 5

The existing SWM Facility No. 4 is water quality control only. It services approximately 79 ha of drainage area, with a permanent pool elevation of 169.55 m. This includes sections of Mavis Road from Fletcher's Creek Mavis Road Bridge to Highway 401. The pond is controlled by a 2100 mm diameter storm sewer leading to a flow splitter manhole. The 2100 mm diameter pipe is sized to convey the peak flow of approximately 7.3 m³/s from the 10-year storm event. The flow splitter manhole diverts the first flush flow of approximately 3.2 m³/s from the 25-mm storm event into Facility No. 4. The flow splitter manhole consists of a 3.8 m x 3.0 m rectangular manhole, a 1350 mm diameter first flush pipe and an 1800 mm diameter bypass pipe. The balance of the minor system flow

(approximately 4.1 m3/s) discharges through the 1800 mm diameter pipe into a channel leading to Fletcher's Creek.

The existing SWM Facility No. 5 services approximately 134.9 ha of drainage area with a permanent pool elevation of 168.8 m. This includes sections of Mavis Road from South of Highway 407 to Fletcher's Creek Mavis Road Bridge. It is controlled by a flow control structure which is equipped with an orifice and weir designed to regulate outflows from the facility for lower frequency storms. The minimum elevation of the pond embankment at the southwest side is 173 m which act as an overflow weir. The outflows from the pond discharge directly to Fletcher's Creek. The Regional Storm water level of Fletcher's Creek is 169.82 m at the downstream of the SWM Facility No 5.

Mavis Road – Highway 407 Interchange area

For the Highway 407 Interchange area, runoff from Catchment E10A is conveyed by roadside ditch and drains to the west side of Mavis Road via 1050 mm diameter concrete pipe culvert (CV6). Runoff from Catchment B1 (drainage area of 0.07 ha) combined with the runoff from Catchment E10A and E10B (drainage area of 2.28 ha) and drains to Mavis Road roadside ditch which, then, drains to the Highway 407 N-W Ramp via a 900 mm CSP culvert (CV1). The total drainage area conveyed to this culvert is 2.35 ha. The major system runoff from this catchment flows overland to the north side of Highway 407 along the ditches on Mavis Road.

Runoff from Catchments B2 and B3 (drainage area of 0.18 ha) combines with the runoff from Catchments E11A, E11B and E11C (drainage area of 4.18 ha) and drains to the ditch on the north side of Highway 407 through different catch basins and, then drains to the Highway 407 N-W Ramp via a 1200 mm CSP culvert (CV2). The total drainage area conveyed to this culvert is 4.98 ha. The major system runoff from these catchment flows overland to the north side of Highway 407 along the ditches on Mavis Road. Runoff from Catchment E11C is directed to Catchment E11B via a 600 mm CSP Culvert with 15 mm PVC lining (CV5)

Runoff from Catchment B4 (drainage area of 0.15 ha) combines with the runoff from Catchments E12A and E12B (drainage area of 3.1 ha) and drains to the ditch on south side of Highway 407 through the catch basin located on west side of the road and, then drains to the Highway 407 N-E⁷ Ramp via a 1200 mm CSP culvert (CV3). The total drainage area conveyed to this culvert is 3.25 ha.

⁷Ramp naming convention is as follows: 'direction travelling from' - 'direction travelling to'. For example, N-E ramp = travelling from the north (i.e. southbound) and to the east (eastbound).

Runoff from Catchments B5 to B10 (drainage area of 0.61 ha) combines with the runoff from Catchment E13 (drainage area of 2.38 ha) and drains to the ditch along Mavis Road through different single catchbasins located on the west side of the road and, then drains to the Highway 407 W-N/S Ramp via a 600 mm CSP Culvert with 15 mm PVC lining (CV4). The total drainage area conveyed to this culvert is 2.99 ha.

The major system runoff from Catchment B4 to B10 flows overland to the west of Mavis Road toward Catchment E13 which ultimately drain to Credit River via culvert CV4.

Table 3-1 summarizes the existing culvert characteristics. CV1 to CV5 culvert characteristics were estimated from the Highway 407 drawings and site investigation. This information need to be confirm during detail design stage. For CV6 and CV7, culvert characteristics were obtained from Stormwater Management Report for Mavis Road widening between Steeles and Highway 407 by Schaeffers (Aug 2009).

Table 3-1: Existing Culverts

Culvert ID	Location	Culvert Length (m)	Culvert Diameter (mm)	Estimated Slope (%)	Estimated Invert Elevation (m)		Culvert
					Upstream	Downstream	Туре
CV1	Mavis Rd - Highway 407 N-W Ramp	23.0	900	0.50	189.6	198.4	CSP
CV2	Mavis Rd - Highway 407 N-W Ramp	25.7	1200	0.50	191.0	190.8	CSP
CV3	Mavis Rd - Highway 407 N-E Ramp	26.9	1200	0.50	196.3	196.1	CSP
CV4	Highway 407 - Mavis Rd W- N/S Ramp	30.0	600	1.00	196.2	195.9	CSP
CV5	Mavis Rd - Highway 407 S-W Ramp	25.8	600	0.50	204.9	204.7	CSP
CV6	Mavis Road, North of Highway 407	51.5	1050	4.00	201.7	199.65	Concrete Pipe
CV7	Mavis Road, North of Highway 407	46.7	900	5.10	194.676	192.30	CSP



Exhibit 3-3: Existing Drainage Mosaic Plate 1



Exhibit 3-4: Existing Drainage Mosaic Plate 2



Exhibit 3-5: Existing Drainage Mosaic Plate 3



Exhibit 3-6: Existing Drainage Mosaic Plate 4

3.6 Major Utilities

Utility providers were contacted as part of the consultation process to confirm the presence of major utilities within the study area. A summary of the major utilities confirmed as being present is provided below. Further information about potential for conflicts and mitigation is provided in **Chapter 8**.

Alectra (formerly Enersource)

- Shared light standard (LED 44) and overhead transmission system along the west side of Mavis Road (via hydro poles), within the City of Mississauga. Aerial lines / poles terminate at the Highway 407 ramp terminal on south side of Highway 407.
- Light standards/poles (LED 100) serviced by underground conductor on the east side of Mavis Road within the City of Mississauga. Poles terminate at the Highway 407 ramp terminal on south side of Highway 407.

Hydro One Networks Inc.

The existing transmission system consists of two existing 500 kV lines within the Parkway Belt West and crosses Mavis Road just north of the eastbound Highway 407 off-ramp terminal.

Alectra (formerly Hydro One Brampton)

- > The existing transmission system through Brampton consists of the following:
 - Direct buried duct along the west side of Mavis Road between Ray Lawson Boulevard and south of the Highway 407 bridge, where the duct crosses under Mavis Road and continues west through the Utility Corridor/Parkway Belt.
 - Shared light standard and overhead transmission lines on the west side of Mavis Road (via hydro poles) between Highway 407 N-W ramp terminal and Ray Lawson Boulevard.
 - Light standards/poles serviced by underground conductor on the east side of Mavis Road between Highway 407 W-N/S ramp terminal and Ray Lawson Boulevard.
 - Two direct buried ducts running in parallel along the east side of Mavis Road between the Highway 407 W-N/S ramp terminal and Ray Lawson Boulevard.

Enbridge (distribution)

 A 30-inch Vital Main pipeline running east-west along Old Derry Road, crossing Mavis Road south of the Derry Road West intersection. A 36-inch pipeline (with 3.0 m easement) extends east-west within the Utility Corridor/Parkway Belt, crossing Mavis Road south of Highway 407.

Enbridge (local)

- Local 4-inch pipelines are in place on the east side of Mavis Road from Courtneypark Drive to Western Skies Way, and again from Derry Road West to Twain Avenue.
- Additionally, local 4-inch pipelines are located on all side roads approaching the study area and cross Mavis Road at the following intersections: Courtneypark Drive, Western Skies Way, Crawford Mill Avenue, Kaiser Drive, Twain Avenue, and Ray Lawson Boulevard.

Watermain and Sanitary Sewer

- A mainline storm sewer pipe of varying diameter runs along the centreline of Mavis Road from Courtneypark Drive to the North City Limits, and to the west of Mavis Road from the Highway 407 N-W ramp terminal to Ray Lawson Boulevard.
- Storm sewer pipes of varying diameter are also located on most side roads within the study area and cross Mavis Road at all intersections and select midblock locations.
- Watermain pipes of varying diameter are located on most side roads within the study area and cross Mavis Road at all intersections and select midblock locations.
- 250 mm sanitary sewer pipes are located on most side roads within the study area and cross Mavis Road at select intersections and midblock locations. In addition, a 375 mm sanitary sewer pipe crosses Mavis Road at Courtneypark Drive, and a 1350 mm sanitary sewer pipe crosses Mavis Road north of Fletchers Creek.
- As part of the Region of Peel's "East to West Wastewater Diversion Strategy", the construction of an 11 m deep gravity sewer is proposed along Old Derry Road that will cross Mavis Road to the south of Derry Road West. The new trunk sewer will require a permanent access shaft in the southeast quadrant of the Mavis Road / Derry Road West intersection. The earliest possible start date for construction is fall of 2018. Further information can be found on the Region of Peel's website at: <u>https://www.peelregion.ca/pw/water/environ-assess/east-west-wastewater-diversion-strategy.htm</u>

Telus

 Overhead fiber lines (via hydro poles) on the west side of Mavis Road from Courtneypark Drive to Derry Road West (fibers leased with Alectra utilities)

Bell Canada

- Bell has lines and ducts buried throughout the study area. In general, these are located:
 - On the east side of Mavis Road from Courtneypark Drive to the North City Limits.
 - On the west side of Mavis Road from the Highway 407 N-W ramp terminal to Ray Lawson Boulevard.
 - On all side roads approaching the study area, crossing Mavis Road at all intersections.

Rogers

Rogers has lines and ducts buried throughout the study area. In general, these lines are located on all side roads approaching the study area, crossing Mavis Road at all intersections except for Western Skies Way and Derry Road West.