

# Chapter 6 – Impact Assessment, Mitigation and Monitoring



**407 TRANSITWAY – WEST OF BRANT STREET TO WEST OF HURONTARIO STREET**  
**MINISTRY OF TRANSPORTATION - CENTRAL REGION**

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## 6. IMPACT ASSESSMENT, MITIGATION AND MONITORING

### 6.1. Introduction

The *Transit Projects and Metrolinx Undertakings Regulation*, Ontario Regulation 231/08 under the *Environmental Assessment Act*, Section 9 (2) requires the proponent to prepare an Environmental Project Report (EPR) that contains the following information, among other requirements:

- Description of the environment that will be affected or might reasonably be affected;
- Anticipated potential impacts;
- Proposed mitigation measures to minimize, manage, prevent and avoid environmental effects; and,
- Proposed monitoring and contingency measures, if required.

An impact assessment of the preferred alternative described in **Chapter 5** of the Draft EPR was undertaken to identify the footprint, construction and operation/maintenance, positive and negative impacts associated with the implementation of the 407 Transitway.

The impact assessment involved the application of the following steps:

1. Identify and analyze activities where the project, as described in **Chapter 4**, may interact with the existing environmental conditions described in **Chapter 3**.
2. Propose mitigation measures that can be implemented during design, construction and the operation of the project.
3. Identify the residual environmental effects and their significance, if any.
4. Recommend monitoring activities during the construction and operation of the project.

The environmental effects were assessed in terms of potential impacts on:

- Natural Environment;
- Socio-Economic and Cultural Environment;
- Transportation; and,
- Utilities.

**Table 6.1** presents the assessment criteria and measures based on legislative requirements and past experiences:

**TABLE 6.1 ASSESSMENT CRITERIA**

ENVIRONMENTAL FACTOR	ENVIRONMENTAL VALUE/CRITERION	MEASURES
NATURAL ENVIRONMENT	Physiography and Soils	Management of excess soil.
		Potential for erosion during construction.
		Potential for disturbance and/or disposal of contaminated waste and/or soils during construction.
	Contaminated Properties and Waste	Potential impacts to contaminated property and waste.
		Potential construction impacts to unknown contaminated property and waste.
	Surface Water, Drainage and Stormwater	Possible impacts on existing drainage patterns along 407 ETR due to proposed grading of the Transitway.
		Increased level of imperviousness, increased runoff volumes to watercourses.
		Floodplain water level increases.
	Groundwater	Impact to quality and quantity of water.
		Potential alterations to the groundwater resources (including groundwater regime and recharge/discharge) due to construction of the Transitway facility.
		Potential for impacts to water wells.
	Fish and Fish Habitat	Potential for groundwater contamination.
		Potential impacts to fish and fish habitat.
	Vegetation and Vegetation Communities	Displacement of and/or disturbance to rare, threatened or endangered fish species or significant fish habitat.
Displacement of and/or disturbance to vegetation and vegetation communities.		
Designated Natural Areas	Displacement of and/or disturbance to rare, threatened or endangered vegetation and vegetation communities.	
	Potential impacts to designated natural areas in the vicinity of the study area.	
Wildlife and Wildlife Habitat	Displacement of wildlife and wildlife habitat.	
	Barrier effects on wildlife passage.	
	Displacement of rare, threatened or endangered wildlife or significant wildlife habitat.	
	Wildlife/vehicle conflicts.	
Air Quality	Impacts to migratory birds during construction.	
	Disturbance to wildlife from noise, light and visual intrusion.	
	Potential for air quality impacts.	
SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT	Land Use	Potential impacts on designated land uses within the study area.
		Potential impacts on existing, planned, and future land uses within the study area.
		Additional property requirements/displacements.
		Number of sensitive land uses affected.

ENVIRONMENTAL FACTOR	ENVIRONMENTAL VALUE/CRITERION	MEASURES
		Number of businesses affected.
	Noise and Vibration	Impacts regarding noise and vibration.
	Built Heritage Resources and Cultural Heritage Landscapes	Displacement/demolition of built heritage resources and/or cultural heritage landscapes or alteration of their settings.
	Archaeological Resources	Potential loss/displacement of archaeological resources within the study area.
Potential impacts to cemeteries and burial sites.		
TRANSPORTATION - ALIGNMENT	Crossing arterial road effects	Underpass or overpass crossing.
	Traffic effects	New roads, new intersections, increased traffic.
		Ability to maintain or improve road traffic and pedestrian circulation during construction on all arterial roads.
		Ability to maintain 407 ETR traffic during construction.
Impact on 407 ETR infrastructure	Impact to 407 ETR Interchanges.	
TRANSPORTATION - STATIONS	Connections to-regional transit services	Potential to connect to regional services enhancing the overall service of the system.
	Compatibility with local transit services	Potential for fast convenient connection with local transit services to encourage ridership.
	Location of station and transit access	Station proximity to local development attracting greater ridership.
	Travel time and service reliability for on-street-stop transit services	Potential for buses to be delayed by traffic entering/leaving station.
	Reduce level of services for vehicular traffic	Potential for traffic congestion at areas of influence of station access roads.
	Station access by walking distance	Ability of walk-in riders to access stations in timely and saved manner. Direct and convenient sidewalk access can attract local area passengers to walk to station.
	Emergency/maintenance vehicles access	Ability of emergency/maintenance vehicles to ingress/egress facilities in timely and saved manner.
	Reduction in main street intersection capacities due to rapid transit operations	Potential for signalling modifications and/or introduction of new signalized intersections.
UTILITIES	Impact on existing utilities	Number and significance of utility impacts.

The impact assessment considered:

- All federal and provincial regulatory requirements for the assessment of environmental effects;
- Issues raised by external agencies, the public, property owners, Indigenous Communities, and other persons of interest during consultation and participation activities conducted to date; and,
- Engineering design and programs for mitigation and monitoring.

The environmental effects of the undertaking can be classified under three categories:

- **Footprint Impacts** – Long term impacts on the existing environmental features located within the study area that will potentially be displaced or lost through the introduction of the Transitway;

- **Construction Impacts** – Potential short-term disruption effects resulting from construction of the Transitway; and,
- **Operations and Maintenance Impacts** – Potential long-term disruption effects resulting from the operations and maintenance of the Transitway.

### 6.1.1. Studies Prepared in Support of the 407 Transitway

Potential impacts, mitigation measures and monitoring and contingency plans were derived from environment technical reports prepared based on the Design of the 407 Transitway. Members of the Technical Advisory/Resource Group (TRG) (including transit organizations, municipal staff, Hydro One Networks Inc., CN Rail, Highway 407 ETR Consortium, MECP, MNRF, Infrastructure Ontario, Halton Conservation, and Credit Valley Conservation) and Indigenous Communities were consulted in the impact assessment studies listed below. The following is a list of the studies conducted:

- **Contamination Overview Study:** This study identified the potential subsurface chemical contamination issues associated with the study area based on available sources of information. Further assessment for potential contamination and/or waste materials may be required for seventy-six properties located in the vicinity of the 407 Transitway, depending on property needs. Five of these are low risk properties that would require further assessment to determine whether subsurface investigations would be warranted (i.e. a Phase I ESA) if impacted by construction activities. Forty-six of these are moderate risk properties that would require subsurface investigations to determine presence/absence of impacts (i.e. limited subsurface environmental investigations) if impacted by construction activities. Twenty-five of these are high risk properties that would require subsurface environmental investigations (i.e. Phase II ESAs) to determine whether soil and/or groundwater impacts exist at the properties if impacted by construction. Further studies/investigations will be carried out prior to construction for any of these properties that will be impacted by the 407 Transitway. Preliminary Site Screening forms are required for properties identified for acquisition.
- **Drainage, Hydrology, SWM and Floodplain Hydraulics:** A comprehensive assessment of the impact of the proposed Transitway on existing drainage patterns and watercourses has been completed. There are fifty-four watercourses within the study limits, out of which forty-three carry the upstream flow from creek subwatersheds under the 407 ETR and the remaining watercourses have been identified as minor conveyance features with small localized tributary areas or upstream 407 ETR outlet that the 407 Transitway will not affect.
- **Secondary Source Groundwater Investigation:** Existing groundwater resources and hydrogeological conditions in the study area were investigated to identify potential constraints to the implementation of the 407 Transitway. This investigation provided an overview of the geology and hydrogeology within and adjacent to the study area and identified areas where dewatering may be required. Areas where the groundwater table is likely to be high were also identified. Hydrogeological features such as significant groundwater recharge and discharge areas, municipal wellhead protection areas, groundwater dependent commercial enterprises, existing water wells and areas of shallow water table

were considered. The Secondary Source Groundwater Investigation concluded that further investigation and monitoring is necessary to assess the impacts to the groundwater resources prior to construction.

- **Terrestrial Ecosystems:** An assessment of the potential effects of the 407 Transitway on terrestrial ecosystems (including physiography and soils, vegetation and vegetation communities, wildlife and wildlife habitat, designated natural areas and species at risk) within the study area was undertaken. This assessment concluded that the 407 Transitway will displace generally previously disturbed vegetation and vegetation communities and wildlife habitat mostly characterized as urban. Most of the vegetation impacted includes cultural vegetation communities as well as anthropogenically influenced lands (i.e. agricultural and manicured lands); however, there will be impacts to forest and wetland communities. The 407 Transitway design was refined to avoid and/or minimize impacts to designated natural areas present in the vicinity of the study area including Areas of Natural and Scientific Interest (ANSIs): Zimmerman Valley Life Science and Trafalgar Moraine Earth Science ANSIs, and the candidate Sixteen Mile Creek, Oakville-Milton Wetlands and Uplands Life Science ANSIs, and North Oakville-Milton West Wetland Complex Provincially Significant Wetland (PSW). A total of 28 wildlife species at risk have been recorded within the vicinity of the study area or have been identified as having the potential to be found within the study area based on secondary source data. Five species at risk were confirmed in the study area by LGL during 2018 and 2019 field investigations: Western Chorus Frog; Eastern Wood Pewee; Barn Swallow; Bobolink; and, Eastern Meadowlark. Consultation with MNRF and Conservation Authorities occurred regarding potential impacts and proposed mitigation measures and commitments, which are presented in this report.
- **Fish and Fish Habitat:** An assessment of the potential effects of the 407 Transitway on the fish and fish habitat located within the study area was undertaken. This assessment concluded that the watercourse sensitivities within the 407 Transitway corridor range from Low to High, and the proposed works at each of the identified affected watercourse crossings, which include bridge and culvert installations, will result in a temporary alteration and disruption of fish habitat. The mitigation measures proposed will minimize negative impacts to fish and fish habitat. The proposed works will take place between July 1 and September 15 in accordance with the coldwater/Redside Dace fisheries timing window, and July 1 and March 31 in accordance with the warmwater timing window. Works are also to be conducted during a period of low flow and precipitation to further reduce the potential impacts. The 'Likelihood of Causing Serious Harm' at each impacted crossing location was determined. Consultation with MNRF took place regarding the potential impacts of this project on fish and fish habitat. Future consultation with MNRF and DFO will take place prior to construction, as required. MTO Project Notification Forms will likely be required prior to construction for the watercourse crossings where there is "No Likelihood of Causing Serious Harm". A DFO Request for Review Form may need to be filled out prior to construction for the watercourse crossings where there is "Likelihood of Causing Serious Harm" as a result of the 407 Transitway.
- **Aesthetics, Landscape Plantings:** A landscape composition analysis was undertaken to provide an

inventory and general evaluation of the existing landscape composition and the aesthetic/visual conditions associated with the proposed 407 Transitway runningway and station sites. In general, the proposed transitway follows a strip of vacant/cultivated land along the south side of the 407 ETR corridor. Some of the vacant lands have evidence of natural regeneration of pioneer tree species starting to occur. There are a few small remnant wooded areas located along the proposed transitway. The most significant wooded areas are located in the valleyland areas associated with Fletchers Creek (just west of the study limits), Etobicoke Creek West, West Humber River, Rainbow Creek and the Lower Humber River. The visual impacts of the proposed transitway corridor and station sites are typically low as the land uses in the surrounding area are dominated by industrial development and the 407 ETR corridor. The proposed station sites are the areas of most visual concern as they will include station buildings and extensive parking lots. Preliminary landscape composition recommended planting layout drawings were prepared and provide a preliminary landscape planting layout for the runningway to help mitigate impacts to the adjacent natural and cultural environment (see **Appendix L**). The landscape plantings will also serve to provide 'greening' to the corridor, add tree canopy cover and add to the overall general aesthetics of the project in the context of the existing and proposed surrounding urban development and the surrounding natural landscape features. More detailed landscape planting plans (including landscape planting plans at the station sites) will be developed prior to construction in consultation with agencies including Halton Conservation, Credit Valley Conservation and MNRF.

- **Noise and Vibration Impact Assessment:** A project-specific noise and vibration impact assessment was conducted as part of the TPAP. This study assessed noise impacts at existing and proposed sensitive locations from buses operating on the proposed 407 Transitway inclusive of changes to local topography; air-borne vibration of house structure elements induced by sound levels from bus engines; and noise and vibration considerations during construction of the 407 Transitway. The potential noise and vibration impacts associated with the 407 Transitway were assessed by predicting noise and vibration conditions at the nearest noise sensitive areas (NSAs) under two operating scenarios: future conditions (2041) assuming that the project *does not* proceed (future no-build), and future conditions (2041) assuming that the project *does* proceed (future build). The assessment concluded that no significant increases of 5 dBA, or more, were predicted for any of the NSAs, however, two NSAs have overall impacts greater than 65 dBA as background sound levels. The assessment concluded that mitigation is not warranted as the 407 Transitway is below ground at these locations. Ground-borne vibration impacts were considered but was concluded not to have an impact. It has been shown in past Transitway studies that the operation of buses does not generate perceptible levels of vibration beyond the right-of-way. No airborne vibration effects due to bus engine pass-by noise were predicted.
- **Air Quality Impact Assessment:** An air quality and greenhouse gas (GHG) emissions inventory was completed for the future reference year 2041, with and without the proposed 407 Transitway. The air quality impacts of the proposed 407 Transitway were evaluated using detailed air dispersion modelling. The assessment estimated the net change in pollutant emissions due to the Transitway in the 407 ETR transportation corridor for each pollutant of concern: carbon monoxide (CO), nitrogen

dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), volatile organic compounds (VOCs) (including 1,3-butadiene, acrolein, acetaldehyde, benzene, and formaldehyde), benzo[a]pyrene, which is a key representative of polycyclic aromatic hydrocarbons (PAHs), total suspended particulate (TSP), particulate matter less than 10 microns (PM<sub>10</sub>), and particulate matter less than 2.5 microns (PM<sub>2.5</sub>). To evaluate the potential impact of the project on ambient air quality, the CAL3QHCR specialized transportation dispersion model was used to predict concentrations for those contaminants of concern. Model-predicted concentrations were added to local background concentrations and compared to applicable provincial and/or federal ambient air quality criteria. Where there are estimated increases in emissions due to the project, their significance relative to emissions incurred on 407 ETR “now” (i.e., 2019) and in the future reference year was estimated. As established by MTO, an increase by more than 10% is deemed significant. In addition to modelling air contaminants of concern, the change in greenhouse gas (GHG) emissions was also evaluated following the assessment approach outlined in MTO’s “*Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects*” (MTO 2012). A review of the proposed guide (2019) Environmental Registry (O19-0131), to update the 2012 *Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects* confirmed that the air quality impact assessment conducted for this project is in accordance with the updated guidelines, GHG emission estimates, and updated air quality standards/criteria were applied. The effects of the project on climate change were considered and the assessment followed the draft guidance for the *Consideration of Climate Change in Environmental Assessment in Ontario* (MECP 2016). The results of the air quality assessment are discussed in **Sections 6.3.1 and 6.4.1**.

- **Land Use Factors:** A secondary source information review was undertaken to identify planned, existing and future land uses in the study area as well as designated land uses by municipality. In general, the land uses within the study area are compatible with the proposed Transitway and the Transitway facility will improve transit facilities/options in the area. A number of changes to land use designations are required for the Transitway. Further assessment of the areas where designated land uses will be affected will be undertaken as part of project implementation, and any amendments to the Parkway Belt West Plan and/or Official Plans will be made by the appropriate agency. In addition, a number of changes to existing land uses will result from the 407 Transitway, including areas of the runningway and stations that cross private land, or existing buildings, businesses, and agriculture. Further assessment will be conducted as part of project implementation to refine and minimize, if possible, impacts to existing land uses that are in close proximity to the preferred Transitway runningway and stations. MTO’s property acquisition process will be followed to purchase any required properties, or amend any lease agreements. Three areas designated as ‘Urban River Valleys’ under the Greenbelt Plan (2017) are located within the study area including the Fourteen Mile Creek, Glenorchy Conservation Area, and Sixteen Mile Creek. Consideration has been made for the potential impacts of the 407 Transitway on the ‘Urban River Valleys’ within the study area. Efforts have been made to avoid crossing at sensitive areas at each of the three ‘Urban River Valleys’ to the extent possible, and spanned bridges are proposed at each watercourse crossing to avoid impacts within the bankfull channel and minimize overall impacts to the watercourses/valleys. Appropriate mitigation measures

have been included to maintain and/or enhance the ‘Urban River Valleys’.

- **Cultural Heritage Reports:** A Cultural Heritage Report - Existing Conditions and Preliminary Impact Assessment (June 2020) was carried out by ASI to identify known and potential built heritage resources and cultural heritage landscapes located within and adjacent to the study area, and to determine any impacts to these resources identify preliminary potential project-specific impacts and propose measures to avoid or mitigate potential negative impacts. The study area has a rural land use history dating back to the early nineteenth century. The identified built heritage resources and cultural heritage landscapes are historically and contextually associated with late-nineteenth century and early twentieth century land use patterns in the former Townships of Trafalgar and Toronto. Thirty-one built heritage resources and cultural heritage landscapes were identified within/adjacent to the study area, 17 of which face potential impacts, including seven farmscapes (CHR 13, 14, 20, 22, 26, 29, 30), five remnant farmscapes (CHR 11, 19, 25, 27,28), one residence (CHR 8), one former residence (CHR 31), one church and cemetery (CHR 24); one heritage conservation district (CHR 23) and one stable (CHR 21). Later in March 2020, City of Mississauga Heritage Planning staff has confirmed that CHRs 25, 26, 27, 28 were removed from the City’s Heritage Register. Cultural Heritage Evaluations (CHERs) were recommended for 12 properties (CHR 8, 11, 13, 14, 19, 20, 21, 22, 24, 29, 30, 31) that could be directly impacted and Heritage Impact Assessments (HIAs) were recommended for CHR 13, 22, 23, 24, 29, 30, 31). All CHERs and HIAs were undertaken in March - July 2020 by ASI. The Cultural Heritage Report – Existing Conditions and Preliminary Impact Assessment, CHERs and HIAs are included in **Appendix G**.
- **Archaeological Assessments:** A Stage 1 Archaeological Assessment was carried out as part of the TPAP in accordance with the *Ontario Heritage Act* (2005) and the Standards and Guidelines for Consulting Archaeologists (2011) (S & G) to identify lands retaining archaeological potential as well as previously registered archaeological sites. As part of the TPAP, a Stage 2 Archaeological Assessment, including test pit and pedestrian surveys, was conducted by a licensed archaeologist on lands retaining archaeological potential that may be disturbed by the proposed Transitway construction lying within 300 m of watercourses/waterbodies (where permission to enter was secured) to identify any sites/lands requiring further assessment. The Stage 1 Archaeological Assessment (PIF P380-0055-1-2019) and Stage 2 (PIFP383-0164-2019) have been entered into the Ontario Public Register of Archaeological Report. All remaining Stage 2 work and any required Stage 3 and Stage 4 archaeological assessment work will be completed as early as possible, and prior to the completion of detail design.”
- **Traffic Impact Assessment:** Project-specific Traffic Impact Assessments were conducted to determine future traffic impacts that may occur due to the construction and operation of the 407 Transitway. The assessment of 407 Transitway construction staging traffic impacts examined various construction stages and their impacts to arterial roadway traffic operations. The assessment covered three scenarios: without construction; with construction; and, with construction and a reversible traffic lane over two-time periods - a.m. peak hour and p.m. peak hour. It concluded that most arterial roadways are projected to operate with reduced traffic capacities and worsening levels of service, particularly in the p.m. peak hour during construction. Where possible, the primary mitigation measure would consist of providing a reversible traffic lane during most construction stages, which is projected to help increase traffic capacity and improve levels of service at most arterial roadways. The assessment of 407 Transitway operations traffic impacts focused on the proposed location of 407 Transitway Stations

and a study of area traffic operations. Station area traffic impacts were assessed for proposed 407 Transitway Stations: Dundas Street, Appleby Line, Bronte Road, Trafalgar Road, Britannia Road, Derry Road and Mississauga Road. The assessment covered three analysis scenarios: (2011) Existing Condition, (2041) Background Condition, and two-time periods: a.m. peak hour and p.m. peak hour. The analysis examined traffic impacts at signalized and un-signalized intersections and driveways around proposed station locations based on background traffic growth, other proposed area developments, increases in transit and vehicular traffic from the new 407 Transitway Station and proposed changes and reconfigurations to area roadways and intersections. With the 407 Transitway operational, due to high levels of background traffic some station area intersections are projected to operate with reduced traffic capacities and worsening levels of service, particularly in the peak directions. However, it is projected that various mitigation measures such as altering existing traffic signal time, providing transit priority measures and adding through and turn lanes will help increase traffic capacity and improve levels of service at poorly operating station area intersections. Further studies will be required prior to construction to review unidentified impacts, and develop any necessary mitigation measures, monitoring and contingency plans, based on conditions at the time of construction.

- **Erosion and Sediment Control:** was looked at in accordance with the EPR. Mitigation measures are prescribed where relevant in this report. In the following project design phases, erosion and sediment control will be further assessed based on the MTO Environmental Reference for Highway Design (ERD) and the MTO Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects. An Erosion and Sediment Control Overview Risk Assessment (ESORA) will be initially conducted followed by the Erosion and Sediment Control (ESC) approach. The ESORA will contained the following documentation:
  - An Erosion and Sediment Overview Risk Map;
  - Project overview;
  - Description of the study area;
  - Scope of work;
  - Existing conditions e.g. soils or surface conditions;
  - Drainage, off-site water, sensitive areas, existing water quality (if known);
  - Description of the approach used to determine and rate erosion potential and consequence; and
  - A recommendation for ESC Approach(es) as per MTO ESC Guide, Section 3.

In this assessment, “residual” environmental impacts are defined as changes to the environment caused by the project, and vice versa, when compared to existing conditions taking into account all built-in mitigation measures. The significance of potential residual environmental impacts were assessed, including spatial and temporal considerations.

## 6.2 Footprint Impacts

This section discusses the permanent displacement or loss of the existing environmental features resulting from the placement of the 407 Transitway on the landscape. The 407 Transitway is a new transit facility in the study area consisting of new runningway, structures such as new bridges, underpasses, and bus stations.

The natural environment subsection will discuss footprint impacts to the natural environment. The impacts relate to impacts to soils, the removal of vegetation and vegetation communities, and disturbance to fish and fish habitat and wildlife and wildlife habitat (including species at risk). The Transitway and associated facilities (i.e. stations, bridges, culverts, and stormwater management facilities) have the potential to affect surface water quality and quantity, groundwater and contaminated property and waste.

The socio-economic and cultural environment subsection identifies footprint-related impacts to designated land uses, existing, planned and future land uses, built heritage resources and cultural heritage landscapes found within the study area, and archaeological resources. For the transportation footprint impacts, the main environmental value/criterion is to minimize the adverse effects on and maximize the benefits for communities within the entire corridor. The environmental issue with respect to the environmental value/criterion is how the 407 Transitway itself will affect lands adjacent to the corridor. The mitigation measures suggested aim to decrease the encroachment of the 407 Transitway property frontage and to minimize additional property acquisition as a whole.

The final subsection discusses footprint-related impacts to the utilities within the study area. Based on the information available it was determined that there are no major utility conflicts with the preferred alignment. It was concluded that in the majority of cases, the relocation of affected utilities is feasible and conventional. Prior to construction, further field investigation and consultations with the utility owners will be carried out to confirm the type of solution. Prior to construction, the loading capacity will be assessed where utilities and municipal services are located under high embankments, to define protection measures and/or special construction techniques to assure these plants are not damaged during construction or operations of the Transitway.

### 6.2.1 Natural Environment

Refer to **Table 6.6** which shows the footprint impacts, proposed mitigation measures and recommended monitoring for the Natural Environment.

#### PHYSIOGRAPHY AND SOILS

The impacts to the terrain located within the study area has been minimized to the extent possible as the 407 Transitway facility will be located primarily where the 407 ETR, municipal roads, agricultural activities and hydro lines have already altered the terrain.

A large volume of soil will be displaced by excavation activities. Excess soil may be generated that cannot

be reused along the 407 Transitway. The excess soil may be stained, odorous, containing debris or found to be contaminated. These excess soils will require management as waste. Final profiles will be defined prior to construction. Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (i.e. OPSS 180 – General Specification for the *Management of Excess Materials, Management of Excess Soil – A Guide for Best Management Practices* (2014)) will be used when developing an Excess Materials Management Plan.

In addition, the disposal of excess soil in the Niagara Escarpment Area will be avoided, in accordance with the landform conservation policies in the Niagara Escarpment Plan (NEP). If such disposal is unavoidable, Niagara Escarpment Commission (NEC) Development Permits for the receiving site(s) will be required. The *On-Site and Excess Soil Management Regulation* (O. Reg. 406/19) under the *Environmental Protection Act* also requires that any fill placed in environmentally sensitive areas (including Escarpment Protection and Natural Areas) meets Table 1 standards. Any soil placed on cropland or pasture must meet the definition of topsoil as per the *Municipal Act*.

### CONTAMINATED PROPERTY AND WASTE

Based on existing land use information obtained from the information collected to date, there are some properties within the study area which would require further environmental investigation to assess the potential presence of subsurface impacts. Further assessment for potential contamination and/or waste materials may be required for seventy-six properties/areas located in the vicinity of the 407 Transitway, depending on property needs (see **Appendix N**). These properties may have environmental impacts to soil and/or groundwater from current or historical activities based on the assessment to date. In general, properties currently or historically developed as service garages, gas stations, vehicle sales centres, auto body repair shops, manufacturing facilities, industrial properties, waste management facilities and construction yards represent issues of potential environmental concern and impacts may be encountered during construction activities in the vicinity of these properties. Properties which require further background investigation generally include properties that appear to be vacant or newly occupied, but which had previously been developed for different uses. Any agricultural properties with active farming infrastructure (i.e. barns, sheds, livestock pens) within the study area have been identified due to the potential petroleum hydrocarbon, pesticide, and nutrients impacts associated with these operations; however, cultivated fields have not been identified.

Five of the seventy-five properties/areas identified within the study area are low risk properties that would require further assessment to determine whether subsurface investigations would be warranted (i.e. a Phase I ESA), if impacted by construction activities. Forty-six of these are moderate risk properties that would require subsurface investigations to determine presence/absence of impacts (i.e. limited subsurface environmental investigations), if impacted by construction activities. Twenty-five of these are high risk properties that would require subsurface environmental investigations (i.e. Phase II ESAs) to determine whether soil and/or groundwater impacts exist at the properties, if impacted by construction. Not all of these properties within the study area will require further investigation; however, it is possible that impacts relating to activities at these properties may be encountered during construction (due to

migration) and, for this reason, these properties will be considered on a case by case basis to determine the need for further assessment during project implementation, specifically during property acquisition.

Based on a review of the 407 Transitway footprint, it has been determined that, at this time, seven of these seventy-five properties/areas (and identified as having potential environmental impacts to soil and/or groundwater from current or historical activities) are located immediately adjacent to the proposed 407 Transitway stations and/or yard maintenance facilities. Three of these properties are moderate risk properties that will require subsurface investigations to determine presence/absence of impacts (i.e. limited subsurface environmental investigations, if impacted by construction activities). These three properties/areas include a property on Ninth Line in Mississauga, a property on Argentinia Road in Mississauga, a property on Hallstone Road in Brampton. Four properties are of high risk that will require subsurface environmental investigation to determine whether soil and/or groundwater impacts exist at the properties. The investigations/studies on these properties will be completed prior to construction. Preliminary Site Screening forms are required for properties identified for acquisition and will be completed as necessary prior to construction.

In addition to the above, a Designated Substances Survey (DSS) shall be completed for any structures that will be removed as part of implementation of the 407 Transitway in order to meet the requirements of the *Occupational Health and Safety Act*.

Should impacts to soil and/or groundwater and/or issues of potential environmental concern be identified during subsequent, more detailed phases of work, additional assessment will be conducted and appropriate steps will be taken following the MTO's Environmental Reference for Highway Design (2013).

Construction impacts to contaminated property and waste are discussed in **Section 6.3.1**.

### SURFACE WATER, DRAINAGE AND STORMWATER

As a result of the introduction of new impervious areas, volumes of runoff and local peak flows will likely increase. There may also be water quality impacts as well in the form of increased erosion, contaminants such as rubber and oil.

#### Brant Street to Dundas Street

No watercourse crossing is proposed within this segment. As the available site space is limited, a retaining wall is proposed on the west side immediately next to the road shoulder. Catchbasins and laterals are proposed to collect and convey surface runoff to a swale along the east side of the corridor to the downstream outlet at North Service Road.

#### Dundas Street to Tremaine Road

Numerous creek crossings are proposed to safely manage the surface water flowing from upstream catchments. Notably, minor branches in the tributary of Shoreacres Creek and Sheldon Creek are to be realigned to provide better flood protection to both 407 Transitway and 407 ETR.



#### Tremaine Road to 407/403 Interchange

To provide sufficient outlet for the existing crossings, crossings proposed for 407 Transitway not only consider the upstream drainage area, it also considers the existing highway drainage and stormwater pond outlets from 407 ETR.

#### 407/403 Interchange to 9th Line

The 407 Transitway traverses a large floodplain area. The transitway corridor is proposed to be the boundary of the floodplain zone and utilized as a floodplain modification measure north of Britannia Road. Future development south of Britannia Road is subject to discussion with Conservation Halton as the current flood level may be revised depending on the improvement of downstream hydraulic restriction. For majority of this segment, the 407 Transitway is offsite from the 407ETR corridor to provide sufficient meander belt width, floodplain storage and conveyance capacity. Detailed floodplain studies have been done and are adopted for the transitway drainage design.

#### Ninth Line to Highway 401

The 407 Transitway runs underground within this segment. Therefore, no watercourse crossing structures are proposed and the surface water features remain undisturbed in post development condition.

#### Highway 401 to Hurontario Street

The transitway within this segment crosses several major creeks within the jurisdiction of Credit Valley Conservation. The proposed alignment is mainly located on the southeast side and downstream the existing 407 ETR except for a small segment around Levi Creek. Existing creek flood study reports are available and adapted. Given the size of the creeks in this area, most of the proposed crossings are bridge structures.

Stormwater Management applications such as swales and ponds are needed to control the post-development release rate, minimize the impacts from the new development and ensure no adverse impact are imposed to the downstream landowner.

The following are proposed works to address drainage and stormwater management:

- Due to the road profile sloping underground, pumping may be required at 2 locations along the proposed 407 Transitway: Road tunnels under the 407 ETR/Highway 403 interchange and Highway 401/407ETR interchange. Details related to pump sizes will be developed during detailed design.
- A treatment train approach is proposed for the transitway corridor consisting of grass embankments, long grassed swales, and enhanced swales. Quantity control of Transitway runoff is proposed to be provided through enhanced swales. These were designed as dry ponds with a formal outlet control structure consisting of 100 mm perforated pipe, hickenbottom structure and a 75 mm orifice plate. A single typical enhanced swale design was used throughout the roadway drainage analysis however a more detailed analysis will be undertaken during detailed design.

- The stormwater management strategy for the stations includes wet ponds with control structures consisting of multiple orifices and/or weirs. Wet ponds were designed for each station to provide quantity, quality, and erosion and sediment control. All of the stormwater facilities meet MECP and MTO criteria.
- The Hydraulic analysis was undertaken using GeoHEC-RAS for 31 culvert crossings within the study limits. All models are developed based on existing Conservation Halton and Credit Valley Conservation HEC models. All crossing design meet MTO criteria.
- The results of the hydraulic analysis show that water levels increase from existing conditions to proposed conditions at some crossings; however, these increases are confined within MTO's right-of-way and have no impacts on upstream nor downstream riparian and private properties.
- A headwater drainage feature in Shoreacres Creek watershed (BU05) that runs parallel to the proposed transitway between stations 16+900 and 17+100 of the 407 Transitway is considered for realignment due to its proximity to the Transitway. Fluvial geomorphology study will be conducted during the detail design phase of this project.
- Dundas Street Station is in conflict with creek corridor of a headwater drainage feature in Shoreacres Creek watershed. This creek will be realigned and enhanced at detailed design stage. Fluvial geomorphology study will be conducted during the detail design phase of this project.
- Ground survey is needed for all existing drainage features within corridor and upstream and downstream streambed on proposed watercourse crossings.

## GROUNDWATER

### Groundwater Recharge and Discharge

A reduction in groundwater recharge to the subsurface will occur as a result of the expansion or construction of impermeable pavement surfaces. It is expected that new impermeable surfaces associated with the Transitway runningway and the station locations will reduce the overall recharge within the study area. Recharge lost to impermeable surfaces can in part be mitigated by direction of runoff to natural ground surfaces, by the construction of permeable pavements or by other low-impact development infiltration techniques. Based on the review of local surface geology maps, most of the flat lying upland areas of the proposed Transitway study area are underlain by relatively fine grained post-glacial lake sediments and glacial deposits of clayey silt till. As such, most of the study area would not be considered to represent an area of significant groundwater recharge. Exceptions to this are the areas of relatively sandy soil in the Sixteen Mile Creek Valley, Credit River Valley and small area between Derry Road and Britannia Road.

Based on the relatively large regional areas from which the local watersheds and aquifers derive recharge and the relatively low rate of groundwater recharge currently expected in most of the study area, the effect of the potential reduction in overall groundwater recharge is not expected to be significant. It is unlikely that the potential reduction in recharge would produce a measurable effect on groundwater recharge and discharge functions, including baseflow in streams.

Recharge lost to impermeable surfaces can in part be mitigated by the direction of runoff to natural ground surfaces, by the construction of permeable pavements or by other low-impact development infiltration (LIDs) techniques where suitable. There are limited areas that are suitable for the implementation of LIDs given the relatively fine grained soil and high water table throughout the study area. Actual opportunities for LID construction will be assessed in subsequent design phases of this project.

Discharge functions within the study area may be reduced as a result of the proposed construction. Profile lowering activities could reduce the existing hydraulic gradients to an extent where a reduction in groundwater discharge is possible. Given the relatively small area of the construction activities compared to overall drainage basin areas, a localized decrease in discharge is not expected to be measurable. Further, given the relatively flat-lying study area, it is not anticipated that significant profile lowering will be required.

Discharge functions at the bridge construction locations may be impacted temporarily during construction activities; however, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures.

#### **Water Well Interference**

Concerns regarding water well supply interference will be only for those wells that remain in active use. Based on a review and plot of the MECP well records and field observations, water wells are in use throughout the study area; however, it is likely given the expansion of the urban area of the City of Burlington between Brant Street and Dundas Street that municipal water supplies are available in that area. Likewise, east of the Credit River in Mississauga and in the vicinity of Mississauga Road and Winston Churchill Boulevard, it is likely that municipal water supplies are present. Elsewhere, the 407 Transitway is located adjacent to the limit of municipal water servicing and water wells will likely be in use. Field investigations indicate the potential for private wells in the vicinity of the proposed stations at Dundas Street, Regional Road 25, Trafalgar Road, Britannia Road, and Derry Road. The study area is not located in the vicinity of any municipal wells or wellhead protection areas.

Given the relatively fine-grained soils in the area, the small proportion of shallow wells and the anticipated relatively shallow excavations for the construction of the 407 Transitway, widespread well interference issues are not anticipated. Any physical impacts will be temporary and abate once the groundwater table has recovered post-construction. The potential for water well interference will be further assessed during detail design phase of this project.

#### **High Water Table**

Based on topography, geology and field observations, there is the potential for a high water table to be present within the study area. Most of the flat lying upland areas of the proposed 407 Transitway study area are underlain by relatively fine grained post-glacial lake sediments and glacial deposits of clayey silt till. The presence of high water table will not represent a significant constraint for construction. For areas of relatively coarse silt and sand such as in the Sixteen Mile Creek Valley, Credit River Valley and

small area between Derry Road and Britannia Road, the presence of a high water table could impact construction techniques and progress. Excavation and construction below the water table in saturated sandy and/or silty soils may present challenges, including the need for de-watering and the increased potential for water well interference.

MECP's Interpretive Bulletin on Source Water Protection dated August 30, 2013 was considered during the groundwater assessment. Based on on-line mapping available from the Regional Municipality of Halton, there are no municipal wells or wellhead protection zones in the study area. Based on on-line source water protection mapping from CTC (Credit Valley, Toronto and Region, and Central Lake Ontario Conservation Authorities), the Region of Peel does not have any wellhead protection areas within the study area. Therefore, the project is not located in or near any well head protection areas or intake protection zones and does not pose a significant drinking water threat to municipal wells.

#### **FISH AND FISH HABITAT**

There are a total of 59 watercourse crossings occurring within the project limits: two within the Rambo Creek watershed, one in Roseland Creek, two in Tuck Creek, three in Shoreacres Creek, two in Appleby Creek, four in Sheldon Creek, two in the Bronte Creek watershed, ten in Fourteen Mile Creek, one in McCraney Creek, one in Taplow Creek, fifteen within the Sixteen Mile Creek watershed, six within Joshua's Creek and eleven within the Credit River watershed. **Chapter 3** of this report provides information on the watercourse locations. This project will directly affect these watercourses. "Serious Harm to Fish" could result from the proposed works with the addition of new watercourse crossings, a potential channel realignment, retaining walls, clearing of vegetation within the riparian areas (including wetland species), modifications to drainage due to increased impermeable surfaces in the vicinity of the watercourses, and the addition of storm water management features.

#### **Aquatic Species at Risk/Ontario ESA Regulated Habitat**

Three watercourses, Bronte Creek, Sixteen Mile Creek, Fletcher's Creek (Sites 15, 29 and 58 respectively) are regulated under the *Endangered Species Act, 2007* (ESA) and *Species at Risk Act* (SARA) due to the presence of occupied habitat for Silver Shiner (Sites 15 and 29), American Eel (Site 15) and Redside Dace (Site 58). Fourteen Mile Creek and its tributaries have been identified as contributing species at risk habitat (upstream of Redside Dace occupied habitat). According to the ESA, "No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario List as an endangered or threatened species." Regulated Redside Dace habitats, by definition, includes the bankfull stream width, in addition to the meander belt width and associated riparian habitat that is a minimum of 30 m from the meander belt measured horizontally. Silver Shiner habitat is broken into three categories: two within the watercourse and one in the floodplain. Works affecting any of these habitats (and for SARA, the fish themselves through collection/rescue) may trigger the need for permitting under the ESA and SARA. Works at these three watercourses will likely affect the habitat of these species and permitting may need to occur prior to construction in consultation with the MECP. Also, any in-water works that would trigger the need for fish collection/rescue would require permitting under SARA from the Department of Fisheries and Oceans (DFO).

Redside Dace is listed provincially as an ‘Endangered’ species and is regulated by the Ontario ESA, 2007. Watercourses which support this species will require specialized mitigation measures to prevent negative impacts to this species and/or its habitat. All best management practices (BMPs) outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011) will need to be incorporated into the project design. An ESA 17(2)(c) overall benefit permit may be required from the MECP during detail design if proposed works will detrimentally affect the regulated habitat. In addition, because Redside Dace are listed on Schedule 1 under SARA, a permit under that regulation may also be required.

Silver Shiner is listed provincially as a “Threatened” species and is regulated by the Ontario ESA, 2007. It is also listed as “Threatened” federally under the SARA. Specialized mitigation for this species may be required, and an ESA 17(2)(c) overall benefit permit may be required from the MECP during detail design if proposed works will detrimentally affect the regulated habitat.

American Eel is listed as “Endangered” provincially under the ESA. American Eel is not listed federally. Specialized mitigation for this species may be required, and an ESA 17(2)(c) overall benefit permit may be required from the MECP during detail design if proposed works will detrimentally affect the regulated habitat.

#### **Summary of Proposed Work at Watercourse Crossings**

The proposed new structures or realignments to new structures will result in temporary and permanent impacts at 34 watercourses supporting fish or fish habitat described above. However, through proper mitigation measures and careful planning, the impacts can be minimized to prevent negative effects to fish and fish habitat.

Design culvert/structure type will be designed in accordance with Section 5.5.3 in the *MTO Fish Guide*, to avoid causing “Serious Harm to Fish”. At watercourses supporting direct fish habitat, passage and habitat provision are important and thus open bottomed culverts or box culverts that are embedded and backfilled with substrates will be considered throughout design. **Section 6.3.1/ Table 6.12.** below provides a summary of the proposed works/impacts for each individual watercourse crossing during construction.

#### **Assessment of Negative Residual Effects**

An assessment of the negative residual effects for the watercourses is outlined below. Details regarding the pathway of effects, specific stressors, mitigation measures and residual effects related to the works are provided in **Table 6.2.** To mitigate for the harmful alteration of fish habitat, the measures identified will be implemented pre-, during and post-construction at the locations where work is proposed.

For watercourses at locations where clear span bridges are proposed and no works are expected to occur within the high water mark, no further assessment was undertaken. These crossings are expected to meet all the conditions of the MTO Fisheries Best Management Practice for Clear Span Bridges and are therefore “not likely to result in serious harm”. Watercourses which meet these criteria are Sites 15, 18,

24, 29, 44, 49, 50, 51 and 58. Review by DFO is not required at these locations. A MTO Project Notification Form will be required prior to construction.

For watercourses in which culvert structures are proposed, the assessment of negative effects are as follows:

- extent (size) for culvert installations are classified as “low”, as these installations affect a site, or segment, and effects are localized;
- duration for these structure installations are “high”, as the residual changes to the fish habitat will be permanent; and,
- intensity is classified as “low” as the altered habitat is expected to remain at a similar level of productivity as the baseline condition.

Overall, negative residual effects at these watercourse locations are classified as “low”. No permanent impacts to fishes’ ability to carry out life processes will result from these works due to the habitat’s indirect nature. However, potential “serious harm” could occur to downstream direct habitat, although these effects are not expected. These are Sites 6, 7, 8, 9, 10, 11, 13, 15a, 16, 17, 19, 20, 21, 22, 23, 26, 28, 37, 39, 40, 52, 53, and 54. A review by DFO is not required at these locations.

For watercourses for which tunneling underneath them is proposed, no further assessment was undertaken. These are Sites 14 and 41.

For the features for which a channel realignment is proposed (Sites 6, 8, 12), the assessment of negative effects are as follows;

- extent (size) for realignment is “low”;
- duration for the channel realignment is “high”, as the residual changes to the fish habitat will be permanent; and,
- intensity is classified as “low” as the altered habitat has undergone significant change (infilling) but is used as water conveyance only which will not be altered.

Overall, negative residual effects at these watercourse locations are classified as “low”, will not permanently impact fishes’ ability to carry out life processes and cause no “serious harm”. Both of these features are ephemeral and indirect fish habitat.

An explanation of the categorization of project risk is provided in **Appendix D.** See **Table 6.12** for additional site specific and general mitigation measures to be implemented during construction at the impacted watercourses.

**TABLE 6.2: AQUATIC EFFECTS ASSESSMENT SUMMARY**

WATERBODY	PATHWAY OF EFFECT (S)	STRESSOR (POTENTIAL IMPACT)	MITIGATION MEASURES	RESIDUAL EFFECTS	SERIOUS HARM Y/N
ALL SITES WITH NEW CULVERTS	L1- Vegetation clearing	<ul style="list-style-type: none"> <li>▪ Alteration of riparian vegetation</li> <li>▪ Addition or removal of in stream organic structure</li> <li>▪ Change in shade</li> <li>▪ Change in external nutrient/energy inputs</li> <li>▪ Changes to bank stability / exposed soils</li> </ul>	<p>Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804.</p> <ul style="list-style-type: none"> <li>▪ Minimize vegetation removal and disturbances on embankments and surface drainage ditches adjacent to the watercourse.</li> <li>▪ Seed and mulch disturbed banks with appropriate seed mixture.</li> <li>▪ Limit the duration that areas are left disturbed/exposed.</li> <li>▪ Erosion and Sediment Control (ESC) will be used to contain/isolate the construction zone during and following vegetation clearing and to manage site drainage to prevent erosion and sedimentation to the waterbody. ESC measures will be in place until all areas are stabilized.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Change in habitat structure and cover</li> <li>▪ Change in food supply</li> <li>▪ Change in nutrient concentrations</li> </ul> <p>The residual effects of vegetation clearing for the new culvert structures will result in permanent alteration or change in habitat structure and cover of the affected area. Residual effects, however, are not likely to result in serious harm.</p>	N
	L2 – Grading	<ul style="list-style-type: none"> <li>▪ Addition or removal of in stream organic structure</li> <li>▪ Changes to bank stability / exposed soils</li> <li>▪ Changes in slope / land drainage patterns</li> <li>▪ Increased erosion potential</li> </ul>	<p>Installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.</p> <p>Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804.</p> <p>Vegetation protection and rehabilitation shall be in accordance with OPSS 182 and OPSS 804.</p>	<p>There will be minor residual effects in habitat structure and cover from the removal of the instream organic material, however not likely to result in serious harm.</p>	N
	L3 – Excavation	<ul style="list-style-type: none"> <li>▪ Alteration of groundwater flow to surface water</li> <li>▪ Creations of pond, pit or trench</li> <li>▪ Dewatering of pit or trench</li> <li>▪ Removal of topsoil</li> <li>▪ Changes to bank stability / exposed soils</li> <li>▪ Changes in slope / land drainage patterns</li> <li>▪ Increased erosion potential</li> </ul>	<p>The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.</p>	<p>No permanent residual effects are expected.</p>	N
	B2 – Industrial equipment	<ul style="list-style-type: none"> <li>▪ Changes to bank stability / exposed soils</li> <li>▪ Increased erosion potential</li> <li>▪ Re-suspension and entrainment of sediment</li> <li>▪ Oil / grease / fuel leaks</li> </ul>	<p>Use of equipment shall be in accordance with OPSS 182.</p> <p>The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.</p> <p>All equipment will be operated, stored, and maintained in a manner that prevents the entry of any deleterious substances to the waterbody. Any part of equipment entering the waterbody or operating on the bank shall be free of fluid leaks and externally cleaned/degreased.</p>	<p>No permanent residual effects are expected.</p>	N
	W1 – Placement of Material or Structures in Water	<ul style="list-style-type: none"> <li>▪ Partial constriction of flow</li> <li>▪ Change in channel morphology</li> <li>▪ Change in hydraulics</li> <li>▪ Change in substrate composition</li> <li>▪ Change in aquatic macrophytes</li> <li>▪ Complete constriction of flow</li> </ul>	<p>Design crossing structures to appropriate flow regime to protect banks and not to constrict flows.</p> <p>Embed culverts using native materials to prevent a barrier to fish passage.</p> <p>Design temporary and permanent water management system and dewatering operations to maintain flows in adjacent waterbody and to prevent erosion and/or release of sediment-laden or contaminated water to the waterbody.</p>	<ul style="list-style-type: none"> <li>▪ Change in habitat structure and cover</li> <li>▪ Change in food supply</li> <li>▪ Change in nutrient concentrations</li> </ul> <p>There will be minor residual effects from the change in the native substrates, however not likely to result in serious harm.</p>	N

**TABLE 6.2: AQUATIC EFFECTS ASSESSMENT SUMMARY**

WATERBODY	PATHWAY OF EFFECT (S)	STRESSOR (POTENTIAL IMPACT)	MITIGATION MEASURES	RESIDUAL EFFECTS	SERIOUS HARM Y/N
	W3 – Water extraction	<ul style="list-style-type: none"> <li>▪ Reduced flow</li> <li>▪ Entrainment of fish in pumps</li> </ul>	<p>Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517.</p> <p>Temporary flow diversions shall be conducted in accordance with OPSS 517.</p> <p>Fish salvage operations shall be conducted in accordance with OPSS 182.</p> <p>Any water intakes or outlet pipes in fish bearing waters shall have screens to prevent entrainment or impingement of fish as per OPSS 182 and follow the measures as outlined in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.</p>	No permanent residual effects are expected.	N
	W5 – Aquatic Vegetation Management	<ul style="list-style-type: none"> <li>▪ Change in light penetration</li> <li>▪ Change in primary productivity</li> <li>▪ Change in nutrient inputs</li> <li>▪ Re-suspension and entrainment of sediment</li> </ul>	<p>Isolate the work site.</p> <p>Minimize vegetation removal to the amount which is necessary to maintain proper and safe fish passage.</p>	Minor change in habitat structure and cover, change in light penetration, change in primary productivity, and change in nutrient inputs, however not likely to result in serious harm.	N
	W7 – Change in timing, duration and frequency of flow	<ul style="list-style-type: none"> <li>▪ Dewatering</li> <li>▪ Bank erosion</li> <li>▪ Scouring of channel beds</li> <li>▪ Change in substrate composition</li> </ul>	<p>Flow diversion via a bypass channel adjacent to the waterbody will be applied for channel and crossing works, to facilitate in the dry construction, maintain existing flow conditions and provide fish passage through the reach.</p> <p>Design crossing structures in new drainage channel to appropriate flow regime to protect banks and not to constrict flows, and embed culverts to prevent a barrier to fish passage.</p>	No permanent residual effects are expected.	N
	W8 – Fish Passage	<ul style="list-style-type: none"> <li>▪ Channel obstructions</li> <li>▪ Upstream/downstream passage of fish</li> <li>▪ Alteration of migration patterns</li> <li>▪ Change in water chemistry</li> <li>▪ Change in temperature</li> <li>▪ Flow alteration</li> <li>▪ Diversion channels</li> </ul>	<p>Adhere to appropriate in-water work timing windows.</p> <p>Temporary flow diversions shall be conducted in accordance with OPSS 517.</p> <p>Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517.</p> <p>Any water intakes or outlet pipes in fish bearing waters shall have screens to prevent entrainment or impingement of fish as per OPSS 182 and follow the measures as outlined in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.</p>	No permanent residual effects are expected.	N
SITES 6, 8 & 12 CHANNEL REALIGNMENTS	L1- Vegetation clearing	<ul style="list-style-type: none"> <li>▪ Alteration of riparian vegetation</li> <li>▪ Addition or removal of in stream organic structure</li> <li>▪ Change in shade</li> <li>▪ Change in external nutrient/energy inputs</li> <li>▪ Changes to bank stability / exposed soils</li> </ul>	<p>Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804.</p> <ul style="list-style-type: none"> <li>▪ Minimize vegetation removal and disturbances on embankments and surface drainage ditches adjacent to the watercourse.</li> <li>▪ Seed and mulch disturbed banks with appropriate seed mixture.</li> <li>▪ Limit the duration that areas are left disturbed/exposed.</li> <li>▪ Erosion and Sediment Control (ESC) will be used to contain/isolate the construction zone during and following vegetation clearing and to manage site drainage to prevent erosion and sedimentation to the waterbody. ESC measures will be in place until all areas are stabilized.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Change in habitat structure and cover</li> <li>▪ Change in food supply</li> <li>▪ Change in nutrient concentrations</li> </ul> <p>The residual effects of vegetation clearing for the channel infilling will result in permanent alteration of ~1,227.5 m<sup>2</sup> of fish habitat that may limit or diminish the ability of the fish to carry out their life processes</p>	Potential serious harm due to infilling of indirect fish habitat that may have effects on downstream direct habitat. DFO review will be needed during detailed design to determine if serious harm will occur.

**TABLE 6.2: AQUATIC EFFECTS ASSESSMENT SUMMARY**

WATERBODY	PATHWAY OF EFFECT (S)	STRESSOR (POTENTIAL IMPACT)	MITIGATION MEASURES	RESIDUAL EFFECTS	SERIOUS HARM Y/N
	L2 – Grading	<ul style="list-style-type: none"> <li>■ Addition or removal of in stream organic structure</li> <li>■ Changes to bank stability / exposed soils</li> <li>■ Changes in slope / land drainage patterns</li> <li>■ Increased erosion potential</li> </ul>	<p>Installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.</p> <p>Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804.</p> <p>Vegetation protection and rehabilitation shall be in accordance with OPSS 182 and OPSS 804.</p>	<p>There will be minor residual effects in habitat structure and cover from the removal of the instream organic material, however not likely to result in serious harm.</p>	N
	L3 – Excavation	<ul style="list-style-type: none"> <li>■ Alteration of groundwater flow to surface water</li> <li>■ Creations of pond, pit or trench</li> <li>■ Dewatering of pit of trench</li> <li>■ Removal of topsoil</li> <li>■ Changes to bank stability / exposed soils;</li> <li>■ Changes in slope / land drainage patterns</li> <li>■ Increased erosion potential</li> </ul>	<p>The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.</p>	<p>No permanent residual effects are expected.</p>	N
	B2 – Industrial equipment	<ul style="list-style-type: none"> <li>■ Changes to bank stability / exposed soils</li> <li>■ Increased erosion potential</li> <li>■ Re-suspension and entrainment of sediment</li> <li>■ Oil / grease / fuel leaks</li> </ul>	<p>Use of equipment shall be in accordance with OPSS182.</p> <p>The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.</p> <p>All equipment will be operated, stored, and maintained in a manner that prevents the entry of any deleterious substances to the waterbody. Any part of equipment entering the waterbody or operating on the bank shall be free of fluid leaks and externally cleaned/degreased.</p>	<p>No permanent residual effects are expected.</p>	N
	W1 – Placement of Material	<ul style="list-style-type: none"> <li>■ Partial constriction of flow</li> <li>■ Entrainment fish in pumps</li> <li>■ Change in channel morphology</li> <li>■ Change in hydraulics</li> <li>■ Change in substrate composition</li> <li>■ Change in aquatic macrophytes</li> <li>■ Complete constriction of flow</li> </ul>	<p>Design temporary and permanent water management system and dewatering operations to maintain flows in adjacent waterbody and to prevent erosion and/or release of sediment-laden or contaminated water to the waterbody.</p> <p>Replant and restore exposed areas to original or better conditions.</p>	<ul style="list-style-type: none"> <li>■ Change in habitat structure and cover</li> <li>■ Change in food supply</li> <li>■ Change in nutrient concentrations</li> </ul> <p>The residual effects from infilling the existing channels will result in destruction of ~1,227.5 m<sup>2</sup> of indirect fish habitat.</p>	<p>Potential serious harm due to infilling of indirect fish habitat that may have effects on downstream direct habitat. DFO review will be needed during detailed design to determine if serious harm will occur.</p>
	W3 – Water extraction	<ul style="list-style-type: none"> <li>■ Reduced flow</li> <li>■ Entrainment of fish in pumps</li> </ul>	<p>Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517.</p> <p>Temporary flow diversions shall be conducted in accordance with OPSS 517.</p> <p>Fish salvage operations shall be conducted in accordance with OPSS 182.</p>	<p>No permanent residual effects are expected.</p>	N

**TABLE 6.2: AQUATIC EFFECTS ASSESSMENT SUMMARY**

WATERBODY	PATHWAY OF EFFECT (S)	STRESSOR (POTENTIAL IMPACT)	MITIGATION MEASURES	RESIDUAL EFFECTS	SERIOUS HARM Y/N
			Any water intakes or outlet pipes in fish bearing waters shall have screens to prevent entrainment or impingement of fish as per OPSS 182 and follow the measures as outlined in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.		
	W7 – Change in timing, duration and frequency of flow	<ul style="list-style-type: none"> <li>■ Dewatering</li> <li>■ Bank erosion</li> <li>■ Scouring of channel beds</li> <li>■ Change in substrate composition</li> </ul>	Flow diversion via a bypass channel adjacent to the waterbody will be applied for channel works, to facilitate in the dry construction, maintain existing flow conditions and provide fish passage through the reach.	No permanent residual effects are expected.	N
	W8 – Fish Passage	<ul style="list-style-type: none"> <li>■ Channel obstructions</li> <li>■ Upstream/downstream passage of fish</li> <li>■ Alteration of migration patterns</li> <li>■ Change in water chemistry</li> <li>■ Change in temperature</li> <li>■ Flow alteration</li> <li>■ Diversion channels</li> </ul>	<p>Adhere to appropriate in-water work timing windows.</p> <p>Temporary flow diversions shall be conducted in accordance with OPSS 517.</p> <p>Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517.</p> <p>Any water intakes or outlet pipes in fish bearing waters shall have screens to prevent entrainment or impingement of fish as per OPSS 182 and follow the measures as outlined in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.</p>	No permanent residual effects are expected.	N

**Potential Enhancement/Offsetting Opportunities**

Rambo Creek Watershed

The main enhancing opportunity for Rambo Creek is to “daylight” the creek. According to the secondary source review, much of Rambo Creek has been hardened, buried and diverted. The mouth of Rambo Creek at Lake Ontario is natural (Cook 2013). No fisheries community information was available from secondary source review because the upstream reaches of this watercourse are not passable to fish.

Roseland Creek Watershed

According to the secondary source review, Roseland Creek has historically had alterations to the natural channel form due to urbanization, hardening and channelization. The hydrology is reported to be unstable and is resulting in accelerated channel enlargement and erosion. The following enhancement opportunities were presented in the Roseland Creek Erosion EA (Aquafor Beech Limited 2014): replacement of failed bank treatments with alternative treatments such as armourstone, natural roundstone, and native bank vegetation; changes to channel planform but maintenance of the existing alignment where property constraints dictate; improvement of riparian buffer through planting of native trees and shrubs.

Tuck Creek Watershed

According to the secondary source review, Tuck Creek has historically had alterations to the natural channel form due to urbanization, hardening and channelization. The hydrology is reported to be unstable and is resulting in accelerated channel enlargement and erosion. The following enhancement opportunities were presented in the Tuck Creek Erosion EA (Aquafor Beech Limited 2012): replacement of failing bank treatments with alternative treatments including armourstone, vegetated stone bank treatment, rock toe protection, and/or vegetated banks; restoration of watercourse floodplain access through cutting back of channel banks; improvement of riparian cover through planting of native trees and shrubs.

Shoreacres Creek Watershed

According to the secondary source review, Shoreacres Creek is experiencing accelerated erosion which is presenting environmental issues, in addition to risk to private property and municipal infrastructure. Some reaches of this watercourse have been hardened and channelized, and others remain in a naturalized state (Cole Engineering 2015). Specific enhancement opportunities for this watershed were

not stated in the secondary source review (Cole Engineering 2015; CH 2009a). General enhancement measures for this watershed could be considered for a watercourse which has experienced a degree of urbanization. These may include, but not be limited to, reconnecting partially or fully disconnected creeks from adjacent floodplains, bank stabilization, removals of barriers to fish movement, buffer enhancement, invasive species management, riparian plantings, and implementation of storm water management techniques for new construction.

#### Appleby Creek Watershed

Specific issues to this watercourse were not found during secondary source review (CH 2009a); however, it can be assumed that this watercourse has experienced effects of urbanization. General enhancement measures for this watershed could be considered for a watercourse which has experienced a degree of urbanization. These may include, but not be limited to, reconnecting partially or fully disconnected creeks from adjacent floodplains, bank stabilization, removals of barriers to fish movement, buffer enhancement, invasive species management, riparian plantings, and implementation of storm water management techniques for new construction.

#### Sheldon Creek Watershed

Specific issues to this watercourse were not found during secondary source review (CH 2009a); however, it can be assumed that this watercourse has experienced effects of urbanization. General enhancement measures for this watershed could be considered for a watercourse which has experienced a degree of urbanization. These may include, but not be limited to, reconnecting partially or fully disconnected creeks from adjacent floodplains, bank stabilization, removals of barriers to fish movement, buffer enhancement, invasive species management, riparian plantings, and implementation of storm water management techniques for new construction.

#### Bronte Creek Watershed

A review of secondary source information indicates Bronte Creek has experienced effects of urbanization including erosion, loss of riparian vegetation and old storm water infrastructure in the watershed. Specific enhancement opportunities at this creek include: streambank restoration and plantings; low impact development controls (LIDs); upgrades to old storm water infrastructure; and, removal of in-stream barriers.

#### Fourteen Mile Creek Watershed

According to secondary source review, the study area occurs within the headwater reaches of Fourteen Mile Creek. The current land use in this area is agricultural and rural-recreational. Impacts to urban development must provide reasonable protection for significant natural areas such as floodplains, environmentally sensitive areas and provincially significant wetlands against changes in the use of land either in or adjacent to them. Erosion, flooding and water quality are issues in the lower reaches of Fourteen Mile Creek. Recommended enhancement features may be limited to maintaining, and if possible, improving form and function of headwater features (TSH et al. 2006).

#### McCraney Creek Watershed

According to secondary source review, the study area occurs within the headwater reaches of McCraney Creek. The current land use in this area is agricultural and rural-recreational. Impacts to urban development must provide reasonable protection for significant natural areas such as floodplains, environmentally sensitive areas and provincially significant wetlands against changes in the use of land either in or adjacent to them. Erosion, flooding and water quality are issues in the lower reaches of McCraney Creek. Recommended enhancement features may be limited to maintaining, and if possible, improving form and function of headwater features. (TSH et al. 2006).

#### Taplow Creek Watershed

According to secondary source review, the study area occurs within the headwater reaches of Taplow Creek. The current land use in this area is agricultural and rural-recreational. Impacts to urban development must provide reasonable protection for significant natural areas such as floodplains, environmentally sensitive areas and provincially significant wetlands against changes in the use of land either in or adjacent to them. Erosion, flooding and water quality are issues in the lower reaches of Taplow Creek. Recommended enhancement features may be limited to maintaining, and if possible, improving form and function of headwater features. (TSH et al. 2006).

#### Sixteen Mile Creek Watershed

According to the secondary source review, this watershed has experienced varied effects of urbanization including bank instability, flooding, old storm water infrastructure, channelization and loss of instream and riparian cover. Watershed-specific enhancement opportunities presented include removal of online ponds, phosphate reduction, improved storm water management techniques, improve in-stream habitat, and increased/improved riparian habitats (CH 2011).

#### Joshua's Creek Watershed

According to secondary source review, the study area occurs within the headwater reaches of Joshua's Creek. The current land use in this area is agricultural and rural-recreational. Impacts to urban development must provide reasonable protection for significant natural areas such as floodplains, environmentally sensitive areas and provincially significant wetlands against changes in the use of land either in or adjacent to them. Erosion, flooding and water quality are issues in the lower reaches of Joshua's Creek. Recommended enhancement features may be limited to maintaining, and if possible, improving form and function of headwater features. (TSH et al. 2006).

#### Credit River Watershed

The Fletchers Creek Restoration Report (CVC 2012b) presents many enhancement and compensation opportunities to benefit the health of the watershed. Some of the general enhancement opportunities presented include: reconnecting partially or fully disconnected creeks from adjacent floodplains, bank



stabilization, removals of barriers to fish movement greater than 12 cm, buffer enhancement, invasive species management, and addition of aquatic habitat improvement structures (CVC 2012b).

## VEGETATION AND VEGETATION COMMUNITIES

Effects on vegetation and vegetation communities related to the implementation of the 407 Transitway could include the displacement of and/or disturbance to vegetation and vegetation communities; and, displacement of and/or disturbance to rare, threatened or endangered vegetation and vegetation communities.

Overall, there will be a loss of 255.47 ha of vegetation communities (including anthropogenically influenced lands such as agricultural and manicured land), which includes a loss of 212.86 ha due to the runningway, and a loss of 42.61 ha due to the stations and the bus storage facility. Collectively, this will result in impacts to both terrestrial and wetland habitats including the removal of 12.95 ha of forest communities 15.85 ha of wetland communities. All of the vegetation communities identified within the study area are considered to be widespread and common in Ontario and secure globally. The natural heritage and the preferred Transitway facility footprint are presented in **Figures 6.1A-F**, **Table 6.3** and **Table 6.4** present a summary of the vegetation removals within the Transitway runningway and stations, respectively.

### Runningway Impacts

#### **Segment S1: West of Brant Street to East of Dundas Street**

A total of 26.15 ha of predominately agricultural, cultural and/or planted areas will be removed because of the proposed 407 Transitway runningway from west of Brant St. to east of Dundas St. Cultural meadow and cultural meadow/cultural thicket communities (CUM1-1a, CUM1a/CUT1a) will experience the largest impact with over 18.0 ha to be removed, as well as impacts of 1.58 ha to cultural woodland habitat. Overall, impacts resulting in the loss of vegetation within these cultural communities is considered to be minor to moderate. Cultural meadows, thickets and woodlands are widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

Impacts will occur across two meadow marshes (MAM2-2a and MAM2-2b) and one shallow marsh (MAS2-1a). Reed canary grass is dominant within the meadow marsh communities. One meadow marsh is within a slight depression associated with a narrow cultural woodland that is surrounded by agriculture, and the other has developed along the side of the 407 ETR likely influenced by highway runoff. The shallow marsh is associated with a tributary of Shoreacres Creek and is dominated by broad-leaved cattails. Impacts related to the removal of 0.59 ha of these wetland communities that are widespread

and common throughout Ontario, is considered to be minor. It is expected that some wetland habitat would re-establish following the completion of transitway works.

Impacts to anthropogenically influenced lands will include the removal of 4.64 ha of agricultural land, the removal of 1.01 ha of associated hedgerows and 0.27 ha of manicured areas. Overall, impacts to these lands are considered to be minor.

#### **Segment S2: East of Dundas Street to East of Appleby Line**

A total of 20.24 ha of predominately agricultural land, hedgerows, and cultural areas will be removed because of the proposed 407 Transitway runningway from East of Dundas St to east of Appleby Line. The largest impact will be to cultural meadow and cultural meadow/cultural thicket (CUM1-1a and c) with 6.27 ha to be impacted, and 0.41 ha of cultural thicket (CUT1-1) and cultural woodland (CUW1d and e) to be impacted within Segment S2. Overall, impacts resulting in the loss of vegetation within these cultural communities is considered to be minor. Cultural meadows, thickets and woodlands are widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

A total of 0.73 ha of marsh habitat will be removed, including impacts to three Reed-canary Grass Meadow Marshes (2 x MAM2-2a and MAM2-2b) and two shallow marshes (MAS2a and b). The shallow marshes are dominated by common reed (*Phragmites australis*). Most of these wetlands are either associated with Appleby Creek, a tributary of Appleby Creek, or tributaries of Sheldon Creek. Impacts will result in the removal of portions of these communities. Though only a smaller portion of these marsh communities will remain, it is expected that these communities would persist and may extend between 407 ETR and the runningway. Runoff from infrastructure is expected to provide adequate conditions for their continued persistence since the associated tributaries provide only intermittent flows. However, the shallow marsh (MAS2b) associated with a hedgerow that is dominated by common reed, will largely be removed. Given the nature of this narrow marsh, its loss is not significant. Overall, impacts to small portions of meadow marsh and shallow marsh communities noted above are considered to be minor. These wetland communities are considered widespread and common in Ontario.

Construction of the runningway in Segment S2 will result in the removal of 0.37 ha of Sugar Maple Deciduous Forest (FOD5-1a) and 0.14 ha of a Sugar Maple-Black Maple Deciduous Forest (FOD6-2) associated with Bronte Creek. These communities are within the Zimmerman Valley Life Science ANSI. The Sugar Maple-Black Maple Deciduous Forest is an uncommon forest community that has a provincial conservation rank of S3, and includes several significant plant species including pale touch-me-not and cow-parsonip (*Heracleum lanatum*). Removal of a portion of the Sugar Maple Deciduous Forest (0.37 ha) can have a negative impact, however, removals are along the community edge where it is already disturbed. This community extends beyond the limits identified for the purposes of this study and it is likely the community will continue to persist post-development. The Sugar Maple-Black Maple Deciduous Forest is small so the removal of 0.14 ha within Segment S2, will likely have a negative impact on this community

where its location is restricted to within the floodplain. Forest edge management is required to enhance newly created forest edges and to increase resilience against invasive species and windthrow. Overall, impacts to the Sugar Maple Deciduous Forest are considered to be minor, but impacts to the Sugar Maple-Black Maple Deciduous Forest are considered to be high. During subsequent design phases, design refinements to minimize impacts to these forest communities will be undertaken, to the extent possible.

FIGURE 6.1A: NATURAL HERITAGE IMPACT ASSESSMENT

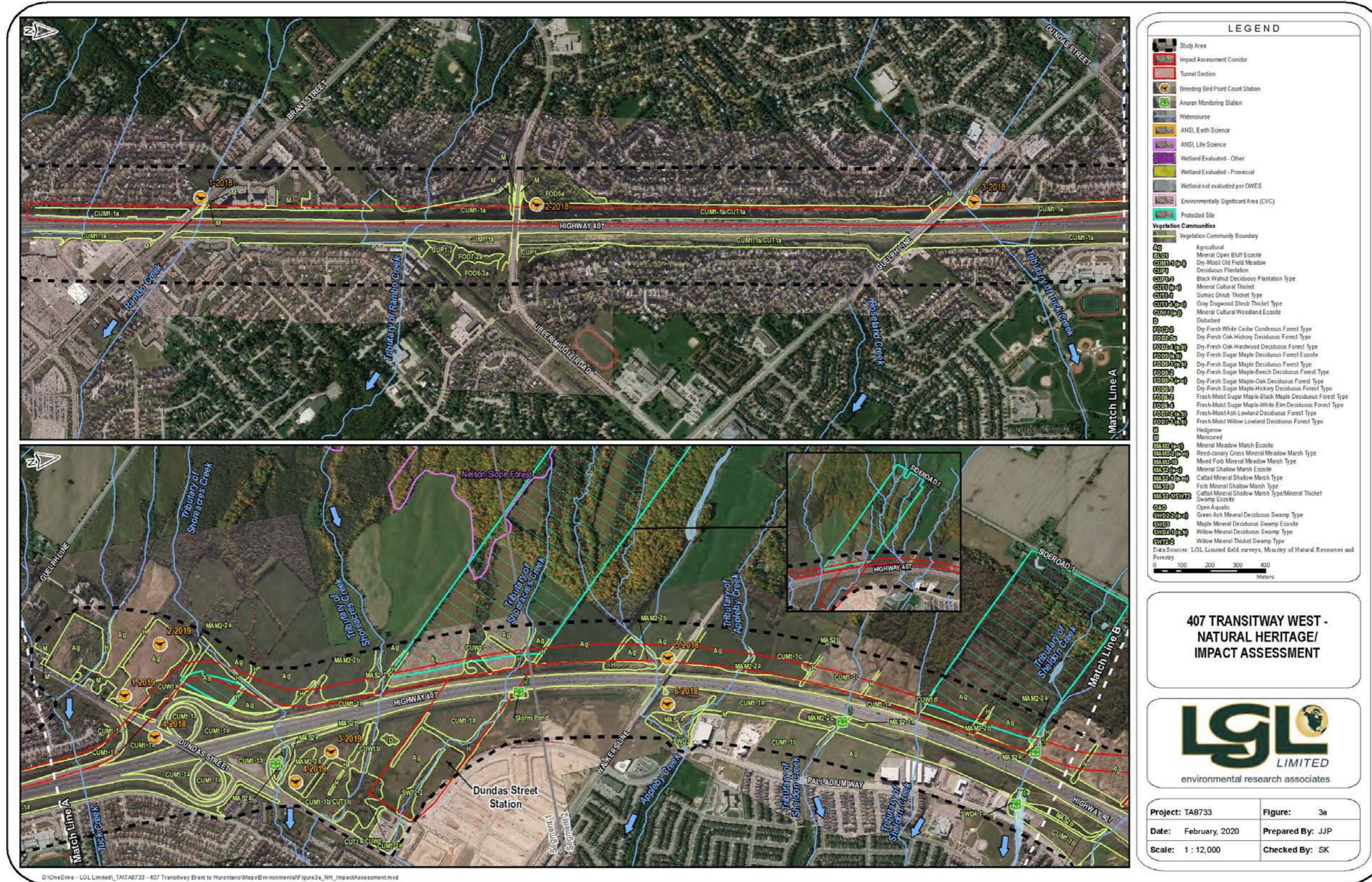


FIGURE 6.1B: NATURAL HERITAGE IMPACT ASSESSMENT

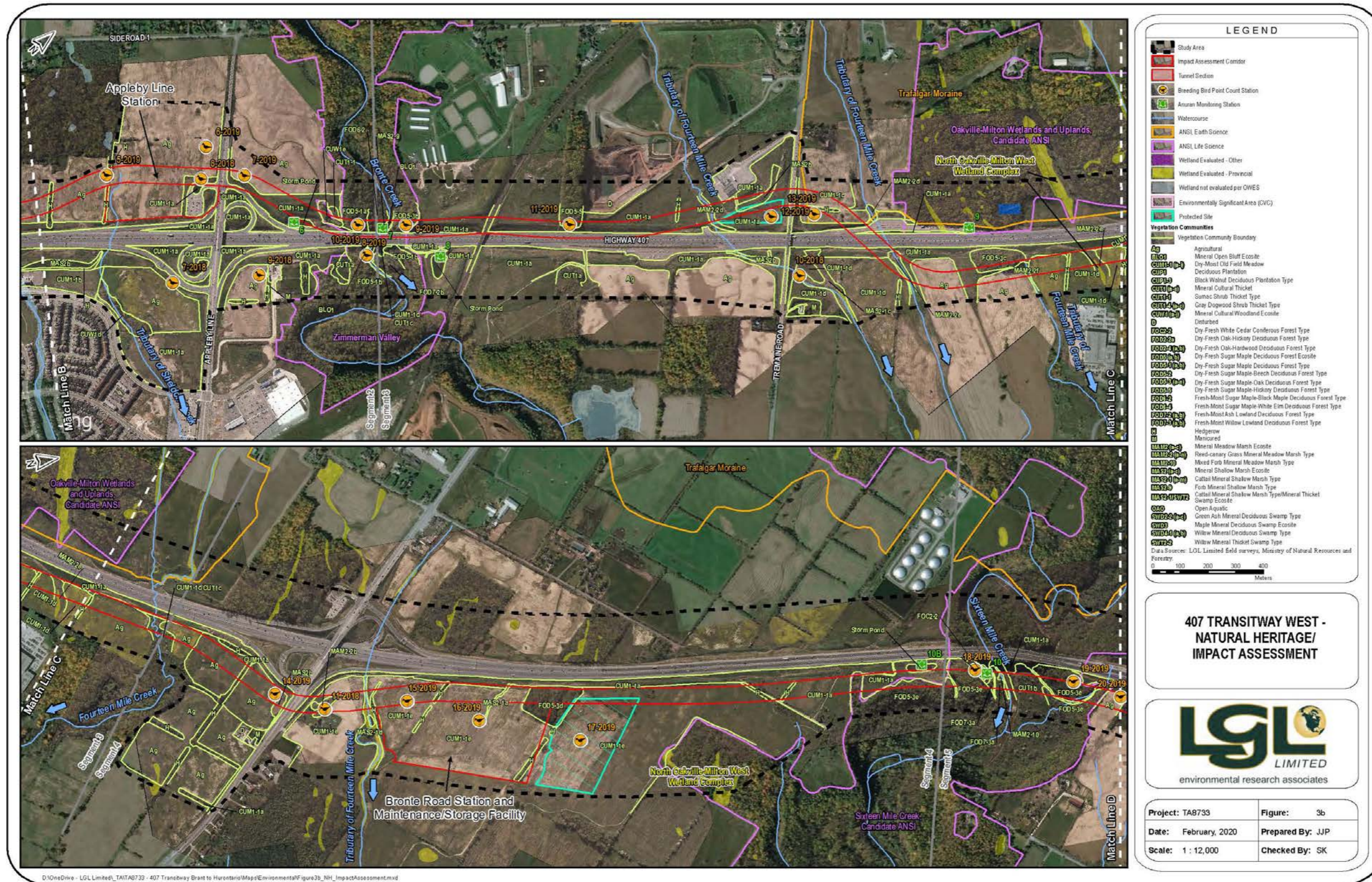


FIGURE 6.1C: NATURAL HERITAGE IMPAC ASSESSMENT

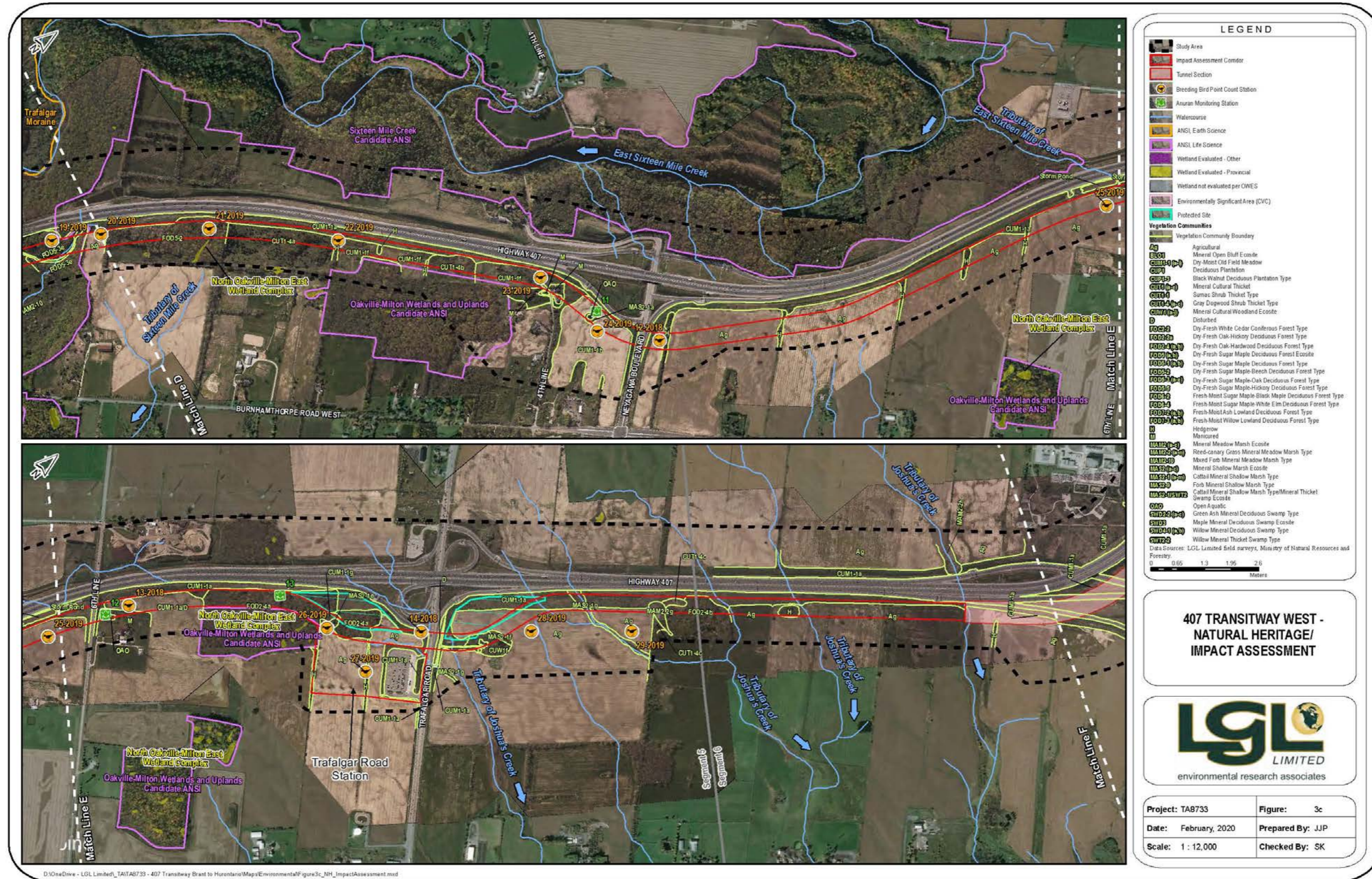


FIGURE 6.1D: NATURAL HERITAGE IMPAC ASSESSMENT



FIGURE 6.1E: NATURAL HERITAGE IMPAC ASSESSMENT

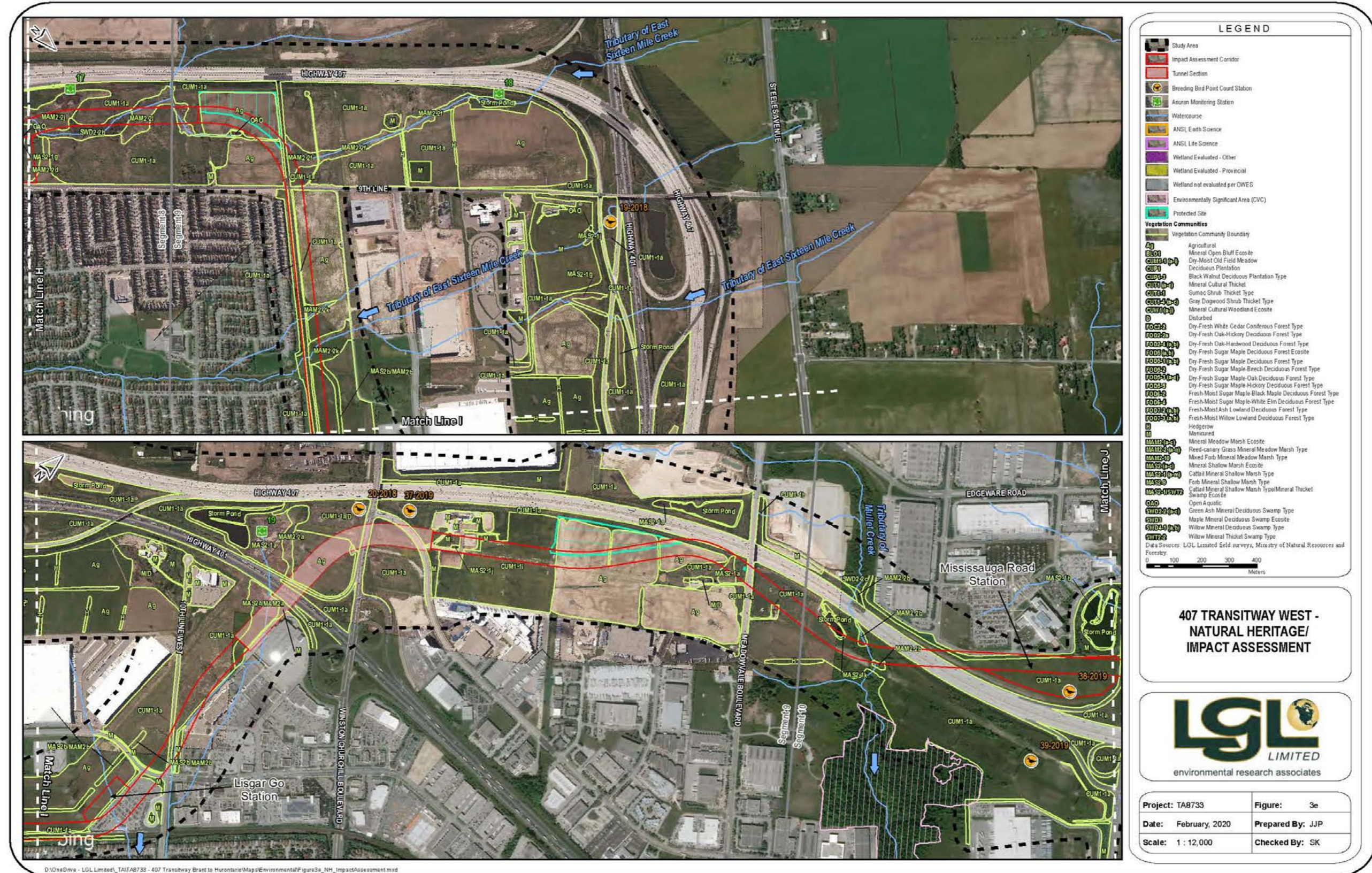
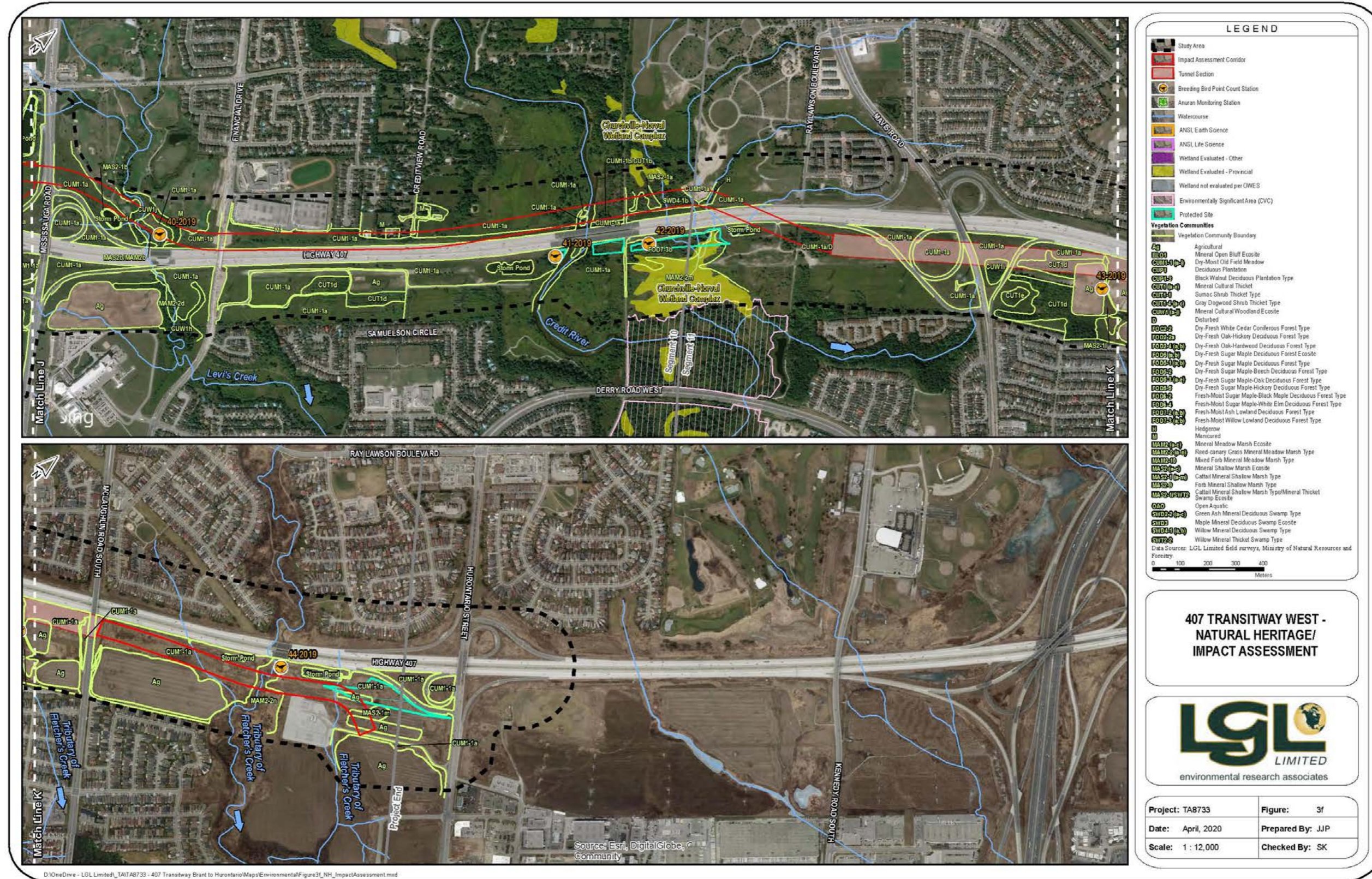


FIGURE 6.1F: NATURAL HERITAGE IMPAC ASSESSMENT





Forest edge management to enhance forest edges and increase resilience against invasive species and windthrow, along with the restoration/enhancement of any suitable lands that remain south of the transitway adjacent to those forest communities or on identified Protected Sites, will be undertaken.

Impacts to anthropogenically influenced lands will include the removal of 11.68 ha of agricultural lands and the removal of 0.57 ha of hedgerow. Overall, impacts to these lands are considered to be minor.

### **Segment S3: East of Appleby Line to East of Tremaine Road**

A total of 16.28 ha of predominately cultural areas and agricultural land will be removed because of the proposed 407 Transitway runningway from East of Appleby Line to east of Tremaine Rd. The largest impact will be to cultural meadow and cultural meadow/cultural thicket (CUM1-1a, c and d, CUM1-1c/CUT1c) with 10.19 ha to be impacted within Segment S3. Overall, impacts resulting in the loss of vegetation within these cultural communities is considered to be minor. Cultural meadows are widespread and common throughout Ontario. Plant species displaced and/or disturbed within the cultural communities due to the proposed construction are expected to re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

A total of 1.19 ha of marsh habitat will be removed, including impacts to four Reed-canary Grass Meadow Marshes (MAM2-2d, 2 x MAM2-2e and MAM2-2f), a shallow marsh (MASb), and a Forb Mineral Shallow Marsh (MAS2-9). Three meadow marsh communities are associated with tributaries of Fourteen Mile Creek. These narrow communities continue beyond the study area where it is expected these will persist/reestablish post-development. The MAM2-2e, located close to the eastern limit of Segment S3 is likely also supported by runoff. This small wetland is complexed as part of the provincially significant North Oakville-Milton West Wetland Complex, of which 0.02 ha will be impacted. Overall, it is expected that remnants of these wetland communities would persist and wetland species will colonize suitable spaces between the 407 ETR and the runningway where runoff from infrastructure is expected to provide adequate conditions to support their continued existence where the associated tributaries provide intermittent flows. Common reed (*Phragmites australis*) dominates the shallow marsh with occasional narrow-leaved cattails that have established within a low-lying area, along a former laneway within the hydro facility. The Forb Mineral Shallow Marsh is a narrow (<1 m) marsh located along the western bank of Bronte Creek, within the the Zimmerman Valley Life Science ANSI, includes floating-leaved macrophytes along the water's edge. It is expected that the Forb Mineral Shallow Marsh would be impacted due to any bridgework to cross Bronte Creek. However, with favourable light conditions below a bridge similar in height to the existing structure – any proposed restoration works, and re-colonization of plants post-construction would mitigate impacts to this community. Overall, impacts to small portions of the wetland communities noted above are considered to be minor. These wetland communities are considered widespread and common in Ontario.

Construction of the runningway in Segment S3 will result in the removal of 0.93 ha of forested habitat primarily associated with Sixteen Mile Creek, within the Zimmerman Valley Life Science ANSI. This includes impacts to 0.09 ha of Sugar Maple-Black Maple Deciduous Forest (FOD6-2), a community ranked

provincially as S3. This community also lies partially within Segment S2 where impacts to 0.14 ha are expected. In total, an area of 0.23 ha of the Sugar Maple-Black Maple Deciduous Forest is expected to be impacted. This uncommon community contains several regionally rare species. It is restricted to within the floodplain west of Bronte Creek. Impacts have the potential to cause considerable negative impacts to this community. Another forest community associated with Bronte Creek is the Sugar Maple-Oak Deciduous Forest (FOD5-3b) located on the upper slope and tableland beyond the top-of-slope, east of Bronte Creek. Impacts here will result in the removal of 0.38 ha of habitat. East of Bronte Creek, 0.15 ha of a Sugar Maple-Hickory Deciduous Forest (FOD5-5) will be removed along the southern edge of this narrow forest community. Impacts are associated primarily with edge habitat that is typically disturbed with a higher incident of invasive species. In addition, the southern edge of a small, fragmented Sugar Maple-Oak Deciduous Forest (FOD5-3c) will be impacted with 0.31 ha removed along its southern edge. This is a good quality remnant forest community with a diverse range of tree species that includes several mature trees (>50 cm diameter at breast height or DBH). Overall, impacts to forest communities discussed above are considered moderate to high. During subsequent design phases, design refinements to minimize impacts to these forest communities will be undertaken, to the extent possible. Forest edge management to enhance forest edges and increase resilience against invasive species and windthrow, along with the restoration/enhancement of any suitable lands that remain south of the transitway adjacent to those forest communities or on identified Protected Sites, will be undertaken.

A Mineral Open Bluff (BL01) associated with Bronte Creek with impacts to 0.02 ha along the eastern bank of the creek was also identified. In addition, impacts to anthropogenically influenced lands will include the removal of 3.69 ha of agricultural land and the removal of 0.25 ha of associated hedgerow. Overall, impacts to these lands are considered to be minor.

### **Segment S4: East of Tremaine Rd to West of Sixteen Mile Creek**

Impacts between east of Tremaine Road to east of Bronte Road will result in the removal of 17.07 ha of vegetation communities and anthropogenically influenced lands. Impacted vegetation communities include cultural meadow (CUM1-1a and e) and cultural meadow/cultural thicket (CUM1-1c/CUT1c), Sugar Maple-Oak Deciduous Forest (FOD5-3d and e), Reed-canary Grass Meadow Marsh (MAM2-2b), Cattail Mineral Shallow Marsh (MAS2-1a and d), Mineral Shallow Marsh (MAS2b), agricultural lands, associated hedgerows and storm ponds.

Impacts to cultural habitats within Segment S4 includes the removal of 11.67 ha of meadow and meadow/thicket. Cultural vegetation communities are widespread and common throughout Ontario. Cultural vegetation communities typically persist in areas that are regularly disturbed, and as a result, generally contain a high proportion of invasive and non-native plant species that are disturbance tolerant. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species present in the cultural communities. Overall, impacts resulting in the loss of vegetation within these cultural communities are considered to be minor.

Impacts to the Reed-canary Grass Meadow Marsh (MAM2-2b) will result in the removal of this community (0.26 ha). This meadow marsh is located within a low-lying area supported by road runoff associated

with the Regional Road 25 to the 407 ETR on-ramp. A total of 0.06 ha will be removed of a Cattail Mineral Shallow Marsh (MAS2-1a) that is located along a very narrow, eroded channel likely supported by road runoff. The MAS2-1d community is associated with a tributary of Fourteen Mile Creek and is complexed as part of the provincially significant North Oakville Milton West Wetland Complex. Impacts are related to the removal of 0.09 ha along the northern portion of this wetland. The loss of a portion of this wetland and its proximity to the runningway and station may have a negative impact to the remaining portion of this community. Impacts to the Mineral Shallow Marsh (MAS2a) will result in the removal of the northern half of this community. Common reed is dominant within this community, which is located within a low-lying area and is supported by highway runoff associated with the 407 ETR to Regional Road 25 off-ramp. Overall, impacts resulting in the loss of vegetation within these wetland communities are considered to be minor.

A total of 1.66 ha of forest habitat will be impacted. Forest removals include 0.65 ha along the northern edge of a Sugar Maple-Oak Deciduous Forest (FOD5-3e), within the Sixteen Mile Creek Candidate ANSI, where a higher presence of non-native and invasive species was observed. It is important to note that the height of any bridge constructed to cross Sixteen Mile Creek allow adequate light to habitat below, thus, vegetation within portions of FOD5-3e will be retained to the extent possible. Impacts of 1.01 ha which equates to approximately half of a small and isolated Sugar Maple-Oak Deciduous Forest (FOD5-3d), will occur due to construction of the runningway in Segment S4. Additional impacts due to the construction of the bus storage yard will result in the complete removal of this community. This forest contains a variety of plant species including the regionally rare pointed broom sedge (*Carex scoparia*), and vegetation observed included a range of young to mid-aged trees. Impacts to these forest communities are considered to be moderate. Where surplus lands are available within the study area, restoration or enhancement of forest habitat will be undertaken, to the extent possible.

Impacts to anthropogenically influenced lands will include the removal of 2.66 ha of agricultural lands and 0.47 ha of associated hedgerows, with very minor impacts to an existing storm pond. Impact to these lands is considered to be minor.

#### **Segment S5: West of Sixteen Mile Creek to East of Trafalgar Road**

The runningway portion of the Transitway will impact 40.21 ha of lands from east of Bronte Road to east of Trafalgar Road, with the greatest impact to cultural habitat and anthropogenically influenced lands. Impacts to cultural communities include cultural meadow (CUM1-1a, b, f and g), cultural thicket (CUT1-4a to c, and CUT1b), and cultural woodland (CUW1f). Impacts to wetlands include Reed-canary Grass Meadow Marsh (MAM2-2g), a Mixed Forb Mineral Meadow Marsh (MAM2-10), Cattail Mineral Shallow Marsh (MAS2-1a, e, f and g), and open aquatic (OAO). Impacts to forest communities include a White Cedar Coniferous Forest (FOC2-2), Oak-Hardwood Deciduous Forest (FOD2-4a and b), a Sugar Maple-Beech Deciduous Forest (FOD5-2), a Sugar Maple-Oak Deciduous Forest (FOD5-3e), and a Willow Lowland Deciduous Forest (FOD7-3a). Impacts to a Mineral Open Bluff (BLO1) associated with Sixteen Mile Creek have been identified, as well as impacts to agricultural lands, hedgerows and manicured

areas. Communities in Segment S5, associated with Sixteen Mile Creek are within the Sixteen Mile Creek Candidate Life Science ANSI.

Impacts to cultural habitats includes the removal of 16.46 ha of meadow, thicket, and woodland habitat. This includes impacts to 0.36 ha of cultural woodland comprised of a small, isolated community associated with a residence and surrounded by agricultural fields, east of Trafalgar Road. A total of 0.68 ha of a cultural thicket (CUT1b) will be impacted. This community is associated with Sixteen Mile Creek comprised of a range of non-native and invasive species including abundant coltsfoot (*Tussilago farfara*), giant hogweed (*Heracleum mantegazzianum*) and wild parsnip (*Pastinaca sativa*) observed occasionally, but also includes several sycamore (*Platanus occidentalis*) trees, a regionally rare species. A total of 2.95 ha of the northern portion of three Gray Dogwood Cultural Thickets (CUT1-4a to c) will also be impacted, all of these providing good quality habitat. Cultural thicket (CUT1-4b) and cultural meadow (CUM1-1f) are located in proximity to a forested community associated with the Oakville-Milton Wetlands and Uplands Candidate ANSI. Where impacts occur next to this ANSI restoration/enhancement and edge management on lands that are retained south of the runningway, will be undertaken. Overall, cultural vegetation communities identified are widespread and common throughout Ontario, and impacts resulting in the loss of vegetation within these cultural communities are considered to be minor. However, restoration/enhancement and edge management as noted above, will be undertaken to mitigate impacts to the Candidate ANSI, and to help to sustain the good quality Gray Dogwood Cultural Thicket (CUT1-4a) that would be retained.

A total of 0.85 ha of wetland habitat will be impacted including impacts to a Mixed Forb Mineral Meadow Marsh associated with Sixteen Mile Creek, a community that includes the regionally rare plant palmate-leaf sweet-coltfoot. Any bridgework undertaken to cross Sixteen Mile Creek would impact this wetland. However, with favourable light conditions below a bridge similar in height to the existing structure that crosses the creek – any proposed restoration works, and re-colonization of plants post-construction would mitigate impacts to this community. The Reed-canary Grass Meadow Marsh near to the eastern limit of Segment S5 is located within a low area, adjacent to a mix of meadow, thicket and woodland communities where 0.20 ha or close to half of this community will be impacted. Two Cattail Mineral Shallow Marshes (MAS2-1a and e) will be removed due to impacts from the construction of the runningway. These shallow marshes are either associated with road drainage or associated with a tributary of Joshua's Creek. Two other shallow marshes (MAS2-1f and g) will be partially impacted by the runningway with additional impacts expected due to transitway infrastructure. These additional impacts are expected to result in a diminished wetland presence across Segment S5. Though these wetland communities are considered widespread and common in Ontario, overall, impacts to wetland communities within this segment are considered to be minor to moderate. Restoration of any low-lying areas, within remaining suitable habitat associated with local tributaries will be undertaken to mitigate impacts to the extent possible.

A total of 8.63 ha of forested habitat will be impacted across Segment S5. Of this area, 2.35 ha along the northern portion of Sugar Maple-Oak Deciduous Forest (FOD5-3e), Willow Lowland Deciduous Forest (FOD7-3a), and White Cedar Coniferous Forest (FOC2-2) communities associated with Sixteen Mile Creek,

will be impacted. Efforts will be made to retain as much of these forest communities as possible below any bridge structure constructed to span Sixteen Mile Creek, where the bridge height is expected to permit adequate light. A total of 6.28 ha of habitat will be impacted across three other forest communities (FOD2-4a and b, and FOD5-2). East of Sixteen Mile Creek a Sugar Maple-Beech Deciduous Forest associated with a Tributary of Sixteen Mile Creek at its eastern edge, will be impacted with a small portion of forest to be retained south of the runningway. Within this forest is a narrow wetland that is complexed with the provincially significant North Oakville-Milton West Wetland Complex. Minor impacts of 0.004 ha are expected, but the removal of forest (FOD5-2) may cause indirect impacts. An Oak-Hardwood Deciduous Forest (FOD2-4a) west of Trafalgar Road, is contiguous with forest habitat that will remain south of the proposed runningway. This forest, south of the runningway is found within the Oakville-Milton Wetlands and Uplands Candidate ANSI. The Oak-Hardwood Deciduous Forest (FOD2-4b) east of Trafalgar Road is a small, isolated forest with fair to good quality habitat of which 0.41 ha is located within Segment S5. A portion of this habitat within Segment S6 will also be removed. The removal of almost half of this forest fragment would likely cause negative impacts to the remaining portion of this forest, given the very small area of habitat to be retained which would have a high edge-to-interior ratio with increased vulnerability to invasion by non-native species and increased exposure to windthrow. Overall, impacts to forest communities discussed above are considered to be high. During subsequent design phases, design refinements to minimize impacts to these forest communities will be undertaken, to the extent possible. Edge management is required to enhance forest edges and to increase resilience against invasive species and windthrow. This is especially important along newly created forest edges associated with the Oakville-Milton Wetlands and Uplands Candidate ANSI, which also contains wetland habitat that is part of the North-Oakville-Milton East Provincially Significant Wetland Complex. The restoration/enhancement of any suitable lands remaining south of the runningway and adjacent to those forest communities, will be carried out. If any excess or surplus lands are identified within the study area, forest restoration will be undertaken.

A Mineral Open Bluff (BL01) associated with Sixteen Mile Creek with impacts to 0.06 ha along the eastern bank of the creek was identified. Also, impacts to anthropogenically influenced lands will include the removal of 12.96 ha of agricultural land, the removal of 0.66 ha of associated hedgerows and 0.52 ha of manicured areas. Overall, impacts to these lands are considered to be minor.

#### **Segment S6: East of Trafalgar Road to North of Lower Base Line**

Impacts between east of Trafalgar Road to east of Lower Base Line will result in the removal of approximately 16.19 ha of vegetation communities and anthropogenically influenced lands, consisting primarily of cultural meadow and disturbed lands (CUM1-1a, CUM1-1a/D and CUM1-1e/D) with minor impacts to wetlands (MAM2a, MAM2-2i, and SWD2-2a) and forest (FOD2-4b). Impacts within this section have been minimized to the extent possible where the preferred alignment will be tunneled across a portion of Segment S6.

The largest impact of 8.71 ha will be to cultural meadow communities that are already in a disturbed state with ongoing development. Overall, impacts resulting in the loss of vegetation within these cultural communities is considered to be minor. Cultural meadow is widespread and common throughout

Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

A total of 1.23 ha will be impacted comprised of meadow marsh (MAM2a and MAM2-2i) communities and one deciduous swamp (SWD2-2a). These wetlands are located in a low-lying area and are surrounded by infrastructure. Common reed dominates the meadow marsh community (MAM2a) with abundant reed canary grass. Species diversity within the Reed-canary Grass Mineral Meadow Marsh (MAM2-2i) is limited. The Green Ash Mineral Deciduous Swamp is dominated by red ash (also known as green ash) of which many are dead or in decline. This community appeared to be in transition with common buckthorn occasional to abundant in the shrub layer. Lands adjacent to this community were in a disturbed state with ongoing construction. Overall, impacts resulting in the loss of vegetation within these wetland communities are considered to be minor.

The Oak-Hardwood Deciduous Forest (FOD2-4b) east of Trafalgar Road is a small, isolated forest with fair to good quality habitat of which 0.52 ha will be impacted within Segment S6, and an additional 0.41 ha within Segment S5, for a total impact of 0.93 ha. The removal of almost half of this forest fragment would likely cause negative impacts to the remaining portion of this forest given the small and isolated nature of retained habitat which would have a high edge-to-interior ratio with increased vulnerability to invasion by non-native species, and increased exposure to windthrow. Overall, impacts to forest communities discussed above are considered to be minor to moderate. Restoration/enhancement of any suitable lands remaining south of the runningway and adjacent to those forest communities, will be carried out. If any excess or surplus lands are identified within the study area, forest restoration will be undertaken.

Impacts to anthropogenically influenced lands will include the removal of 5.05 ha of agricultural land, the removal of 0.51 ha of associated hedgerows and 0.17 ha of manicured areas. Overall, impacts to these lands are considered to be minor.

#### **Segment S7: North of Lower Base Line to North of Britannia Road**

Impacts between east of Lower Base Line to North of Britannia Road will result in the removal of 9.92 ha of vegetation communities and anthropogenically influenced lands. Impacted vegetation communities include cultural meadow (CUM1-1a and CUM1-1e/D disturbed by ongoing development), Reed-canary Grass Mineral Meadow Marsh (MAM2-2i and j), Mineral Shallow Marsh/Mineral Meadow Marsh (MAS2c/MAM2c) and Open Aquatic (OAO).

The largest impact will be to cultural meadow communities (CUM1-1a and CUM1-1e/D) which cover an area of 7.54 ha across Segment S7. Overall, impacts resulting in the loss of vegetation within these cultural communities are considered to be minor. Cultural meadow is widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

Construction of the runningway will result in the removal 0.66 ha of meadow marsh, shallow marsh habitat and open aquatic. Both wetland communities are in low-lying areas between the 407 ETR and Ninth Line, and are associated with a Tributary of East Sixteen Mile Creek. Impacts will mostly affect existing edge habitat. These communities exhibit limited plant diversity. Overall, impacts resulting in the loss of vegetation within these wetland communities are considered to be minor.

Impacts to anthropogenically influenced lands will include the removal of 1.72 ha of agricultural lands, manicured areas and hedgerows, with the greatest impact of 1.06 ha to manicured areas. The impact to these lands is considered to be minor.

#### **Segment S8: North of Britannia Road to North of Derry Road**

Impacts between north of Britannia Road to north of Derry Road will result in the removal of 21.76 ha of vegetation communities and anthropogenically influenced lands. Impacted vegetation communities include cultural meadow (CUM1-1a, c and g) and cultural woodland (CUW1d and g), Reed-canary Grass Mineral Meadow Marsh (MAM2-2h, j and l), Cattail Mineral Shallow Marsh (MAS2-1g), Green Ash Mineral Deciduous Swamp (SWD2-2b), Open Aquatic (OAO), and Sugar Maple-White Elm Deciduous Forest (FOD6-4).

The largest impact of 9.16 ha will be to cultural meadow communities across Segment S8, with the greatest impact of 9.03 ha to cultural meadow. Overall, impacts resulting in the loss of vegetation within these cultural communities are considered to be minor. Cultural meadow is widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

Construction of the runningway will result in the removal 4.83 ha of Reed-canary Grass Mineral Meadow Marsh, Cattail Mineral Shallow Marsh, Green Ash Mineral Deciduous Swamp and open aquatic. The largest of these removals is associated with meadow marsh communities where 4.51 ha will be impacted. Two Reed-canary Grass Mineral Meadow Marshes (MAM2-2h and j) are associated with a tributary of East Sixteen Mile Creek, which crosses the length of Segment S8, immediately adjacent and east of the 407 ETR. Impacts to these communities would occur both north and south of Derry Road. Any surface alteration to tributary flows to accommodate for the construction of the runningway would provide suitable habitat for the re-establishment of meadow marsh habitat. A total of 0.51 ha of Green Ash Mineral Deciduous Swamp will be impacted. Most of the large red ash (also known as green ash) trees within this community are dying or are in decline with common buckthorn occasional in the shrub layer. This community is located within a low-lying area, but appears to be in transition. There may be opportunity for the restoration of deciduous swamp in suitable habitat between the runningway and the 407 ETR. Overall, impacts resulting in the loss of vegetation within these wetland communities are considered to be minor to moderate.

A total of 0.11 ha of Sugar Maple-White Elm Deciduous Forest (FOD6-4) will be impacted at the northwest corner of this forest community. Overall, impacts resulting in the loss of vegetation along the forest edge

are considered to be minor. However, forest edge management to enhance forest edges and increase resilience against invasive species is required to mitigate any additional impacts to the forest community.

Impacts to anthropogenically influenced lands will include the removal of 6.58 ha of agricultural and disturbed lands, manicured areas, hedgerows, and storm ponds, with the greatest impact of 4.15 ha to agricultural lands. The impact to these lands is considered to be minor.

#### **Segment S9: North of Derry Road to West of Heritage Road**

Impacts between north of Derry Road to west of Heritage Road will result in the removal of 18.39 ha of vegetation communities and anthropogenically influenced lands. Impacted communities include cultural meadow (CUM1-1a and i) and Reed-canary Grass Mineral Meadow Marsh (MAM2-2f, k and l), Cattail Mineral Shallow Marsh (MAS2-1a and j), and Mineral Shallow Marsh/Mineral Meadow Marsh (MAS2a/MAM2 and MAS2b/MAM2b). Impacts within this section have been greatly reduced where the preferred alignment will be tunneled across a portion of Segment S9.

The largest impact will be to cultural communities and lands that are anthropogenically influenced. These impacts are associated with the removal of 8.01 ha of cultural meadow and 8.49 ha of agricultural lands that are largely associated with a hydro corridor. Impacts to cultural meadow communities are considered to be minor. Cultural meadows are widespread and common throughout Ontario. Cultural vegetation communities typically persist in areas that are regularly disturbed, and as a result, generally contain a high proportion of invasive and non-native plant species that are disturbance tolerant. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species present in cultural communities. Impacts to anthropogenically influenced lands are also considered to be minor.

Construction of the runningway will result in the removal 1.27 ha of wetland habitat comprised of Reed-canary Grass Mineral Meadow Marshes and Cattail Mineral Shallow Marshes. These wetland communities are located in low-lying areas, are associated with Tributaries of East Sixteen Mile Creek and are partially influenced by runoff and/or drainage. The very small (0.04 ha) shallow marsh community (MAS2-1j) will be removed entirely due to runningway impacts. Impacts are typically associated with community edges. It is expected that most plant species displaced and/or disturbed within these wetlands that are dominated by reed-canary grass, cattails and/or common reed, will re-colonize available lands adjacent to the new right-of-way, post-construction. Overall, impacts resulting in the loss of vegetation within these wetland communities are considered to be minor.

#### **Segment S10: West of Heritage Road to East of Credit River**

A change to this segment has been made since the initial analysis of Alignment Option 1 and Alignment Option 2. This was due to new information received regarding existing archaeological potential south of the 407 ETR around Credit River area. The change consists of the crossing of the Credit River on the north side of 407 ETR (Figure 6.1A). The impacts to the new alignment is presented here.

Impacts between west of Heritage Road to east of Creditview Road will result in the removal of 18.96 ha of vegetation communities and anthropogenically influenced lands. Impacted vegetation communities include Mineral Cultural Meadow (CUM1-1a), Mineral Cultural Meadow/Mineral Cultural Thicket (CUM1-1b/CUT1b), Mineral Cultural Woodland (CUW1j), Reed-canary Grass Mineral Meadow Marsh (MAM2-2b), Cattail Mineral Shallow Marsh (MAS2-1a and k), Mineral Shallow Marsh/Mineral Meadow Marsh (MAS2b/MAM2b), and a Willow Mineral Lowland Deciduous Swamp (SWD4-1b).

The largest impact of 15.77 ha will be to cultural communities including the removal of 14.63 ha of meadow habitat across Segment S10. Overall, impacts resulting in the loss of vegetation within these cultural communities are considered to be minor. Cultural meadow is widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

Construction of the runningway will result in the removal 1.64 ha of wetland habitat. A total of 0.51 ha is associated with Reed-canary Grass Mineral Meadow Marsh, Cattail Mineral Shallow Marsh and Mineral Shallow Marsh/Mineral Meadow Marsh communities that are dominated by cattails, reed-canary grass or common reed. Impacts will mainly affect edge habitat. The greatest wetland impact within this segment is the removal of 1.13 ha of a willow lowland swamp. Overall, impacts resulting in the loss of vegetation within these wetland communities are considered to be minor to moderate. Where there are opportunities for the re-establishment and spread of similar wetland communities between the runningway and the 407 ETR, as well as south of the runningway, edge management/restoration efforts will be undertaken to mitigate impacts.

Impacts to anthropogenically influenced lands will include the removal of 1.55 ha of manicured areas and a small portion of a storm pond. The impact to these lands is considered to be minor.

#### Segment S11: East of Credit River to West of Hurontario Street

Impacts between east of Creditview Road to west of Hurontario Street will result in the removal of 8.78 ha of vegetation communities and anthropogenically influenced lands. Impacted vegetation communities include cultural meadow (CUM1-1a and CUM1-1a/D which includes lands that have anthropogenic disturbances), Reed-canary Grass Mineral Meadow Marsh (MAM2-2m and n), Cattail Mineral Shallow Marsh (MAS2-1m), and a Willow Mineral Lowland Deciduous Swamp (SWD4-1b). Impacts within this section have been minimized to the extent possible where the preferred alignment will be tunneled across a portion of Segment S11.

The largest impact will be to cultural meadow communities including an area of 7.62 ha across Segment S11. Overall, impacts resulting in the loss of vegetation within these cultural communities are considered to be minor. Cultural meadow is widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction.

Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

Construction of the runningway will result in the removal of 0.55 ha of wetland habitat, with the largest impact of 0.36 ha to the Reed-canary Grass Mineral Meadow Marsh, which is located within the floodplain of a Tributary of Fletcher’s Creek. Impacts to this meadow marsh will be limited to impacts associated with the construction of a bridge to cross the tributary, where it is expected that reed canary grass will re-establish post-construction. A total of 0.15 ha will be removed from the Cattail Mineral Shallow Marsh (MAS2-1m), a small wetland with abundant narrow-leaved cattails and abundant common reed surrounded by agriculture and cultural meadow. A total of 0.04 ha of the willow lowland swamp, which is partially within Segment S10, will also be impacted. Overall, impacts resulting in the loss of vegetation within these wetland communities are considered to be minor to moderate. Where there are opportunities for the re-establishment and spread of similar wetland communities between the runningway and the 407 ETR, as well as south of the runningway, edge management/restoration efforts will be undertaken to mitigate impacts. Impacts to anthropogenically influenced lands will include the removal of 0.44 ha of agricultural lands and 0.16 ha associated with a hedgerow. The impact to these lands is considered to be minor.

**TABLE 6.3: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY RUNNINGWAY**

TRANSITWAY SEGMENT	TOTAL AREA TO BE AFFECTED (HA)
<i>Segment S1: West of Brant St to East of Dundas St</i>	
Cultural Communities (CUM1-1a, CUM1-1a/CUT1a, CUW1a and c)	19.64
Wetland Communities (MAM2-2a and b and MAS2-1a)	0.59
Anthropogenically Influenced Lands (Agricultural, Manicured and Hedgerow)	5.92
<b>Subtotal West of Brant St to East of Dundas St</b>	<b>26.15 ha</b>
<i>Segment S2: East of Dundas St to East of Appleby Line</i>	
Cultural Communities (CUM1-1a and c, CUT1-1, CUW1d and e)	6.68
Wetland Communities (MAM2-2a and b, MAS2a and MAS2b)	0.73
Forest Communities (FOD5-1a and FOD6-2)	0.51
Anthropogenically Influenced Lands (Agricultural, Hedgerows and Storm Pond)	12.31
<b>Subtotal East of Dundas St to East of Appleby Line</b>	<b>20.23 ha</b>
<i>Segment S3: East of Appleby Line to East of Tremaine Rd</i>	
Cultural Communities (CUM1-1a, c and d and CUM1-1c/CUT1c)	10.19
Mineral Open Bluff (BLO1)	0.02
Wetland Communities (MAM2-2d, e and f, MAS2-9 and MAS2b)	1.19
Forest Communities (FOD5-3b and c, FOD5-5 and FOD6-2)	0.93
Anthropogenically Influenced Lands (Agricultural and Hedgerows)	3.95
<b>Subtotal East of Appleby Line to East of Tremaine Rd</b>	<b>16.28 ha</b>
<i>Segment S4: East of Tremaine Rd to East of Bronte Rd</i>	
Cultural Communities (CUM1-1a and e, CUM1-1c/CUT1c)	11.67

**TABLE 6.3: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY RUNNINGWAY**

TRANSITWAY SEGMENT	TOTAL AREA TO BE AFFECTED (HA)
Wetland Communities (MAM2-2b, MAS2-1a and d, MAS2b)	0.58
Forest Communities (FOD5-3d and e)	1.66
Anthropogenically Influenced Lands (Agricultural, Hedgerows and Storm Pond)	3.16
<b>Subtotal East of Tremaine Rd to West of Sixteen Mile Creek</b>	<b>17.07 ha</b>
<i>Segment S5: East of Bronte Rd to East of Trafalgar Rd</i>	
Cultural Communities (CUM1-1a, CUM1-1a/D, CUM1-1b, f, and g, CUT1-4a, b and c, CUT1b and CUW1f)	16.46
Mineral Open Bluff (BLO1)	0.06
Wetland Communities (MAM2-10, MAM2-2g, MAS2-1 and e, MAS2-1f and g, OAO)	0.85
Forest Communities (FOC2-2, FOD2-4a and b, FOD5-2, FOD5-3e and FOD7-3a)	8.63
Anthropogenically Influenced Lands (Agricultural, Manicured, and Hedgerows)	14.21
<b>Subtotal West of Sixteen Mile Creek to East of Trafalgar Rd</b>	<b>40.21 ha</b>
<i>Segment S6: East of Trafalgar Rd to East of Lower Base Line</i>	
Cultural Communities (CUM1-1a, CUM1-1a/D, and CUM1-1e/D)	8.71
Wetland Communities (MAM2a, MAM2-2i, and SWD2-2a)	1.23
Forest Communities (FOD2-4b)	0.52
Anthropogenically Influenced Lands (Agricultural, Manicured and Hedgerows)	5.73
<b>Subtotal East of Trafalgar Rd to East of Lower Base Line</b>	<b>16.19 ha</b>
<i>Segment S7: East of Lower Base Line to North of Britannia Rd</i>	
Cultural Communities (CUM1-1a and CUM1-1e/D)	7.54
Wetland Communities (MAM2-2i and j, MAS2c/MAM2c and OAO)	0.66
Anthropogenically Influenced Lands (Agricultural, Manicured, Hedgerows, Disturbed and Storm Pond)	1.72
<b>Subtotal East of Lower Base Line to North of Britannia Rd</b>	<b>9.92 ha</b>
<i>Segment S8: North of Britannia Rd to North of Derry Rd</i>	
Cultural Communities (CUM1-1a, c, and g, CUW1d and g)	9.16
Wetland Communities (MAM2-2h, j and l, MAS2-1g, SWD2-2b and OAO)	4.83
Forest Communities (FOD6-4)	0.11
Anthropogenically Influenced Lands (Agricultural, Manicured, Hedgerows, Disturbed and Storm Pond)	6.58
<b>Subtotal North of Britannia Rd to North of Derry Rd</b>	<b>20.68 ha</b>
<i>Segment S9: North of Derry Rd to West of Heritage Rd</i>	
Cultural Communities (CUM1-1a and i)	8.01
Wetland Communities (MAM2-2f, k, and l, MAS2-1a and j, MAS2a/MAM2a and MAS2b/MAM2b)	1.27
Anthropogenically Influenced Lands (Agricultural and Manicured)	9.11
<b>Subtotal North of Derry Rd to West of Heritage Rd</b>	<b>18.39 ha</b>
<i>Segment S10: West of Heritage Rd to East of Creditview Rd</i>	
Cultural Communities (CUM1-1a, CUM1-1b/CUT1b and CUW1j)	15.77
Wetland Communities (MAM2-2b, MAS2-1a and k, MAS2b/MAM2b, SWD4-1b)	1.64

**TABLE 6.3: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY RUNNINGWAY**

TRANSITWAY SEGMENT	TOTAL AREA TO BE AFFECTED (HA)
Anthropogenically Influenced Lands (Agricultural, Manicured and Storm Pond)	1.55
<b>Subtotal West of Heritage Rd to East of Creditview Rd</b>	<b>18.96 ha</b>
<i>Segment S11: East of Creditview Rd to West of Hurontario St</i>	
Cultural Communities (CUM1-1a and CUM1-1a/D)	7.63
Wetland Communities (MAM2-2n, MAS2-1m and SWD4-1b)	0.55
Anthropogenically Influenced Lands (Agricultural)	0.60
<b>Subtotal East of Creditview Rd to West of Hurontario St</b>	<b>8.78 ha</b>
<b>Total Impacted Area (ha) for the Transitway Runningway</b>	<b>212.86 ha</b>

**Stations and Bus Storage Yard Impacts**

**Dundas Street Station**

Impacts associated with the construction of the Dundas Street Station will result in the removal of 8.88 ha of vegetation communities comprised of cultural habitat, wetland, hedgerow and storm ponds, and anthropogenically influenced lands. Impacted vegetation communities include cultural meadow (CUM1-1a), cultural thicket/cultural woodland (CUT1a/CUW1a), cultural woodland (CUW1c), and Willow Mineral Thicket Swamp (SWT2-2).

A total of 4.39 ha of cultural habitat will be impacted with the largest impact to cultural meadow communities including an area of 4.16 ha across the Dundas Street Station footprint. Overall, impacts resulting in the loss of vegetation within these cultural communities are considered to be minor. Cultural meadow is widespread and common throughout Ontario.

Impacts to 0.91 ha of Willow Mineral Thicket Swamp are expected. This swamp thicket is dominated by willows (*Salix* spp.), with Manitoba maple and black walnut observed occasionally. This thicket is associated with a tributary of Shoreacres Creek. Overall, impacts resulting in the loss of vegetation within this wetland community are considered to be minor to moderate. Where any surplus lands are available between the constructed station and the 407 ETR and suitable habitat is present, restoration or enhancement of wetland habitat will be undertaken.

Impacts to anthropogenically influenced lands will include the removal of 3.58 ha of agricultural lands and associated hedgerows, and this impact is considered to be minor.

**Appleby Line Station**

Impacts associated with the construction of the Appleby Line Station will result in the removal of 4.19 ha of vegetation communities and anthropogenically influenced lands. Removals consist primarily of agricultural lands and associated hedgerows with a total removal of 3.51 ha, with 0.68 ha of cultural meadow (CUM1-1a). Overall, impacts resulting in the loss of anthropogenic lands and cultural meadow

are considered to be minor. Cultural meadow is widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction.

### **Bronte Road Station and Bus Storage Yard**

Impacts associated with the construction of the Bronte Road Station will result in the removal of 14.20 ha of vegetation communities and anthropogenically influenced lands. Removals consist primarily of cultural meadow (CUM1-1e) with a total of 13.33 ha to be impacted. Overall, impacts resulting in the loss of anthropogenic lands and cultural meadow are considered to be minor. Cultural meadow is widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction.

Impacts include the removal of 0.50 ha of a Sugar Maple-Oak Deciduous Forest (FOD5-3d). With additional impacts associated with the runningway portion of the transitway, this entire forest will be removed. As previously noted, this community contains a variety of plant species including the regionally rare pointed broom sedge (*Carex scoparia*) and vegetation present included a range of young to mid-aged trees. Overall, impacts to this community are considered to be moderate. The restoration/enhancement of any suitable lands remaining south of the runningway and adjacent to those forest communities will be carried out. If any excess or surplus lands are identified within the study area forest restoration will be undertaken.

Impacts to a Cattail Mineral Shallow Marsh (MAS2-1a) includes the removal of 0.04 ha of this community. With additional impacts associated with the runningway portion of the transitway, this entire wetland will be removed. This wetland is located along a very narrow, eroded channel that crosses agricultural fields that is likely supported by runoff/drainage. This meadow marsh community is considered widespread and common in Ontario, and impacts to this wetland are considered to be minor.

A Cattail Mineral Shallow Marsh (MAS2-1d) is located adjacent and east of the station. This marsh is associated with a Tributary of Fourteen Mile Creek and is complexed as part of the provincially significant North Oakville-Milton West Wetland Complex. Although the marsh is outside of the footprint of the Bronte Road Station and the bus storage yard, development so close on adjacent lands may cause negative impacts. During detail design, design consideration will be given to mitigate negative impacts to this wetland.

Impacts of 0.33 ha to anthropogenically influenced lands will be to hedgerows associated with agricultural lands. This impact is considered to be minor.

The impact to anthropogenically influenced lands will be to hedgerows associated with agricultural lands. This impact is considered to be minor.

### **Trafalgar Road Station**

Impacts associated with the construction of the Trafalgar Road Station will result in the removal of 5.26 ha of vegetation communities and anthropogenically influenced lands. Removals are primarily to agricultural fields and associated hedgerows with a total of 4.34 ha to be impacted. Minor impacts to cultural meadow (CUM1-1a) of 0.83 ha are also expected. Overall, impacts resulting in the loss of anthropogenic lands and cultural meadow are considered to be minor. Cultural meadow is widespread and common throughout Ontario. It is expected that most plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the new right-of-way post-construction.

A total of 0.09 ha of the Oak-Hardwood Deciduous Forest (FOD2-4a) will be impacted due to the Trafalgar Road Station. This impact is considered to be minor; however, additional impacts to this forest are associated with the runningway portion of the transitway. As a result, a total of 3.4 ha of this forest community will be removed. This Oak-Hardwood Deciduous Forest is contiguous with forest habitat that will remain south of the proposed runningway, which is within the Oakville-Milton Wetlands and Uplands Candidate ANSI. Overall, impacts to this forest community are considered to be moderate to high. During subsequent design phases, design refinements to minimize impacts will be undertaken, to the extent possible. Forest edge management is required to enhance newly created forest edges and to increase resilience against invasive species and windthrow. Also, the restoration/enhancement of any suitable, surplus lands within the study area will be undertaken.

### **Britannia Road Station**

Impacts associated with the construction of the Britannia Road Station will result in the removal of 2.31 ha of vegetation communities and anthropogenically influenced lands. Impacts include the removal of 1.60 ha of cultural meadow (CUM1-1a) and manicured areas. Cultural communities typically persist in areas that are subject to regular disturbance. Consequently, impacts to the cultural communities are considered to be minor. Cultural meadows are widespread and common throughout Ontario.

Impacts are also expected to a Reed-canary Grass Meadow Marsh (MAM2-2j) with the removal of 0.66 ha of wetland along its eastern edge. There may be opportunities for the re-establishment and spread of similar wetland habitat between the runningway and the 407 ETR, as well as opportunity adjacent to the station. Overall, impacts resulting in the loss of vegetation within this wetland community are considered to be minor to moderate.

### **Derry Road Station**

Impacts associated with the construction of the Derry Road Station will result in the removal of 3.73 ha of vegetation communities and anthropogenically influenced lands. Impacts include the removal of 3.18 ha of cultural meadow (CUM1-1c) and manicured areas. Cultural communities typically persist in areas that are subject to regular disturbance. Consequently, impacts to the cultural communities are considered to be minor. Cultural meadows are widespread and common throughout Ontario.

Impacts are expected to two wetland communities. A Reed-canary Grass Meadow (MAM2-2d) will be impacted along its eastern edge with impacts of 0.03 ha. Impacts to a Marsh Cattail Mineral Shallow

Marsh and open aquatic (MAS2-1g and OAO) with result in its removal (0.09 ha). There may be opportunities for the re-establishment and spread of similar wetland habitat between the runningway and the 407 ETR, as well as opportunity adjacent to the station. The remaining impacts will result in the removal of 0.49 ha of hedgerow and manicured areas. Overall, impacts resulting in the loss of vegetation within two wetland communities are considered to be minor.

### Lisgar GO Station

Impacts associated with the construction of the Lisgar GO Station will result in the removal of 0.97 ha of vegetation communities and anthropogenically influenced lands. Impacts are primarily to cultural meadow (CUM1-1a) and to agricultural lands, and to a lesser extent, cultural meadow. Cultural communities typically persist in areas that are subject to regular disturbance. Consequently, impacts to the cultural communities are considered to be minor. Cultural meadows are widespread and common throughout Ontario.

### Mississauga Road Station

Impacts associated with the construction of the Mississauga Road Station will result in the removal of 2.95 ha of cultural meadow (CUM1-1a) and manicured areas. Cultural communities typically persist in areas that are subject to regular disturbance. Consequently, impacts to the cultural communities are considered to be minor. Cultural meadows are widespread and common throughout Ontario.

**TABLE 6.4: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY STATIONS AND BUS STORAGE YARD**

TRANSITWAY STATION	TOTAL AREA TO BE AFFECTED (HA)
<i>Dundas Street Station</i>	
Cultural Communities (CUM1-1a, CUTa/CUW1a, and CUW1c)	4.39
Wetland Communities (SWT2-2)	0.91
Anthropogenically Influenced Lands (Agricultural, Hedgerows and Storm Pond)	3.58
<b>Subtotal Dundas Street Station</b>	<b>8.88 ha</b>
<i>Appleby Line Station</i>	
Cultural Communities (CUM1-1a)	0.68
Anthropogenically Influenced Lands (Agricultural and Hedgerow)	3.51
<b>Subtotal Appleby Line Station</b>	<b>4.19 ha</b>
<i>Bronte Road Station and Bus Storage Yard</i>	
Cultural Communities (CUM1-1e)	13.33
Wetland Communities (MAS2-1a)	0.04
Forest Communities (FOD5-3d)	0.50
Anthropogenically Influenced Lands (Hedgerows)	0.33
<b>Subtotal Bronte Road Station/Bus Storage Yard</b>	<b>14.20 ha</b>
<i>Trafalgar Road Station</i>	
Cultural Communities (CUM1-1a)	0.83

**TABLE 6.4: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY STATIONS AND BUS STORAGE YARD**

TRANSITWAY STATION	TOTAL AREA TO BE AFFECTED (HA)
Forest Communities (FOD2-4a)	0.09
Anthropogenically Influenced Lands (Agricultural and Hedgerows)	4.34
<b>Subtotal Trafalgar Road Station</b>	<b>5.26 ha</b>
<i>Britannia Road Station</i>	
Cultural Communities (CUM1-1a)	1.60
Wetland Communities (MAM2-2j)	0.66
Anthropogenically Influenced Lands (Manicured)	0.05
<b>Subtotal Britannia Road Station</b>	<b>2.31 ha</b>
<i>Derry Road Station</i>	
Cultural Communities (CUM1-1c)	3.18
Wetland Communities (MAM2-2d, MAS2-1g and OAO)	0.12
Anthropogenically Influenced Lands (Manicured and Hedgerows)	0.55
<b>Subtotal Derry Road Station</b>	<b>3.85 ha</b>
<i>Lisgar GO Station</i>	
Cultural Communities (CUM1-1a)	0.14
Anthropogenically Influenced Lands (Agricultural)	0.83
<b>Subtotal Lisgar GO Station</b>	<b>0.97 ha</b>
<i>Mississauga Road Station</i>	
Cultural Communities (CUM1-1a)	2.95
<b>Subtotal Mississauga Road Station</b>	<b>2.95 ha</b>
<b>Total Impacted Area (ha) for the Transitway Stations and Bus Storage Yard</b>	<b>42.61 ha</b>

### Displacement of Rare, Threatened or Endangered Vegetation and Vegetation Communities

A Fresh-Moist Sugar Maple-Black Maple Deciduous Forest (FOD6-4) was identified along the west side of Bronte Creek, north of the 407 ETR. This is a vulnerable community type, which is provincially ranked as S3. This community contained several conservative species. All of the other vegetation communities identified within the study area are considered to be widespread and common in Ontario and secure globally. As noted previously, two butternut trees and numerous seedlings were identified within the study area. The construction of the runningway will directly impact these butternut trees. During detail design a designated butternut health assessor will assess those butternut trees. It may be beneficial to collect branch/leaf/bud samples and have these sent to the MNRF Ontario Forest Research Institute for genetic testing to confirm these are not hybrid. Mitigation and/or permitting may be required to be undertaken later in the design process. No other plant species at risk were identified during the plant surveys undertaken throughout the study area in 2018 and 2019.

Twenty-two plant species identified as rare in Peel and Halton Regions, were observed within several communities associated with the study area. Efforts will be made, where warranted, to locate regionally



rare plants that will be impacted due to the proposed 407 Transitway. Where possible, these plant species will be salvaged through transplanting into nearby vegetation communities with suitable habitat characteristics that will afford ongoing protection.

### **Protective Measures**

#### **Vegetation Community Offsets**

Terrestrial and wetland impacts associated with the construction of the runningway portion of the 407 Transitway will result in the removal of 12.36 ha of forest and 14.12 ha of wetland. Impacts associated with the stations and bus storage yard will result in the removal of 0.59 ha of forest and 1.73 ha of wetland. Total removals of 12.95 ha of forest habitat and 15.85 ha of wetland habitat have been calculated. During subsequent design phases, design refinements to minimize impacts to forest and wetland communities will be undertaken, to the extent possible. The removal of wetland and forest communities will be offset. The restoration/enhancement of any suitable lands that remain south of the transitway or on identified Protected Sites, will be undertaken. Where suitable habitat to restore wetland habitat is less than calculated removals, the restoration of forest habitat in lieu of wetland, will be considered. A total of 12 Protected Sites that are outside of the runningway, stations and bus storage yard footprints have been identified and are presented on **Figures 6.1A-F**. These include an area of almost 106.5 ha; however, existing forest habitat comprises approximately 33 ha where compensation opportunities would be limited. To the extent possible, forest compensation will be prioritized on lands adjacent to existing forest to increase/create interior habitat, to the extent possible. Where lands are identified for forest and wetland offsetting, no fill placement will be undertaken and plantings will be installed into natural, good quality soils. If planting for butternut under the ESA 2007 is required as determined during detail design, consideration will be given to planting pure butternut seedlings within forest restoration sites. However, such plantings must be installed in accordance with mitigation or overall benefit conditions as required under the ESA 2007, to be determined during detail design. Overall, butternut seedlings will be planted in an area for optimal establishment and growth. Where wetland restoration is undertaken bio-engineering may be required on lands that require augmentation to ensure wetland function. If during construction, additional forest or wetland habitat is impacted, suitable sites along the 407 Transitway will be identified and protected for additional offsetting to compensate for additional habitat loss.

There is potential for impacts to Bobolink and Eastern Meadowlark habitat based on the screening undertaken during this preliminary design phase. Protected Sites will also serve as areas to create/restore suitable nesting and foraging habitat to benefit the species. Suitable compensation habitat requirements for Bobolink and Eastern Meadowlark areas under the ESA 2007, includes but is not limited to:

- the creation of grass dominated habitat;
- compensation areas must be larger than the SAR habitat that is damaged or destroyed by an activity;

- compensation areas must be a minimum of 4 ha in size; and,
- no area within the compensation area will measure less than 200 m in width.

Habitat will be restored as far back from roadways/highways as possible, and created/restored habitat will be relatively flat. Seeding will be undertaken with a suitable grass dominated seed mix that adheres to mitigation/overall benefit conditions required under the ESA 2007, as determined during detail design.

Three Protected Sites across the study area meet the criteria outlined above. The first site, east of Walkers Line and north of the 407 ETR covers an area of 54.3 ha including approximately 20 ha of existing forest (see **Figure 6.1A**). Associated agricultural/pasture lands have the potential to meet the above noted criteria, but would require clearing of two hedgerows including a portion of a hedgerow associated with a Tributary of Shoreacres Creek. The second Protected Site east of Walkers Line, also north of the 407 ETR covering an area of 25.7 ha including approximately 13.5 ha of existing forest (see **Figure 6.1A**). Associated agricultural/pasture lands in this Protected Site have the potential to meet the above noted criteria with the removal of a hedgerow. The third Protected Site is located east of Bronte Road and the Bronte Road Station and bus storage yard south of the 407 ETR. It covers an area of 7.7 ha which is comprised of cultural meadow habitat (see **Figure 6.1B**).

If Protected Sites used for Bobolink and Eastern Meadowlark are considered for the purposes of fill during construction, a minimum of six inches and up to 1 m of topsoil shall be disked into the final graded surface, smoothed and seeded. However, fill sites will not negatively impact adjacent, existing habitat, and no fill will be placed within 5m to 10 m of an existing forest or wetland edge. If additional impacted habitat is identified based on species at risk surveys undertaken prior to construction, suitable sites along the 407 Transitway will be similarly identified and protected for additional SAR habitat offsets.

Restoration of suitable forest and/or wetland habitat will be undertaken at a compensation ratio to be determined through further discussion with regulatory agencies (e.g., MNRF, CVC), as part of implementing the project. As part of habitat restoration and/or enhancement, consideration for suitability will include:

- potential conditions for specific habitat function (e.g., suitability for wetland creation/restoration where variable or prolonged flooding conditions are possible for wetland species, etc.);
- habitat for species protected under the ESA 2007, if confirmed that the Transitway will impact existing SAR habitat and a permit is required for overall benefit;
- buffering capacity to protect existing vegetation communities;
- increasing species diversity;
- supporting/increasing habitat connectivity; and,
- improving habitat conditions to facilitate the movement of wildlife.

Impacts to wetland communities within the study area will be very small portions of primarily meadow marsh habitat. These wetlands are typically located along several watercourses that traverse the study area or along low-grade areas through cultural meadows, as well as adjacent to agricultural fields. These

wetland vegetation communities include meadow and shallow marshes, and deciduous swamp that provide valuable ecological functions such as flood mitigation, and habitat for more sensitive wildlife and plant species. It is expected that post-construction, new wetland areas will be created because of changes in drainage related to the construction of the 407 Transitway and its related components and this can, in part, mitigate for removals of similar wetland types. Additionally, edge management, which would include high-density plantings of robust, native wetland plant species, will be undertaken, with priority in areas associated with designated natural areas. Edge management plantings can mitigate impacts related to invasive species establishment/encroachment further into wetlands, and can increase local diversity. Other mitigation measures include the removal of dumped garbage, and the treatment of invasive species such as common reed.

Forest community impacts within the study area are typically related to the creation of new forest edges where complete forest removal has been avoided. Forest edge management is required to enhance forest edges and to increase resilience against invasive species and windthrow. This is especially important along newly created forest edges associated with the Zimmerman Valley Life Science ANSI, the Sixteen Mile Creek Candidate Life Science ANSI, and the Oakville-Milton Wetlands and Uplands Candidate ANSI.

Where restoration is undertaken across the study area as part of compensation, the contractor will be required to provide a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. The inadvertent spread of aggressive or non-native plant species shall be appropriately managed. It is recommended that restoration plantings not be undertaken in fill, but in areas with suitable soil conditions for sustained vegetation growth and health. Where these conditions cannot be met, soil amendments primarily incorporating/mixing suitable soils into the top 1.0 m of fill will be considered.

#### **Riparian Habitat and Valleyland Management**

Riparian habitat will be retained at a minimum of 3 m to 5 m from the bank edge of any watercourse impacted during construction. This measure is expected to ensure bank stability, mitigate erosion, and mitigate negative impacts to aquatic habitat. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Restoration/enhancement of riparian habitat will be undertaken immediately following the completion of work in riparian zones. Suitable deep rooting graminoid, herbaceous and shrub species, with a variety of trees where suitable, will be installed to prevent streambank erosion and improve riparian conditions. Plant species selected will be native and/or non-invasive.

Where valleylands are impacted, the zone of construction impacts will be limited, and staging areas will be well outside of forested valleys. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Restoration of newly impacted edges will be undertaken, and methods for the enhancement of these areas will be carried out as outlined in the forest edge management section presented below. Plant species selected will be native and/or non-invasive.

The contractor will be required to provide a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. The inadvertent spread of aggressive or non-native plant species shall be appropriately managed.

#### **Forest Edge Management**

The removal of forest vegetation along existing forest edges or the removal of a portion of a forested feature that results in the exposure of a new forest edge will have several negative impacts along forest borders and within the forest interior. Some of the direct and indirect impacts as a result of newly exposed edges include:

- exposure of the retained vegetation to the effects of increased light, wind, and sun which results in decreased soil moisture;
- exposure to salt spray;
- reduced establishment of shade tolerant plant species and an overall reduction in plant species richness and abundance;
- increased invasion/spread of aggressive non-native plant species;
- loss of native seedbank;
- decreased presence of interior habitat;
- exposure of “edge” trees to windthrow;
- changes in wildlife diversity and abundances;
- destabilization of landforms composed of unconsolidated material and/or soil compaction; and
- changes to hydrology.

Forest edge management is recommended at forest communities, including deciduous and coniferous forests and deciduous and thicket swamps across the study area. Where new forest edges are exposed, forest management techniques will be implemented to mitigate the associated impacts to forest communities. As part of the forest edge management, mitigation measures will include, but not be limited to the following:

- Planting of appropriate native trees, shrubs and ground flora, which shall be undertaken as soon as possible following vegetation removals. Plantings along the disturbed forest edges will provide a protective buffer. Newly exposed forest edges become exposed to a greater potential for aggressive and invasive species infiltration further into the forest interior causing greater impacts. Micro-habitat conditions are also altered due to a greater incident of light penetrating further into the forest resulting in decreased soil moisture and increased windthrow. Plant species used within the buffer shall be somewhat similar to those in the adjacent habitat and be non-invasive in nature.
- Grading within areas where edges will be newly created shall be designed to meet existing grades a minimum of 3 m away from the tree drip-line.
- Compaction of soils on lands immediately adjacent to the newly exposed forest edge will be

minimized to the extent possible. Construction activities can result in cut roots, and soil compaction due to re-grading and fill placement. Cut tree roots can reduce a tree's capacity to uptake and transfer water and nutrients, and soil compaction can result in a decrease in air spaces within the soil, which can reduce the infiltration capacity of the soil, limits soil oxygen and limits root penetration. Decompaction efforts and methodology shall be site specific. Where decompaction is required, it shall extend to a minimum depth of approximately 25 cm.

- Drainage patterns adjacent to newly created edges shall be maintained to avoid changes in soil moisture, this is especially important around wetland areas and forest communities with substrates that maintain increased moisture capacity.
- Suitable tree protection fencing will be installed and regularly maintained along any newly exposed forest edges.
- The spread/invasion of aggressive plant species must be immediately mitigated. The inclusion of filter fabric along all tree protection fencing, to enhance protection from the spread of invasive, aggressive plant species, will be undertaken.
- The contractor will be required to provide a warranty on planted material to ensure that the newly planted material survives and fulfils the intended function. The inadvertent spread of aggressive or non-native plant species shall be appropriately managed.

Prior to construction, forest edge management will be considered for those communities where forest edge management is recommended.

#### **Invasive Species Management**

Efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species at a minimum will include the following:

- where there are dense patches of common buckthorn, swallow-wort (*Cynanchum rossicum*), common reed or garlic mustard, Canada thistle (*Cirsium arvensis*), Russian or Autumn olive (*Elaeagnus angustifolia* and *E. umbellata*), Japanese knotweed (*Fallopia japonica*) the appropriate removal and control of these species by a qualified specialist will be undertaken. Swallow-wort, Canada thistle, common reed, common buckthorn and Japanese knotweed are particularly invasive. These species establish dense stands in meadow habitat but can also invade into forested sites displacing numerous native species. Any emerging or established populations observed will be effectively treated. Treatment of these species may include two or three applications of herbicide, over time, with the use of foliar-applied herbicides when the plants are actively growing. With common reed, only a herbicide formulation that is approved for aquatic use shall be used. Herbicide treatment will be used in conjunction with cutting or mowing to also mitigate spread by seed. Invasive species management is particularly important where restoration and/or enhancement is undertaken as part of supporting restoration trajectories/objectives;
- minimize the exposure of bare soil, where bare soil must persist over a period of time these will be planted with a non-invasive annual cover crop for an interim period; and

- no non-native and invasive ornamentals plants will be used for landscaping (e.g., Norway maple, purple loosestrife, Japanese knotweed, Japanese honeysuckle, etc.).

#### **Planting Plans**

Preliminary landscape composition recommended planting layout drawings were prepared and provide a landscape planting layout for the runningway and stations to help mitigate impacts to the adjacent natural and cultural environment (see **Appendix L**). The landscape plantings will also serve to provide 'greening' to the corridor, add tree canopy cover and add to the overall general aesthetics of the project in the context of the existing and proposed surrounding urban development and the surrounding natural landscape features. The location of the various planting schemes will depend on the local conditions of the site and surrounding land uses. A more detailed planting plan will be developed prior to construction and once areas identified for restoration have been determined in consultation with the respective regulatory agencies. It is recommended that the planting of forest and wetland habitat be undertaken with the appropriate native and non-invasive plant species that will be presented on site-specific plans to be developed by an experienced landscape architect/ecologist. At a minimum, planting plans will show the following:

- detailed maps of the planting locations along with the respective allocations of tree, shrub, herbaceous and grass species to be planted inclusive of species and ratio of plantings or abundances, and stock size; and
- a description of the best management practices that are to be followed in the planting and tending of these sites for a minimum of five to 10 years following the initial planting stage. In particular, management will need to be undertaken for those invasive / aggressive plant species.

#### **DESIGNATED NATURAL AREAS**

The 407 Transitway spanning from west of Brant Street to west of Hurontario Street is planned to travel adjacent to/or near to several designated natural areas and Plan Policy Areas. These include three Provincially Significant Wetlands (PSW) and one Unevaluated Wetland; the North Oakville-Milton West PSW and the Drumquin unevaluated wetland are all over 120 m from the study area. There are several wetlands associated with the North Oakville-Milton East PSW that are within 120 m of the study area. Wetlands that are complexed with this PSW where direct impacts to small portions of those wetlands are expected are located within Segments 3, 4 and 5. Within Segment 5 immediately south of the alignment and east of Sixteen Mile Creek, direct impacts to a wetland within the Sugar Maple-Beech Deciduous Forest (FOD5-2) are very minor (0.004 ha). However, impacts due to forest removals may cause indirect impacts. Just west of Trafalgar Road still in Segment S5, several small wetland pockets are located within a forest to the south of the Oak-Hardwood Deciduous Forest (FOD2-4a). These wetlands will not be impacted directly, but forest removal may cause indirect wetland impacts.

Four Areas of Natural and Scientific Interest (ANSI) were identified, including the provincially significant Zimmerman Valley Life Science and Trafalgar Moraine Earth Science ANSIs, and the candidate Sixteen Mile Creek and Oakville-Milton Wetlands and Uplands Life Science ANSIs.

**Table 6.5** presents a summary of impacts to Designated Natural Areas and Plan Policy Areas.

**TABLE 6.5: IMPACTS TO DESIGNATED NATURAL AREAS AND PLAN POLICY AREAS**

DESIGNATED NATURAL AREA / PLAN POLICY AREA	SEGMENT #	TOTAL AREA TO BE IMPACTED (HA)
<b>Designated Natural Areas</b>		
Zimmerman Valley Life Science ANSI	2 and 3	1.3
Trafalgar Moraine Earth Science ANSI	3	1.15
Sixteen Mile Creek Candidate Life Science ANSI	4	0.73
Oakville-Milton Wetlands and Uplands Candidate Life Science ANSI	5	0.11
North Oakville-Milton West Wetland Complex, Evaluated - Provincial	3, 4, and 5	0.053
<i>Designated Natural Areas Total</i>		<b>3.34</b>
<b>Plan Policy Areas</b>		
<b>Greenbelt Plan</b>		
Protected Countryside	1, 2 and 3	39.18
Urban River Valley	3, 4, 5 and 5	2.57
<i>Sub-total</i>		<b>41.75</b>
<b>Niagara Escarpment Plan</b>		
Escarpment Natural Area	1	0.24
Escarpment Protection Area	1 and 2	0.74
<i>Sub-total</i>		<b>0.98</b>
<i>Plan Policy Areas Total</i>		<b>46.07</b>

Impacts to vegetation communities within the Zimmerman Valley Life Science ANSI, along Bronte Creek, are associated with runningway impacts in Segments 2 and 3. Impacted vegetation communities include a mineral open bluff, cultural meadow, cultural thicket, cultural woodland, deciduous forest and shallow wetland communities. Forested communities include a Fresh-Moist Sugar Maple-Black Maple Deciduous Forest (FOD6-4) associated with the Bronte Creek floodplain. This is a vulnerable community type provincially ranked as S3. Several regionally rare species and Butternut trees/seedlings were identified within this ANSI. Butternut trees are listed as Endangered under the Endangered Species Act, 2007. Mitigation will include tree fencing with filter cloth to minimize edge impacts along the construction limit.

Within the Trafalgar Moraine Earth Science ANSI within Segment S3, impacts will occur to a small portion of cultural meadow (CUM1-1c) and hedgerow (H), just east of Tremaine Road. These impacts are associated with the construction of the runningway.

Within the Sixteen Mile Creek Candidate Life Science ANSI within Segments 4 and 5, impacts will occur to a small portion of cultural meadow. As well, 0.62 ha of Sugar Maple- Oak Deciduous Forest (FOD5-3e) will be impacted within this ANSI where several regionally rare species were identified.

Just west of Trafalgar Road within Segment S5, the northern portion (2.6 ha) of an Oak-Hardwood Deciduous Forest (FOD2-4a) will be impacted by the runningway. This portion of forest is located outside of the Oakville-Milton Wetlands and Uplands Life Science Candidate ANSI, but is contiguous with forest

to the south, which is within the ANSI where 0.11 ha of forest habitat will also be impacted. The removal of forest both outside and within the ANSI may cause indirect impacts to remaining forest habitat. These impacts will be mitigated to the extent possible. Mitigation will include tree fencing with filter cloth to minimize edge impacts to the extent possible, and edge management plantings.

Further to the west, west of Neyagawa Boulevard, the runningway is approximately 15 m to 30 m north of another forest community associated with the Oakville-Milton Wetlands and Uplands Life Science Candidate ANSI. No direct, inadvertent impacts shall occur to the forest, and indirect impacts will be minimized to the extent possible. Mitigation will include tree fencing with filter cloth to minimize edge impacts along the construction limit.

Within Segments 3, 4 and 5, minor impacts are expected to wetland habitat within the North Oakville-Milton West Wetland Complex PSW. This includes impacts to 0.11 ha to meadow marsh and shallow marsh (MAM2-2e and MAS2-1d) habitat. As previously noted, the meadow marsh is likely additionally supported by runoff from the highway and it is expected that the wetland remnant would persist with wetland species colonizing suitable spaces between the 407 ETR and the runningway where runoff from infrastructure is expected to provide adequate conditions to support its continued existence. Impacts to the shallow marsh where the proposed infrastructure is immediately adjacent, may cause negative impacts. During detail design, design consideration will be given to mitigate negative impacts to this wetland, to the extent possible.

#### Impacts to Plan Policy Areas

Within the Greenbelt Plan Area, 39.18 ha of cultural, forest and wetland habitat will be impacted within Segments 1, 2 and 3. These impacts are within the Protected Countryside designation which includes the Greenbelt Natural Heritage System. This includes impacts along Bronte Creek. A total of 2.57 ha of similar habitat within Segments 3, 4, and 5 will be impacted within the Urban River Valley Area. Watercourses across the study area located within this plan area include Fourteen Mile Creek and Sixteen Mile Creek.

Within the Niagara Escarpment Area, a total of 0.98 ha of cultural and wetland habitat will be impacted within Segments 1 and 2, associated with the Escarpment Natural Area and the Escarpment Protection Area (between Dundas Street and Walkers Line). Impacts are primarily to agricultural lands and cultural meadow habitat. Several meadow marsh and shallow marsh communities will also be impacted, these communities are typically supported by intermittent watercourses that bisect the 407 ETR, as well as by runoff from infrastructure.

Overall, the environmental protection/mitigation measures outlined will help maintain/enhance habitat within the Protected Countryside and the Urban River Valleys designations to ensure that the policies of the Greenbelt Plan will be adhered to at these features. Such measures will also help to support connections between the Natural Heritage System and the local, regional and broader natural heritage systems of southern Ontario.

#### WILDLIFE AND WILDLIFE HABITAT

Implementation of the 407 Transitway has the potential to result in impacts to wildlife and wildlife habitat which could include:

- Displacement of wildlife and wildlife habitat;
- Barrier effects on wildlife passage;
- Wildlife/vehicle conflicts;
- Wildlife passage considerations;
- Disturbance to wildlife from noise, light and visual intrusion;
- Potential impacts to migratory birds; and,
- Displacement of rare, threatened, or endangered wildlife or significant wildlife habitat.

#### **Segment S1: West of Brant Street to East of Dundas Street**

Much of the habitat found within this segment consists of cultural meadow/thicket/woodland, deciduous forest, hedgerow, manicured lawns or active agricultural lands. Additionally, there are several small seasonal watercourses also present, including Tuck Creek, Rambo Creek and tributary, and tributary of Shoreacres Creek. The watercourse valleylands may provide amphibian breeding habitat and habitat for aquatic or semi-aquatic wildlife. This segment contains the Nelson Slope Forest, which is a regionally significant life science area of natural and scientific interest (ANSI). With the exception of the ANSI and aquatic features, no significant effects on wildlife or wildlife habitat are expected. Limited negative effects are anticipated as most habitats identified within the study area consist of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential, due to extensive disturbance from existing highway infrastructure, residential/commercial/industrial development and agricultural practices. Efforts will be made to minimize impacts to habitats and maintain opportunity for wildlife movement through the Nelson Slope Forest ANSI.

#### **Segment S2: East of Dundas Street to East of Appleby Line**

The runningway in this segment will largely affect cultural meadow, deciduous forest, manicured land, agricultural habitat types and small seasonal watercourses. These habitats were found to contain a wildlife assemblage which is considered tolerant to human disturbance/anthropogenic influences. Along with these vegetation communities, this segment contains tributaries of Appleby and Sheldon Creeks. Deciduous forest habitats in this segment may also function as important wildlife habitat because of the large, connective nature of the natural heritage features. Limited negative effects are anticipated as habitats identified within this segment consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Implementation of mitigation measures such as forest edge management and vegetation community offsets are recommended. Furthermore, opportunity for wildlife movement through these natural heritage features will be maintained.

#### **Segment S3: East of Appleby Line to East of Tremaine Road**

This segment is comprised of cultural meadow, deciduous forests, meadow/shallow marsh, agricultural and manicured lands. Along with these vegetation communities, this segment contains areas of natural

and scientific interest (ANSI) and candidate ANSI: Trafalgar Moraine ANSI, Earth Science (Provincial) and Oakville-Milton Wetlands and Uplands Candidate ANSI, Life Science (Provincial). The Oakville-Milton Wetlands and Uplands Life Science Candidate ANSI supports a diversity of 115 vegetation communities, including rare wetland communities such as buttonbush thicket, bur oak and swamp white oak swamp; a high concentration of 59 significant plant species and 46 significant faunal species are also supported (Natural Heritage Information Centre 2011). Trafalgar Moraine ANSI, Earth Science (Provincial), is an environmentally sensitive area which can be highly impacted by any activity that alters its natural contours through grading and/or covering of the landforms (Ministry of Natural Resources 2006c). Additionally, tributaries of the high quality natural heritage feature, Fourteen Mile Creek, are present throughout the segment. Fourteen Mile Creek valleylands and natural features associated with Trafalgar Moraine, and Oakville-Milton Wetlands and Uplands provide higher quality natural heritage features and opportunity for wildlife movement across the local landscape. Limited negative effects are anticipated as habitats identified within the study area consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Efforts will be made to minimize impacts to habitats and maintain opportunity for wildlife movement through the Tributary of Fourteen Mile Creek, Trafalgar Moraine and Oakville-Milton Wetlands and Uplands.

#### **Segment S4: East of Tremaine Road to West of Sixteen Mile Creek**

The segment of runningway between these two stations consists mainly of cultural vegetation communities bordering agricultural and manicured lands. Deciduous forest, and cultural meadow/thicket communities are associated with Fourteen Mile Creek and Sixteen Mile Creek. Sixteen Mile Creek Candidate ANSI, (Life Science Provincial) is also present, which supports a high concentration of plant species and several vegetation communities that are provincially and regionally rare (Natural Heritage Information Centre 2011). Limited negative effects are anticipated as habitats identified within the study area consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Efforts will be made to minimize impacts to habitats in the Fourteen Mile Creek, Sixteen Mile Creek and Sixteen Mile Creek Candidate ANSI, as well as to maintain opportunity for wildlife movement through these features.

#### **Segment S5: West of Sixteen Mile Creek to East of Trafalgar Road**

The majority of the habitat in this segment consists largely of agricultural lands and cultural meadow communities, as well as deciduous forests, manicured lands, hedgerow, and storm ponds. However, this segment also consists of several watercourse crossings of East Sixteen Mile Creek and Joshua's Creek, which also feed into the North Oakville-Milton East provincially significant wetland (PSW) and Oakville-Milton Wetlands and Uplands Candidate ANSI (Life Science Provincial). Several other small PSW's are also present throughout the segment within agricultural and deciduous forest communities. Sixteen Mile Creek and Oakville-Milton Wetlands and Uplands (Candidate Areas of Natural and Scientific Interest) are present throughout the segment area as well. Sixteen Mile Creek is an environmentally significant area (ESA) which supports a high diversity of plant species. The North Oakville-Milton East PSW supports 45 significant species, including 41 locally rare plant species, four regionally rare plant species and the

locally rare Northern Ribbon Snake. No significant effects on wildlife and wildlife habitat are expected to occur given the level of disturbance present within natural heritage features. With regard to the East Sixteen Mile Creek, Oakville-Milton Wetlands and Uplands, and North Oakville-Milton East PSW, several habitat types will be impacted, but these removals will be along edges previously disturbed by the creation of the 407 ETR corridor. As such, limited negative effects are anticipated; however, efforts will be made to minimize impacts to habitats in these natural heritage features, and to maintain opportunity for wildlife movement through these natural heritage features.

#### **Segment S6: East of Trafalgar Road to North of Lower Base Line**

Wildlife habitat in this segment consists almost entirely of cultural meadows/woodlands, agricultural lands, hedgerow and manicured grass. Additionally, there are some deciduous forest lands, mineral deciduous swamps, reed-canary grass and mineral meadow marshes. This segment contains a very high level of disturbance and few natural heritage features which provide habitat for wildlife, with the exception of watercourses from tributaries of Joshua's Creek. Across Segment S6, impacts to wildlife are minimized because much of the runningway will be constructed underground (tunnel). Where below ground works will be conducted, there is potential for localized impacts to wildlife that may result from noise and/or vibration. However, if such impacts are observed at the surface these are expected to be minimal and temporary in nature. When such works are interrupted day to day and upon the completion of construction, wildlife are expected to return. Where impacts will occur above ground, no significant effects on wildlife and wildlife habitat are expected given the level of disturbance present within natural heritage features. However, efforts will be made to minimize impacts to habitats in Joshua's Creek watercourses, and to maintain opportunity for wildlife movement through this natural heritage feature.

#### **Segment S7: North of Lower Base Line to North of Britannia Road**

Most of the land within this segment is comprised of deciduous forests, cultural meadow/thicket/savannah, agricultural/manicured lands, hedgerow and storm ponds. Tributaries of East Sixteen Mile Creek are also present throughout the segment area, which feed into open aquatic vegetation communities. The East Sixteen Mile Creek is expected to function as a locally significant wildlife movement corridor because of the linear natural areas associated with the feature in an otherwise highly disturbed landscape. These features do experience disturbance and fragmentation resulting from extensive agricultural lands and nearby roads. Efforts will be made to avoid and/or minimize impacts to East Sixteen Mile Creek tributaries and maintain their function as wildlife corridors.

#### **Segment S8: North of Britannia Road to North of Derry Road**

The majority of the habitat in this segment consists of agricultural/manicured lands, hedgerow, cultural meadows/thicket/woodlands and deciduous forests. The segment is also comprised of several aquatic features, including shallow marsh, thicket swamp, stormwater management ponds, as well as the more sensitive tributaries of East Sixteen Mile Creek. As mentioned in Segment S7, the East Sixteen Mile Creek acts as a high quality natural heritage feature within this segment and can provide important north-south

movement opportunity/linkages for wildlife within, or in the immediate vicinity of the study area. The swamp features may function as amphibian breeding habitat and habitat for aquatic or semi-aquatic wildlife. However, these habitats were found to contain a wildlife assemblage which is considered tolerant to human disturbance/anthropogenic influences. Limited negative effects are anticipated as habitats identified within the study area consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Efforts will be made to minimize impacts to habitats within East Sixteen Mile Creek valleyland and swamp features, as well as maintain opportunity for wildlife movement.

#### **Segment S9: North of Derry Road to West of Heritage Road**

This segment contains wildlife habitat primarily within vegetation communities such as cultural meadow, hedgerow, agricultural and manicured fields. One of the agricultural fields is listed as a protected site. Aquatic features are also present, such as shallow marsh, meadow marsh, reed-canary grass mineral meadow marsh, and cattail mineral shallow marsh, which are associated tributaries of East Sixteen Mile Creek. As mentioned in Segment S7, the East Sixteen Mile Creek is a high-quality natural heritage feature within this segment and can provide important north-south movement opportunity/linkages for wildlife within, or in the immediate vicinity of the study area. The wetland and swamp features may also function as amphibian breeding habitat and habitat for aquatic or semi-aquatic wildlife. Most of Segment S9 will be constructed underground (tunnel) so impacts to wildlife and wildlife habitat will be minimal. Where below ground works will be conducted, there is potential for localized impacts to wildlife that may result from noise and/or vibration. However, if such impacts are observed at the surface these are expected to be minimal and temporary in nature. When such works are interrupted day to day and upon the completion of construction, wildlife are expected to return. Above ground impacts are associated with habitats that consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential, limited negative effects are anticipated; however, efforts will be made to minimize impacts to habitats in these natural heritage features, and to maintain opportunity for wildlife movement through this natural heritage feature.

#### **Segment S10: West of Heritage Road to East of Credit River**

A change to this segment has been made since the initial analysis of Alignment Option 1 and Alignment Option 2. This was due to new information received regarding existing archaeological potential south of the 407 ETR around Credit River area. The change consists of the crossing of the Credit River on the north side of 407 ETR. The impacts to the new alignment is presented here.

Much of the habitat within this segment consists of cultural meadow/woodland/thicket communities, agricultural or manicured land and some storm ponds. Reed-canary grass mineral meadow marsh, cattail mineral shallow marsh and willow mineral deciduous swamp is also present, as the segment contains watercourses from Mullet Creek, Levi's Creek and the Credit River. The watercourses and marsh meadow communities may contain higher quality wildlife habitat, as it may function as amphibian breeding habitat and habitat for aquatic or semi-aquatic wildlife. With the exception of the aquatic features, no significant effects on wildlife or wildlife habitat are expected. Limited negative effects are anticipated as most

habitats identified within the study area consist of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential.

### **Segment S11: East of Credit River to West of Hurontario Street**

The majority of the habitat in this segment consists largely of cultural meadow communities, as well as cultural woodland/thicket, manicured lands and agricultural fields. This segment also contains watercourse crossings including the Credit River with associated willow mineral deciduous swamp north of the 407 ETR, and Fletcher's Creek with associated reed-canary grass mineral meadow marsh and cattail mineral shallow marsh, south of the 407 ETR. Most of the runningway in Segment S11 will be constructed underground (tunnel). Where such works will be conducted, there is potential for localized impacts to wildlife that may result from noise and/or vibration. However, if such impacts are observed at the surface these are expected to be minimal and temporary in nature. When such works are interrupted day to day and upon the completion of construction, wildlife are expected to return. Where impacts will occur above ground, no significant effects on wildlife and wildlife habitat are expected to occur given the level of disturbance present within natural heritage features within Segment S11. However, efforts will be made to minimize impacts to habitats in the aquatic natural heritage features, and to maintain opportunity for wildlife movement through these watercourses.

### **Dundas Street Station**

Construction of the Dundas Street Station will result in the removal of portions of cultural meadow communities. This station will also impact watercourses from Tuck Creek and a tributary of Shoreacres Creek. The impacts to these communities are considered to be minor based on the wildlife and wildlife habitat assemblage identified at the station location and the availability of similar habitat types in the immediate vicinity.

### **Appleby Line Station**

Construction of the Appleby Line Station will result in the disturbance of agricultural lands, hedgerow, stormwater management ponds and cultural meadow communities. A tributary of Sheldon Creek also intersects Appleby Line Station construction zone. The impacts to these communities are considered to be minor based on the wildlife and wildlife habitat assemblage identified at the station location and the availability of similar habitat types in the immediate vicinity.

### **Bronte Road Station and Bus Storage Yard**

Impacts associated with the construction of the Bronte Road Station will occur to cultural meadow communities, agricultural lands and hedgerow. Cultural meadow communities containing PSWs (North Oakville-Milton West Wetland Complex) and watercourses from Fourteen Mile Creek and tributaries may be impacted with construction as well. This station location contains a high level of disturbance and some natural heritage features which provide habitat for wildlife. As a result, no significant effects on wildlife and wildlife habitat are expected to occur given the level of disturbance present within natural

heritage features; however, efforts will be made to avoid impact to these natural features during construction.

The construction of the bus storage yard will result in disturbance to cultural meadow communities and hedgerow. This location contains a high level of disturbance and natural heritage features which provide habitat for wildlife.

### **Trafalgar Road Station**

The construction of the Trafalgar Road Station will result in the disturbance of cultural meadow, deciduous forest, agricultural, hedgerow and manicured communities. This station is situated immediately east of the Oakville-Milton Wetlands and Uplands Candidate ANSI, which provides important habitat for wildlife. Wildlife habitat within deciduous forest communities situated in this natural feature, containing provincially significant wetlands, can possibly be impacted during construction. However, the Trafalgar Road Station is largely fragmented from the Oakville-Milton Wetlands and Uplands feature. This station location contains a high level of disturbance and few natural heritage features which provide habitat for wildlife. As a result, no significant effects on wildlife and wildlife habitat are expected to occur given the level of disturbance present within natural heritage features.

### **Derry Road Station**

Impacts associated with the construction of the Derry Road Station will occur to cultural meadow and deciduous forest communities. Aquatic features associated with East Sixteen Mile Creek, such as shallow marsh vegetation communities, will be impacted as well. This station location contains a high level of disturbance and few natural heritage features which provide habitat for wildlife. As a result, no significant effects on wildlife and wildlife habitat are expected to occur given the level of disturbance present within natural heritage features; however, efforts will be made to avoid impact to these natural features during construction.

### **Lisgar GO Station**

Impacts associated with the construction of the Lisgar GO Station will occur to cultural meadow and manicured communities. However, the site largely consists of an existing parking lot. This station location contains a high level of disturbance and few natural heritage features which provide habitat for wildlife. As a result, no significant effects on wildlife and wildlife habitat are expected to occur given the level of disturbance present within natural heritage features; however, efforts will be made to avoid impact to these natural features during construction.

### **Mississauga Road Station**

Impacts associated with the construction of the Mississauga Road Station will occur to cultural meadow communities, manicured land, and stormwater management ponds. This station location contains a high level of disturbance and few natural heritage features which provide habitat for wildlife, with the exception of the watercourse crossing from Levi's Creek. As a result, no significant effects on wildlife and

wildlife habitat are expected to occur given the level of disturbance present within natural heritage features.

#### **Displacement of Rare, Threatened or Endangered Wildlife or Significant Wildlife Habitat**

A total of 28 wildlife species at risk have been recorded within the vicinity of the study area or have been identified as having the potential to be found within the study area based on secondary source data. Five species at risk were confirmed in the study area by LGL during 2018 and 2019 field investigations: Western Chorus Frog; Eastern Wood Pewee; Barn Swallow; Bobolink; and, Eastern Meadowlark. The following sections provide a brief review of each species' status under the Ontario *Endangered Species Act* (ESA) and the federal *Species at Risk Act* (SARA), the results of field surveys undertaken, and the potential impacts to the species at risk and their populations as a result of the 407 Transitway project.

#### **Western Chorus Frog**

Western Chorus Frog (Great Lakes/St. Lawrence Population) is regulated as 'Threatened' under the SARA, but the species has no designation and is not regulated under the ESA. Western Chorus Frogs were identified at several anuran breeding stations during field investigations. No permitting is anticipated as this species is not regulated under the ESA.

#### **Jefferson Salamander**

Jefferson Salamander is regulated as 'Endangered' under the ESA and the SARA. The Jefferson X Blue-spotted Salamander, Jefferson genome dominates hybrid is also afforded protection under the ESA. The Jefferson Salamander (including hybrid populations) is generally associated with deciduous forest habitats. This species lives under leaf-litter and logs and is generally encountered when they move to vernal pools to breed in the early spring. Suitable habitat for Jefferson Salamander may include deciduous forest habitats that were identified at several sites across the study area. However, no habitat for this species was found during field investigations conducted in 2018 and 2019. No habitat is anticipated for removal from the construction of the transitway. No permitting is anticipated for this species.

#### **Milksnake**

Milksnake was formerly listed as 'Special Concern' under the ESA and SARA; however, this species has recently been removed from the Species at Risk in Ontario (SARO) list and is not a regulated species (Endangered or Threatened) under the ESA. Milksnake is found in a wide variety of habitats. This species is known to inhabit areas heavily disturbed by humans (e.g., farmland, urban parks and residential areas). Habitats that could be suitable to support Milksnake were found across much of the study area. Field investigations conducted in 2018 and 2019 did not identify this species. No permitting is anticipated as this species is not regulated under the ESA.

#### **Timber Rattlesnake**

Timber Rattlesnake is listed as 'Extirpated' under both the ESA and SARA. This species has been considered extirpated from Ontario for more than 50 years. Field investigations conducted in 2018 and 2019 did not identify this species. No permitting is anticipated for this species.

#### **Common Five-lined Skink (Southern Shield population)**

Common Five-lined Skink (Southern Shield population) is regulated as 'Special Concern' under the ESA and SARA (Great Lakes/St. Lawrence population). The Carolinian population of this species is largely ('Endangered' under SARA and SARO) is largely restricted to dunes, open woods or savannas with sandy substrates. No habitat considered suitable to support this species is found within the study area. Field investigations conducted in 2018 and 2019 did not identify this species. No permitting is anticipated for this species.

#### **Snapping Turtle**

Snapping Turtle is listed as 'Special Concern' under the ESA and SARA; however, this species is not regulated ('Endangered' or 'Threatened') under the ESA. As previously noted, despite this species not being documented within the study area, field investigations have concluded that Snapping Turtle have the potential to be present in a variety of aquatic habitats identified. No permitting is anticipated as this species is not regulated under the ESA.

#### **Common Nighthawk**

Common Nighthawk is listed as 'Special Concern' under the ESA and 'Threatened' under the SARA; however, this species is not a regulated species ('Endangered' or 'Threatened') under the ESA. As previously noted, field investigations have concluded that Common Nighthawk has the potential to be present within a wide range of open, vegetation-free rural and urban habitats such as forest clearings, grasslands, open forests, and rocky outcrops; they may also nest on flat gravel rooftops. However, no Common Nighthawk were identified during LGL's 2018 and 2019 breeding bird surveys. No permitting is anticipated as this species is not regulated under the ESA.

#### **Chimney Swift**

Chimney Swift is regulated as 'Threatened' under the ESA and SARA. Habitats which have the potential to support Chimney Swift were found where deciduous habitat communities were identified within the project lands. However, breeding bird surveys conducted in 2018 and 2019 did not identify this species. Therefore, no permitting is anticipated for this species.

#### **Eastern Wood Pewee**

Eastern Wood Pewee is listed as 'Special Concern' under the ESA; however, this species is not a regulated species ('Endangered' or 'Threatened') under the ESA. The Eastern Wood Pewee is listed as 'Special Concern' under SARA. This species was identified at several breeding bird stations (9-2019, 5-2019, 8-2019, 10-2019, 17-2019, 19-2019, 21-2019, 36-2019) during surveys conducted in 2019



(see (Figures 6.1A-F). Generally, observations of this species were associated with woodland edges. No permitting is anticipated as this species is not regulated under the ESA.

#### **Bank Swallow**

Bank Swallow is listed and is regulated as ‘Threatened’ under the ESA. There is potential for suitable Bank Swallow nesting habitat at open bluffs in the Bronte Creek and Sixteen Mile Creek valleys. In addition, no Bank Swallow were identified during LGL’s 2018 and 2019 breeding bird surveys. Therefore, no permitting is anticipated for this species.

#### **Barn Swallow**

Breeding Bird Atlas data for areas within the vicinity of the study area also contained records (dated from 2001-2005) for Barn Swallow. MNRF confirmed that Barn Swallow has the potential to be found in the vicinity of study area. Barn Swallow is regulated as ‘Threatened’ under the ESA and SARA.. This species was identified at several breeding bird stations during surveys conducted in 2018 and 2019. However, most observations of this species were limited to foraging individuals, often over stormwater ponds, agricultural fields or meadows. Confirmed breeding colonies were identified at several locations across the lands surveyed. However, each breeding colony identified was located outside of the transitway alignment and station locations. Breeding colonies identified were typically associated with barns or other outbuildings within agricultural settings. This species was documented during field investigations at stations 5-2018, 6-2018, 7-2018, 10-2018, 11-2018, 13-2018, 16-2018, 17-2018, 18-2018, 19-2018, 1-2019, 2-2019, 8-2019, 14-2019, 15-2019, 23-2019, 25-2019, 30-2019, 30-2019, 31-2019, 33-2019, 34-2019, 35-2019, 40-2019 (Figures 6.1A-F). As such, no permitting is anticipated for this species.

#### **Canada Warbler**

Canada Warbler is listed as ‘Special Concern’ under the ESA; however, this species is not a regulated species (‘Endangered’ or ‘Threatened’) under the ESA. The Canada Warbler is listed as ‘Threatened’ by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and SARA. The Canada Warbler breeds in a variety of deciduous and coniferous wooded habitats, particularly those that contain a dense understory of shrubs or other vegetation. Habitat considered suitable to support Canada Warbler was identified (through air-photo analysis) where wooded areas exist; however, ground-truthing is required to confirm the suitability of potential habitat areas. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated as this species is not regulated under the ESA.

#### **Golden-winged Warbler**

Golden-winged Warbler is regulated as ‘Threatened’ under the SARA. The Golden-winged Warbler is listed in Ontario as ‘Special Concern’ under the *Endangered Species Act, 2007*. The Golden-winged Warbler nests in areas with young shrub growth surrounded by mature forest communities, locations that have experienced disturbance, such as field edges, hydro or utility corridors. Habitat that may be considered

suitable to support Golden-winged Warbler was identified (through air-photo analysis) where open-county habitat borders forest communities; however, ground-truthing is required to confirm the suitability of potential habitat areas. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated for this species.

#### **Grasshopper Sparrow**

Grasshopper Sparrow is listed as ‘Special Concern’ under the ESA; however, this species is not a regulated species (‘Endangered’ or ‘Threatened’) under the ESA. The Grasshopper Sparrow is listed as ‘Special Concern’ by COSEWIC and SARA. The Grasshopper Sparrow nests in open grassland, hayfields and pastureland. Habitat that may be considered suitable to support Grasshopper Sparrow was identified (through air-photo analysis) where open-county habitat exists; however, ground-truthing is required to confirm the suitability of potential habitat areas. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated as this species is not regulated under the ESA.

#### **Peregrine Falcon**

Peregrine Falcon is listed as ‘Special Concern’ under the ESA and SARA; however, this species is not a regulated species under either act. Historically, the Peregrine Falcon nested almost exclusively on rocky ledges near waterbodies; however, this species now nests on tall building ledges in large cities. Habitat that may be considered suitable to support Peregrine Falcon was identified (through air-photo analysis) where tall building ledges are found; however, ground-truthing is required to confirm the suitability of potential habitat areas. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated as this species is not regulated under the ESA.

#### **Red-headed Woodpecker**

Red-headed Woodpecker is listed as ‘Special Concern’ under the Species at Risk in Ontario List; however, this species is not a regulated species (‘Endangered’ or ‘Threatened’) under the ESA. This species is regulated as Threatened under the SARA. The Red-headed Woodpecker lives in open woodland and woodland edges, and is often found in parks, golf courses and cemeteries. These areas typically have many dead trees, which the bird uses for nesting and perching. Habitats which could be suitable to support the Red-headed Woodpecker were generally absent from the study area; however, ground-truthing is required to confirm the suitability of potential habitat areas. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated as this species is not regulated under the ESA.

#### **Least Bittern**

Least Bittern is regulated as ‘Threatened’ under the ESA and SARA. Least Bittern are typically found in wetland communities, particularly large contiguous tracts of coastal wetland habitat. No habitat considered suitable to support this species was identified within the study area. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated for this species.

### Louisiana Waterthrush

Louisiana Waterthrush is regulated as ‘Threatened’ under the ESA and SARA. This species is typically associated with steep, forested ravines with fast-flowing streams. Habitat suitable to support this species may be found where watercourse valleylands are found within the study area. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated for this species.

### Eastern Whip-poor-will

Eastern Whip-poor-will is regulated as ‘Threatened’ under the ESA and SARA. This species is typically associated with a mix of open and forested areas, such as savannahs, open woodlands or openings in deciduous, coniferous and mixed forests. Habitat suitable to support this species may be found where forested communities are present within the study area. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated for this species.

### Henslow’s Sparrow

Henslow’s Sparrow is regulated as ‘Endangered’ under the ESA and the SARA. MNR data included record(s) for this species within the vicinity (5 km) of the study area. Henslow’s Sparrow is typically found in large and undisturbed grassland communities. No habitat considered suitable to support this species was identified within the study area. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated for this species.

### Wood Thrush

Wood Thrush is listed as ‘Special Concern’ under the ESA; however, this species is not a regulated species (‘Endangered’ or ‘Threatened’) under the ESA. The Wood Thrush is listed as ‘Threatened’ by the COSEWIC and SARA. The Wood Thrush is found in mature deciduous and mixed forests with large trees, shade and leaf litter for foraging. Habitats which have the potential to support Wood Thrush were found where mature deciduous and mixed forest habitat communities were identified within the project lands. Breeding bird surveys conducted in 2018 and 2019 did not identify this species. No permitting is anticipated as this species is not regulated under the ESA.

### Bobolink

Bobolink, a species with a broad distribution across southern Ontario, is regulated ‘Threatened’ under the ESA and is listed as ‘Threatened’ under SARA. Bobolinks are typically described as residents of grassland communities with an abundance of grass species that are typical of old fields (Cadman *et al.* 2007). Bobolinks are also commonly associated with agricultural lands. Open-country, meadow and agricultural habitat types found across the study area have the potential to provide habitat suitable to support this species. This species was documented during field investigations at stations 5-2018 and 34-2019 (Figures 6.1A-F). Additional field investigations are required prior to construction to confirm

species presence/impacts. If Bobolink are confirmed during fieldwork, permitting under the ESA may be required.

### Eastern Meadowlark

Eastern Meadowlark, a species with a broad distribution across southern Ontario, is regulated ‘Threatened’ under the ESA and SARA. The Eastern Meadowlark, formerly a prairie species, has adapted to agricultural practices of the European settlers (hayfields, pastures, etc.) (Cadman *et al.* 2007). As farming practices have become more efficient, Eastern Meadowlark numbers have declined. Open-country, meadow and agricultural habitat types found across the study area have the potential to provide habitat suitable to support this species. This species was documented during field investigations at stations 5-2018, 7-2019, and 33-2019 (Figures 6.1a-f). Additional field investigations are required prior to construction to confirm species presence/impacts. If Eastern Meadowlark are confirmed during fieldwork, permitting under the ESA may be required.

### Bats

There are currently four bat species regulated as ‘Endangered’ under the ESA, including Eastern Small-footed Myotis; Little Brown Myotis; Northern Myotis; and, Tri-coloured Bat. The ESA affords protection for both individuals of these species (subsection 9(1)) and their habitat (subsection 10(1)). Given that species-specific habitat regulations have not yet been developed for SAR bats, habitat is protected according to the general definition provided in the ESA. Specifically, according to section 2(1), the Act protects “an area, on which the species depends, directly or indirectly, to carry on its life processes, including processes such as reproduction, rearing, hibernation, migration or feeding”.

Five potential underground tunnels were identified from review of the aerial imagery available for the proposed runningway and stations. A site investigation was completed of the external conditions of these tunnels on August 8, 2019 to determine if they are suitable as potential bat hibernacula. A search for all underground features meeting these criteria will be completed as part of the permitting phase of the project in advance of construction. Surveys of these features through internal or external survey methods may be required prior to disturbance.

Maternity roosting habitat has been grouped into three types: treed habitat, buildings, and rock piles. Within the study area, many treed habitats occur, and all of these are considered potentially suitable as bat roosting habitat. Buildings areas also used for roosting, most frequently by Little Brown Myotis. Bats could use any building, regardless of building age, structure type or whether it is currently occupied by people. Therefore, all buildings are considered potentially suitable habitat. Eastern Small-footed Myotis is a saxicolous (rock-loving) species and will frequently roost in rock piles, talus, or crack and crevices in rock outcrops. In all cases, habitat occupancy must be either demonstrated or conservatively assumed for protection to be applied. A more detailed evaluation of bat habitat and the occupancy of their habitat will be completed as part of the permitting phase of the project in advance of construction.

### Barrier Effects on Wildlife Passage

No new barriers to wildlife passage are expected to occur as a result of the construction of the 407 Transitway. All major corridors associated with valleylands will be maintained and new crossings will mimic the existing crossings to facilitate wildlife passage.

The bridge structures at several watercourse/valley crossings within the study area provide the only significant wildlife passage corridors as the entire 407 ETR corridor is fenced and/or the smaller culvert associated with small watercourse crossings do not generally accommodate wildlife passage. These crossings are (from west to east): Bronte Creek, Sixteen Mile Creek, East Sixteen Mile Creek and the Credit River. At present, these large structures provide passage to both small wildlife species (e.g., small mammals, herpetofauna, etc.) and large species (e.g., white-tailed deer). Important habitat connectivity is also achieved at the following crossings: Fourteen Mile Creek, several tributaries of East Sixteen Mile Creek and the tributary of Fletcher's Creek. Lands in the vicinity of these structures comprise some of the highest quality natural heritage features found within the vicinity of the study area and provide important north-south/east-west movement corridors for wildlife within, or in the immediate vicinity of, the study area. The fencing mentioned above, also provides some function to funnel wildlife species towards these corridors by forcing them to move laterally until they reach a suitable crossing area. However, the chain-link fencing currently present is not wildlife-specific funnel fencing and may be permeable by some wildlife species.

Openness ratio (OR) is a calculation which is used to determine the tunnel effect created by a structure and thus the likelihood wildlife species would utilize that structure. This evaluation is completed by analysing a structure's component measurements (i.e., height x width / structure length). Generally, a greater openness ratio value is expected to increase the likelihood of wildlife utilization of a given structure or culvert. To maximize the openness ratio, structures will be designed to have a larger opening and the shortest length as possible, since wildlife species are more likely to enter a culvert if they can see light at the other end. Minimum OR was determined by a review of secondary source data regarding wildlife passage at road crossings (Clevenger *et al.* 2001). The minimum OR for small animals is 0.05 and the minimum OR for large animals is 0.6. Research indicates that small mammals prefer small diameter openings (e.g., concealment may decrease exposure to predation), and subsequently, smaller OR structures (Ministry of Transportation, 2006). A minimum clearance height of 3 m for structures that will provide passage for large animals (e.g. white-tailed deer) is recommended. In addition, natural substrates will be used to encourage wildlife to utilize crossing structures. Ground cover will be continuous with the substrates found outside and adjacent to the structural entrances thereby encouraging animals to pass through the structure (Yanes *et al.* 1995).

As part of project implementation, once structure sizes are confirmed, OR can be calculated for each of the new structures to determine whether target animal groups can use the structures for passage. Structures sizes for the 407 ETR are already generally large enough to accommodate large wildlife species. Constructing new structures of similar size will allow for continued use of these corridors for all species of wildlife.

#### **Wildlife Passage Considerations for Enhanced Functionality**

The following wildlife passage considerations will be implemented to enhance the functionality of crossing structures.

#### **Planting at Wildlife Crossing Structures**

Low stature vegetation is considered an important component of wildlife crossing use by reptiles, amphibians and small mammals (Cavallaro *et al.* 2005). Bare and exposed earth surrounding the entrance to a wildlife passage will deter use by wildlife as a result of perceived vulnerability to predators. To the extent possible, all existing natural vegetation will be salvaged surrounding all crossing locations. Where vegetation has been removed or is found to be absent, in the immediate vicinity of crossings, planting of low stature vegetation (e.g., grasses and small shrubs) will occur. Shrubs will be spaced apart from one another by approximately 3-5 m, as to not cause a visual obstruction of the wildlife crossing structure.

#### **Internal Cover at Wildlife Crossing Structures**

Reptiles, amphibians and small mammals prefer low stature vegetation or other forms of shelter within crossing structures (Cavallaro *et al.* 2005). An assessment of light penetration into the crossing structures will be required to determine if adequate vegetation growth and establishment as cover will occur. Other natural forms of cover such as stumps, logs (preferably hollowed), and rock piles, can be used to provide shelter and moist microclimates for wildlife. It is recommended that a mix of stumps, logs and rock piles be placed within each of the crossing structures. Cover objects will be present at intervals of approximately every 10 m, within enclosed areas. Rock piles may be constructed out of rip-rap or other similar sized material, but be no larger than 0.5 m height x 1 m wide, to avoid impediment of wildlife movement through the structure. Similarly, logs placed within the crossing structure will be oriented lengthwise within the structure wall so as to not impede wildlife movement.

#### **Substrate Materials within Wildlife Crossing Structures**

Natural substrates will be used to encourage wildlife to utilize crossing structures. Ground cover will be continuous with the substrates found outside and adjacent to the structural entrances thereby encouraging animals to pass through the structure. Substrates covering the ground within and surrounding the crossing structures will contain a mix of soil and small granular materials, matching what is found on lands surrounding the crossing structures (locally excavated soils is recommended).

#### **Funnel Fencing**

Where it is necessary to construct new roads, expand existing highways, or similar infrastructure, wildlife crossing structures (e.g., bridges and culverts) can be used to enable wildlife movement across roads (Beier *et al.* 2008). Funnel and/or barrier fencing is the most effective way to guide wildlife to a given crossing structure and reduce road-mortality (Clevenger 2011; Ministry of Transportation 2006). Wildlife fencing is recommended at the crossing structures to improve their effectiveness at safely moving wildlife across the landscape. Further analysis at a site-specific level will be required to determine fencing requirements and to further explore fencing type required (e.g. small animal fencing vs. large animal

fencing). Given the level of disturbance and lack of extensive natural cover, wildlife fencing would be constructed in close association with valleylands.

**AIR QUALITY**

Footprint impacts to air quality do not apply. Please see **Sections 6.3.1** and **6.4.1** for construction, and operations and maintenance impacts for air quality.

**TABLE 6.6: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/ CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Physiography and Soils	Excess soil may be generated during construction.	A large volume of soil will be displaced by excavation activities. Excess soil may be generated that cannot be reused along the 407 Transitway. The excess soil may be stained, odorous, containing debris or found to be contaminated.	Excess soil that is stained, odorous, contains debris or has been analyzed and found to be contaminated will require management as a waste. Final profiles will be defined prior to construction. Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (i.e. OPSS 180 – General Specification for the <i>Management of Excess Materials, Management of Excess Soil – A Guide for Best Management Practices</i> (2014)) will be used when developing an Excess Materials Management Plan. In addition, the disposal of excess soil in the Niagara Escarpment Area will be avoided, in accordance with the landform conservation policies in the Niagara Escarpment Plan (NEP). If such disposal is unavoidable, Niagara Escarpment Commission (NEC) Development Permits for the receiving site(s) will be required. <i>The On-Site and Excess Soil Management Regulation</i> (O. Reg. 406/19) under the <i>Environmental Protection Act</i> also requires that any fill placed in environmentally sensitive areas (including Escarpment Protection and Natural Areas) meets Table 1 standards. Any soil placed on cropland or pasture must meet the definition of topsoil as per the <i>Municipal Act</i> .	An Excess Materials Management Plan will be developed prior to construction and will include management for any excess (and contaminated) soils.
Contaminated Property and Waste	Potential impacts to contaminated property and waste.	Seventy-six properties/areas have been identified within the study area that may have environmental impacts to soil and/or groundwater from current or historical activities based on the assessment to date. At this time, seven of the seventy-five properties/areas will be directly impacted by the 407 Transitway. Four of these properties are Risk Level 3 properties and three of these properties are Risk Level 2 properties.	Five of the seventy-six properties/areas identified within the study area are Risk Level 1 properties that would require further assessment to determine whether subsurface investigations would be warranted (i.e. a Phase I ESA), if impacted by construction activities. Forty-six of these are Risk Level 2 properties that require further assessment to determine whether subsurface investigations are warranted (i.e. a Phase I ESA). Twenty-five of these are Risk Level 3 properties that require subsurface environmental investigation to determine whether soil and/or groundwater impacts exist at the properties.  Preliminary Site Screening forms are required for properties identified for acquisition and will be completed as necessary prior to construction.	Further assessment for potential contamination and/or waste materials will take place prior to construction on a case by case basis, specifically during property acquisition.  All required additional investigations/studies (i.e. any remaining PSSs, Phase I ESAs, limited subsurface environmental investigations, and Phase II ESAs) will be conducted prior to construction. A Designated Substances Survey (DSS) shall be completed for any structures that will be removed as part of implementation of the 407 Transitway in order to meet the requirements of the <i>Occupational Health and Safety Act</i> .  Should impacts to soil and/or groundwater and/or issues of potential environmental concern be identified during detail design, additional assessment will be conducted and appropriate steps will be taken following MTO's <i>Environmental Reference for Highway Design</i> (2013).

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Surface Water, Drainage and Stormwater	Possible impacts on existing drainage patterns along 407 ETR due to proposed grading of the Transitway. Increased level of imperviousness, increased runoff volumes to watercourses. Impacts of climate change – increase flooding and extreme weather events- on the 407 transitway infrastructure.	407 ETR facilities not impacted by 407 Transitway grading. Potential impacts to water quality, quantity, temperatures, sediment loads, and seasonal and daily flow variations. Potential flooding in the area.	Proposed drainage designs and watercourse crossings adopted floodplain studies and considered existing highway drainage and stormwater management facilities. The following are proposed works to address drainage and stormwater management: <ul style="list-style-type: none"> <li>▪ Due to the road profile sloping underground, pumping may be required at 2 locations along the proposed 407 Transitway: Road tunnels under the 407 ETR/Highway 403 interchange and Highway 401/407ETR interchange. Details related to pump sizes will be developed during detailed design.</li> <li>▪ A treatment train approach is proposed for the transitway corridor consisting of grass embankments, long grassed swales, and enhanced swales. Quantity control of Transitway runoff is proposed to be provided through enhanced swales. These were designed as dry ponds with a formal outlet control structure consisting of 100 mm perforated pipe, hickenbottom structure and a 75 mm orifice plate. A single typical enhanced swale design was used throughout the roadway drainage analysis however a more detailed analysis will be undertaken during detailed design.</li> <li>▪ The stormwater management strategy for the stations includes wet ponds with control structures consisting of multiple orifices and/or weirs. Wet ponds were designed for each station to provide quantity, quality, and erosion and sediment control. All of the stormwater facilities meet MECP and MTO criteria.</li> <li>▪ The Hydraulic analysis was undertaken using GeoHEC-RAS for 31 culvert crossings within the study limits. All models are developed based on existing Conservation Halton and Credit Valley Conservation HEC models. All crossing design meet MTO criteria.</li> <li>▪ A headwater drainage feature in Shoreacres Creek watershed (BU05) that runs parallel to the proposed transitway between stations 16+900 and 17+100 of the 407 Transitway is considered for realignment due to its proximity to the Transitway. Fluvial geomorphology study will be conducted during the detail design phase of this project.</li> <li>▪ Dundas Street Station is in conflict with creek corridor of a headwater drainage feature in Shoreacres Creek watershed. This creek will be realigned and enhanced at detailed design stage. Fluvial geomorphology study will be conducted during the detail design phase of this project.</li> </ul>	Fluvial geomorphology study will be conducted during the detail design phase of this project within Dundas Street Station and the headwater drainage feature in Shoreacres Creek watershed.  Ground survey is needed for all existing drainage features within corridor and upstream and downstream streambed on proposed watercourse crossings.
Groundwater	Potential alterations to groundwater resources (including groundwater regime and recharge/discharge) due to the construction of the Transitway facility. Potential for impacts to water wells. Potential need for de-watering.	A reduction in groundwater recharge to the subsurface will occur as a result of the expansion or construction of impermeable pavement surfaces. It is expected that new impermeable surfaces associated with the Transitway runningway and the station locations will reduce the overall recharge within the study area.  The effect of the potential reduction in overall groundwater recharge is not expected to be significant.  Discharge functions at the bridge construction locations may be impacted temporarily during construction activities; however, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures.  Most of the study area would not be considered to represent an area of significant groundwater recharge. Exceptions to this are the areas of relatively sandy soil in the Sixteen Mile Creek Valley, Credit River Valley and small area between Derry Road and Britannia Road.  The Transitway is not located in or near any well head protection areas or intake protection zones	Recharge lost to impermeable surfaces can in part be mitigated by the direction of runoff to natural ground surfaces, by the construction of permeable pavements or by other low-impact development infiltration (LIDs) techniques where suitable. There are limited areas that are suitable for the implementation of LIDs given the relatively fine grained soil and high water table throughout the study area. Actual opportunities for LID construction will be assessed in subsequent design phases of this project.  Discharge functions within the study area may be reduced as a result of the proposed construction. Profile lowering activities could reduce the existing hydraulic gradients to an extent where a reduction in groundwater discharge is possible. Given the relatively small area of the construction activities compared to overall drainage basin areas, a localized decrease in discharge is not expected to be measurable. Further, given the relatively flat-lying study area, it is not anticipated that significant profile lowering will be required.  Discharge functions at the bridge construction locations may be impacted temporarily during construction activities; however, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures.  Hydrogeological conditions within the study area will vary locally and are subject to confirmation with actual site specific investigations by a qualified hydrogeologist prior to construction, as necessary, including (but not limited to) boreholes, monitoring wells, test pits, groundwater hydraulic testing, chemical analysis, etc.	The potential impacts to groundwater resources will be reassessed based on more detailed site specific hydrogeological data prior to construction of the project (if warranted). Further investigation/monitoring will be completed and appropriate mitigation measures will be incorporated into the design prior to construction, as required.  The need for and effectiveness of implementing permeable pavements or other low impact development infiltration techniques will be reassessed prior to construction to reduce the groundwater recharge lost to impermeable surfaces.  Based on the findings of the reassessment of the design and hydrogeological/subsurface data prior to construction, and the impacts of the suspected areas of high water table, Environmental Activity and Sector Registry registration or Permit(s) to

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		<p>and does not pose a significant drinking water threat.</p> <p>Excavation and construction below the water table in saturated sandy and/or silty soils may present challenges, including the need for de-watering.</p>		<p>Take Water for construction will be applied for as necessary.</p>
Fish and Fish Habitat	<p>Potential impacts to fish and fish habitat.</p> <p>Displacement of and/or disturbance to rare, threatened or endangered fish species or significant fish habitat.</p>	<p>The 407 Transitway will directly affect the 34 watercourse crossings that support fish and fish habitat watercourses. "Serious Harm to Fish" could result as a result of the proposed works.</p>	<p>Design culvert/structure types in accordance with Section 5.5.3 in the <i>MTO Fish Guide</i>, to avoid causing "Serious Harm to Fish". At watercourses supporting direct fish habitat, passage and habitat provision are important and thus open bottomed culverts or box culverts that are embedded and backfilled with substrates will be considered throughout design. See <b>Section 6.3.1/ Table 6.12</b> for a summary of the proposed works/impacts for each individual watercourse crossing during construction. Also included are site-specific mitigation measures during construction, and potential net environmental effects for each watercourse based on the Transitway design. See <b>Table 6.2</b> above for additional mitigation measures for each impacted watercourse.</p> <p>For watercourses at locations where clear span bridges are proposed and no works are expected to occur within the high water mark, no further assessment was undertaken. These crossings are expected to meet all the conditions of the MTO Fisheries Best Management Practice for Clear Span Bridges and are therefore "not likely to result in serious harm". Watercourses which meet these criteria are Sites 15, 18, 24, 29, 44, 49, 50, 51 and 58. Review by DFO is not required at these locations. A MTO Project Notification Form will likely be required prior to construction.</p> <p>For watercourses in which new culvert/crossing structures are proposed (Sites 6, 7, 8, 9, 10, 11, 13, 15a, 16, 17, 19, 20, 21, 22, 23, 26, 28, 37, 39, 40, 52, 53, and 54), it was determined that no permanent impacts to fishes' ability to carry out life processes will result from the proposed works due to the habitat's indirect nature. Review by DFO is not required at these locations.</p> <p>For the watercourses in which a channel realignment is proposed (Sites 6, 8, and 12) there is low "Likelihood of Causing Serious Harm", as the they are ephemeral swales that are indirect habitat and proposed works will not permanently impact fishes' ability to carry out life processes and cause no 'serious harm'.</p> <p>For watercourses for which tunneling underneath them is proposed (Sites 14 and 41), no impacts are anticipated.</p> <p>Two watercourses are identified as habitat for Silver Shiner (Sites 15 and 29) and one as habitat for Redside Dace (Site 58), which are regulated under the Ontario <i>Endangered Species Act, 2007</i>. Consultation with MECP will need to occur during later design phases of this project as necessary.</p> <p>Consideration in implementing potential enhancement/offsetting opportunities presented in <b>Section 6.1.2</b>.</p>	<p>Continue consultation with MNRF/MECP and DFO as required (in particular regarding aquatic species at risk and any required permits for fisheries) prior to construction. Obtain all required permits (including Ontario ESA permits and <i>Fisheries Act</i> Authorization, as required) prior to construction.</p> <p>Prepare and submit MTO Project Notification Forms for watercourses where there is "No Likelihood of Causing Serious Harm".</p> <p>The design of the Transitway crossings over watercourses will be confirmed to minimize impacts and mitigation measures as per best management practices in accordance with the PILOT <i>MTO/DFO/MNRF Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings (2016)</i> and <i>MTO Environmental Guide for Fish and Fish Habitat (2009)</i>. All current crossings will be maintained and new crossings will be equal to or longer/wider than existing crossings.</p> <p>Review potential enhancement/offsetting opportunities at impacted watercourses in the study area prior to construction, as required.</p> <p>Prepare detailed meander belt width analysis.</p>
Vegetation and Vegetation Communities	<p>Displacement of and/or disturbance to vegetation and vegetation communities.</p> <p>Displacement of and/or disturbance to rare, threatened or endangered</p>	<p>Overall, there will be a loss of 255.47 ha of vegetation communities (including anthropogenically influenced lands such as agricultural and manicured land), which includes a loss of 212.86 ha due to the runningway, and a loss of 42.61 ha due to the stations and the bus storage facility. This will result in the removal of</p>	<p>The removal of wetland and forest communities will be offset/compensated through restoration, as well as through the enhancement of nearby vegetation communities, to the extent possible. A total of 12 Protected Sites adjacent to the 407 Transitway facilities have been identified for offsets/future environmental compensation. To the extent possible, forest compensation will be prioritized on lands adjacent to existing forest to increase/create interior habitat, to the extent possible. Where lands are identified for forest and wetland compensation, no fill placement will be undertaken and plantings will be installed into natural, good quality soils.</p>	<p>A detailed planting plan (including plantings at the station sites) will be developed prior to construction and once areas identified for restoration have been determined in consultation with the respective regulatory agencies to help mitigate impacts to the adjacent natural and cultural</p>

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	<p>vegetation and vegetation communities.</p>	<p>12.95 ha of forest communities and 15.85 ha of wetland communities.</p> <p>A Fresh-Moist Sugar Maple-Black Maple Deciduous Forest (FOD6-4) was identified along the west side of Bronte Creek, north of the 407 ETR. This is a vulnerable community type, which is provincially ranked as S3. This community contained several conservative species. All of the other vegetation communities identified within the study area are considered to be widespread and common in Ontario and secure globally.</p> <p>Two butternut trees and numerous seedlings were identified within the study area. The construction of the runningway will directly impact these butternut trees. During detail design a designated butternut health assessor will assess those butternut trees. It may be beneficial to collect branch/leaf/bud samples and have these sent to the MNRF Ontario Forest Research Institute for genetic testing to confirm these are not hybrid. Mitigation and/or permitting may be required to be undertaken later in the design process. No other plant species at risk were identified during the plant surveys undertaken throughout the study area in 2018 and 2019.</p> <p>Twenty-two plant species identified as rare in Peel and Halton Regions, were observed within several communities associated with the study area.</p>	<p>Riparian habitat will be retained at a minimum of 3 m to 5 m from the bank edge of any watercourse impacted during construction. This measure is expected to ensure bank stability, mitigate erosion, and mitigate negative impacts to aquatic habitat. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Restoration/enhancement of riparian habitat will be undertaken immediately following the completion of work in riparian zones. Suitable deep rooting graminoid, herbaceous and shrub species, with a variety of trees where suitable, will be installed to prevent streambank erosion and improve riparian conditions. Plant species selected will be native and/or non-invasive.</p> <p>Where valleylands are impacted, the zone of construction impacts will be limited, and staging areas will be well outside of forested valleys. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Restoration of newly impacted edges will be undertaken, and methods for the enhancement of these areas will be carried out as outlined in the forest edge management section presented below. Plant species selected will be native and/or non-invasive.</p> <p>Forest edge management will be implemented to enhance edges, and to mitigate the establishment of invasive species along the disturbed edges. Where new forest edges are exposed, forest management techniques will be implemented to mitigate the associated impacts to the forest communities. As part of the forest edge management, mitigation measures will include, but not be limited to the following:</p> <ul style="list-style-type: none"> <li>■ Planting of appropriate native trees, shrubs and ground flora, which shall be undertaken as soon as possible following vegetation removals to provide a protective buffer along disturbed forest edges.</li> <li>■ Grading within areas where edges will be newly created shall be designed to meet existing grades a minimum of 3 m away from the tree drip-line.</li> <li>■ Compaction of soils on lands immediately adjacent to the newly exposed forest edge will be minimized to the extent possible. Decompaction efforts and methodology shall be site specific. Where decompaction is required, it shall extend to a minimum depth of approximately 25 cm.</li> <li>■ Drainage patterns adjacent to newly created edges shall be maintained to avoid changes in soil moisture.</li> <li>■ Suitable tree protection fencing will be installed and regularly maintained along any newly exposed forest edges.</li> <li>■ The spread/invasion of aggressive or non-native plant species must be immediately mitigated. The inclusion of filter fabric along all tree protection fencing, to enhance protection from the spread of invasive, aggressive plant species, will be considered.</li> </ul> <p>Efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species, at a minimum will include the following:</p> <ul style="list-style-type: none"> <li>■ where there are dense patches of common buckthorn, swallow-wort, common reed or garlic mustard, Russian or Autumn olive, the appropriate removal and control of these species by a qualified specialist will be undertaken;</li> <li>■ minimize the exposure of bare soil, and where bare soil must persist over a period of time these will be planted with a non-invasive annual cover crop for an interim period; and,</li> <li>■ no non-native and invasive ornamentals plants will be used for landscaping.</li> </ul> <p>Site-specific planting/landscape plans will be prepared prior to construction by an experienced landscape architect. It is recommended that the planting of forest and wetland habitat be undertaken with the appropriate native and non-invasive plant species. At a minimum, planting plans will show the following:</p> <ul style="list-style-type: none"> <li>■ detailed maps of the planting locations along with the respective allocations of tree, shrub, herbaceous and grass species to be planted inclusive of species and ratio of plantings or abundances; and</li> <li>■ a description of the best management practices that are to be followed in the planting and tending of these sites for a minimum of five years following the initial planting stage. In particular, management will need to be undertaken for those invasive / aggressive plant species.</li> </ul> <p>Efforts will be made, where warranted, to locate regionally rare plants that will be impacted due to the proposed 407 Transitway. Where possible, these plant species will be salvaged through transplanting into nearby vegetation communities with suitable habitat characteristics that will afford ongoing</p>	<p>environment. The contractor will be required to provide a warranty on planted materials to ensure the newly planted material survives and fulfils the intended function. All forest and wetland restoration areas required for compensation, as well as all forest edge, riparian and valleyland areas where vegetation management is required, must be revisited/identified prior to construction commencement. The compensation ratio is to be determined through further discussion with regulatory agencies (e.g., MNRF, CH, CVC), as part of implementing the project. Forest edge, riparian and valleyland management shall take place where such management is recommended.</p> <p>If planting for butternut under the ESA 2007 is required as determined during Detail Design phase of this project, consideration will be given to planting pure butternut seedlings within forest restoration sites. However, such plantings must be installed in accordance with mitigation or overall benefit conditions as required under the ESA 2007, to be determined during detail design. Overall, butternut seedlings will be planted in an area for optimal establishment and growth. Where wetland restoration is undertaken bio-engineering may be required on lands that require augmentation to ensure wetland function.</p> <p>If during construction, additional forest or wetland habitat is impacted, suitable sites along the 407 Transitway will be identified and protected for additional</p>

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			protection.	offsetting to compensate for additional habitat loss.
Designated Natural Areas	Impacts to designated natural areas in the the study area.	<p>Four are Areas of Natural and Scientific Interest (ANSI) were identified, including the provincially significant Zimmerman Valley Life Science and Trafalgar Moraine Earth Science ANSIs, and the candidate Sixteen Mile Creek and Oakville-Milton Wetlands and Uplands Life Science ANSIs. Three Provincially Significant Wetlands (PSWs) are within the study area: North Oakville-Milton West Wetland Complex PSW, North Oakville-Milton East Wetland Complex PSW and Churchville-Norval PSW are also within the study area.</p> <p>Within the Greenbelt Plan Area, cultural, forest and wetland habitat will be impacted within Segments 1, 2 and 3. These impacts are within the Protected Countryside designation which includes the Greenbelt Natural Heritage System. This includes impacts along Bronte Creek. Similar habitat within Segments 3, 4, 5 and 10 will be impacted within the Urban River Valley Area. Watercourses across the study area located within this plan area include Fourteen Mile Creek and Sixteen Mile Creek.</p> <p>Within the Niagara Escarpment Area, cultural and wetland habitat will be impacted within Segments 1 and 2, associated with the Escarpment Natural Area and the Escarpment Protection Area (between Dundas Street and Walkers Line). Impacts are primarily to agricultural lands and cultural meadow habitat. Several meadow marsh and shallow marsh communities will also be impacted, these communities are typically supported by intermittent watercourses that bisect the 407 ETR, as well as by runoff from infrastructure.</p>	<p>Protection of vegetation communities within designated natural and plan policy areas is important to mitigate impacts to the extent possible. Mitigation will include tree fencing with filter cloth to minimize edge impacts to the extent possible, and edge management plantings.</p> <p>Overall, the environmental protection/mitigation measures for Vegetation and Vegetation Communities (above) and Wildlife and Wildlife Habitat (below) will help maintain/enhance habitat within the Protected Countryside and the Urban River Valleys designations to ensure that the policies of the Greenbelt Plan will be adhered to at these features. Such measures will also help to support connections between the Natural Heritage System and the local, regional and broader natural heritage systems of southern Ontario.</p>	Any design refinements necessary at will be completed prior to construction to delineate the designated natural areas and the construction area within them as well as address the policies of the Greenbelt Plan.
Wildlife and Wildlife Habitat	Displacement of wildlife and wildlife habitat. Displacement of rare, threatened or endangered wildlife or significant wildlife habitat.	Displacement of and/or disturbance to wildlife and wildlife habitat as a result of the construction of the 407 Transitway runningway and stations. A total of 28 wildlife species at risk have been recorded within the vicinity of the study area or have been identified as having the potential to be found within the study area. Five species at risk	<p>Efforts will be made to ensure that impacts to areas containing more sensitive wildlife habitat (e.g. natural areas/valleylands) are minimized to the extent possible and to maintain opportunity for wildlife movement through the natural areas/valleylands.</p> <ul style="list-style-type: none"> <li>Further field investigations for the Western Chorus Frog (Great Lakes/St. Lawrence Population) in marshes, meadows (and other open-country environments) and swales, undertaken during the appropriate season, will be conducted prior to construction to establish their presence or absence and identification of potential breeding habitat, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA. This species was found at several anural breeding stations in 2019 field investigations.</li> </ul>	Further correspondence shall take place with MNRF prior to construction to discuss the wildlife species at risk that have been identified or have the potential to be located in the vicinity of the study area, any potential impacts of the proposed work on species at



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	<p>Barrier effects on wildlife passage. Wildlife/vehicle conflicts.</p>	<p>were confirmed in the study area by LGL during 2018-2019 field investigations including Western Chorus Frog; Eastern Wood Pewee; Barn Swallow; Bobolink; and, Eastern Meadowlark. The 407 Transitway has the potential to result in new barriers to wildlife passage, wildlife/vehicle conflicts, and impacts to migratory birds.</p>	<ul style="list-style-type: none"> <li>▪ Further field investigations for Milksnake in anthropogenic habitat types (farmland, urban parks and residential areas), undertaken during the appropriate season and using appropriate species-specific protocols for surveying for this species, will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA.</li> <li>▪ Further field investigations for Snapping Turtle in a variety of aquatic habitats identified in the study area will be undertaken during the appropriate season and using appropriate species-specific protocols for surveying for this species, will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA.</li> <li>▪ Further field investigations for the Common Nighthawk within a wide range of open, vegetation-free rural and urban habitats such as clearings, grasslands, open forests and rocky outcrops will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA.</li> <li>▪ Further field investigations for the Chimney Swift in deciduous forest habitat communities will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</li> <li>▪ Further field investigations for the Eastern Wood Pewee will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting. Observations were made at various breeding bird stations associated with woodland edges in 2019 field investigations.</li> <li>▪ Further field investigations for the Bank Swallow along eroded watercourse banks will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</li> <li>▪ Further field investigations for the Barn Swallow will be conducted prior to construction to confirm the breeding status of Barn Swallow, and, thus, the appropriate steps for protection and permitting. Most observations during 2018 and 2019 field investigations were limited to foraging individuals often over stormwater ponds, agricultural fields or meadows. Breeding colonies identified were located outside of the transitway alignment and station locations.</li> <li>▪ Further field investigations for Canada Warbler a variety of deciduous and coniferous wooded habitats, particularly those that contain a dense understory of shrubs or other vegetation in the study area will be undertaken during the appropriate season and using appropriate species-specific protocols for surveying for this species, will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA.</li> <li>▪ Further field investigations for Golden-winged Warbler in open-country habitat that borders forest communities and potential nesting areas with young shrub growth surrounded by mature forest (i.e. field edges, hydro or utility corridors) in the study area will be undertaken during the appropriate season and using appropriate species-specific protocols for surveying for this species, will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</li> <li>▪ Further field investigations for the Grasshopper Sparrow in open-country habitat and nesting grounds such as open grassland, hayfields and pastureland in the study area will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA.</li> <li>▪ Further field investigations for the Peregrine Falcon on rocky ledges or tall buildings near waterbodies in the study area will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA.</li> <li>▪ Further field investigations for the Red -headed Woodpecker in open woodland and woodland edges in the study area will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA.</li> <li>▪ Further field investigations for the Louisiana Waterthrush in watercourse valleylands in the study area will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</li> <li>▪ Further field investigations for the Eastern Whip-poor-will in forested communities in the study area will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</li> </ul>	<p>risk, and any requirements for permitting under the Ontario ESA. Prior to construction, further field investigations will be undertaken as required for species at risk during the appropriate season using MNRF protocols. Surveying for these species will be conducted to establish their presence or absence, and, thus, the appropriate steps for protection and permitting. As part of project implementation, once structure sizes are confirmed, the Openness Ratio will be calculated for each of the new structures to determine whether target animals groups can use the structures for passage. As part of project implementation, wildlife passage considerations will be reviewed, as required.</p>

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ENVIRONMENTAL VALUE/ CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
			<ul style="list-style-type: none"> <li>▪ Further field investigations for the Wood Thrush in mature deciduous and mixed forest communities in the study area will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection. No permitting is anticipated as this species is not regulated under the ESA.</li> <li>▪ Further field investigations for Eastern Meadowlark and Bobolink in grass-dominated open-country habitat types, undertaken during the appropriate season using MNRFP protocols for surveying for these species, will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</li> <li>▪ Further field investigations for Bat species near buildings and forest communities, undertaken during the appropriate season using MNRFP protocols for surveying for these species, will be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</li> </ul> <p>No new barriers to wildlife passage are expected to occur as a result of the 407 Transitway. All major corridors associated with valleylands will be maintained and new crossings will mimic the existing crossings to facilitate wildlife passage. As part of project implementation, once structure sizes are confirmed during the detail design phase of this project, the Openness Ratio (OR) can be calculated for each of the new structures to determine whether target animals groups can use the structures for passage. Structure sizes for the 407 ETR are already generally large enough to accommodate large wildlife species. Constructing new structures of similar size will allow for continued use of these corridors for all species of wildlife. To maximize the OR, structures will be designed to have a larger opening and the shortest length as possible, since wildlife species are more likely to enter a culvert if they can see light at the other end. The minimum OR for small animals is 0.05 and the minimum OR for large animals is 0.6. A minimum clearance height of 3 m for structures that will provide passage for large animals (e.g. white-tailed deer) is recommended. In addition, natural substrates will be used to encourage wildlife to utilize crossing structures. Ground cover will be continuous with the substrates found outside and adjacent to the structural entrances thereby encouraging animals to pass through the structure (Yanes <i>et al.</i> 1995).</p> <p>Wildlife/vehicle conflicts are minor as large corridors exist at the larger watercourse crossings (valleylands), which are typically spanned by bridges. No additional conflicts are anticipated as these corridors will be maintained under the 407 Transitway through construction of similarly dimensioned structures, and the structures will allow for the continued use of these wildlife corridors for all species of wildlife.</p> <p>Wildlife passage considerations will be implemented to enhance the functionality of crossing structures including:</p> <ul style="list-style-type: none"> <li>▪ plantings at wildlife crossing structures;</li> <li>▪ providing internal cover at wildlife crossing structures including an assessment of light penetration into the crossing structures to determine if adequate vegetation growth and establishment as cover will occur;</li> <li>▪ providing substrate materials within wildlife crossing structures; and,</li> <li>▪ funnel fencing.</li> </ul> <p>Three Protected Sites across the study area meet the criteria for suitable compensation for Bobolink and Eastern Meadowlark habitat:</p> <ul style="list-style-type: none"> <li>▪ east of Walkers Line and north of the 407 ETR covers an area of 54.3 ha including approximately 20 ha of existing forest (see <b>Figure 6.1A</b>). Associated agricultural/pasture lands have the potential to meet the criteria, but would require clearing of two hedgerows including a portion of a hedgerow associated with a Tributary of Shoreacres Creek.</li> <li>▪ east of Walkers Line, also north of the 407 ETR covering an area of 25.7 ha including approximately 13.5 ha of existing forest (see <b>Figure 6.1A</b>). Associated agricultural/pasture lands in this Protected Site have the potential to meet the above noted criteria with the removal of a hedgerow.</li> <li>▪ east of Bronte Road and the Bronte Road Station and Maintenance/Storage Facility and south of the 407 ETR, covers an area of 7.7 ha which is comprised of cultural meadow habitat (see <b>Figure 6.1B</b>).</li> </ul> <p>If Protected Sites used for Bobolink and Eastern Meadowlark are considered for the purposes of fill during construction, a minimum of six inches and up to 1 m of topsoil shall be disked into the final graded surface, smoothed and seeded. However, fill sites will not negatively impact adjacent, existing habitat, and no fill will be placed within 5m to 10 m of an existing forest or wetland edge. If additional impacted habitat is identified based on species</p>	

**TABLE 6.6: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/ CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
			at risk surveys undertaken prior to construction, suitable sites along the 407 Transitway will be similarly identified and protected for additional SAR habitat offsets.	
Air Quality	Footprint impacts to air quality do not apply.			

### 6.2.2 Socio-Economic and Cultural Environment

The following section discusses the footprint impacts to the socio-economic and cultural environment within the study area. In general, the land uses adjacent to the 407 Transitway are compatible with the 407 Transitway and support urban and regional transit. The majority of the 407 Transitway stations will serve as opportunities for transportation transfer points with other transit and transportation systems, thereby providing greater transit options. Seventeen built heritage resources and cultural heritage landscapes were identified within or adjacent to the 407 transitway facilities, with direct impacts to 12 built heritage resources and cultural heritage landscapes and indirect impacts to five built heritage resources and cultural heritage landscapes. Further Cultural Heritage Evaluation is required for each of the sixteen built heritage resources and cultural heritage landscapes with a provisional Heritage Impact Assessment and one built heritage resources and cultural heritage landscapes requires a Heritage Impact Assessment. Further archaeological investigations will be needed at some locations within the footprint of the 407 Transitway prior to construction. Refer to **Table 6.9** which shows the footprint impacts, proposed mitigation measures and recommended monitoring for the Socio-Economic and Cultural Environment.

#### LAND USE AND PROPERTY REQUIREMENTS

A number of changes to land use designations are required for the Transitway. Minor amendments to the Parkway Belt West Plan, City of Burlington Official Plan, the Town of Oakville Official Plan, and the Town of Milton Official Plan may be required to reflect changes in the footprint of the Transitway. These issues have been discussed with the municipalities, Ministry of Municipal Affairs and Housing and MECP throughout the duration of the TPAP. No major concerns have been identified to date from the agencies. Further assessment of the areas where designated land uses will be affected will be undertaken as part of implementing the 407 Transitway, and the appropriate amendments to the Parkway Belt West Plan and/or Official Plans will be made. Further assessment of the areas where planned land uses will be affected will be undertaken as part of the implementation of the project, and the appropriate amendments to the Parkway Belt West Plan and/or Official Plans will be made at that time.

A number of changes to existing land uses will result from the 407 Transitway, including areas of the runningway and stations that cross/impact private land, or existing buildings, businesses, and agricultural land. Impacts to existing land uses that are in close proximity to the preferred Transitway runningway and stations have been minimized to the extent possible. However, some properties will be affected by the Transitway. Consultation with affected private property owners has taken place and will continue prior to construction, as necessary. Design details in the vicinity of private properties that will be affected by the Transitway will be investigated in greater detail prior to construction to determine if there are possible refinements that can be made to reduce or minimize impacts. If property is required, the standard MTO process for acquiring properties will be followed. Acquisition of any affected municipal properties will be the subject of discussion with the appropriate municipal authorities.

Where portions and/or edges of agricultural fields are displaced by the runningway and stations, further assessment will be required to determine appropriate mitigation measures. Consideration will be given to repairing any agricultural infrastructure (i.e., fences, tile drains) where appropriate.

The existing and planned land uses and the preferred Transitway facility footprint are presented in **Figures 6.2.A-F**.

Canada Land Inventory (CLI) classifications of capability for agricultural assessment were assessed for relevance and utility in identifying potential agricultural impacts in the 407 Transitway study area. The following presents the classifications:

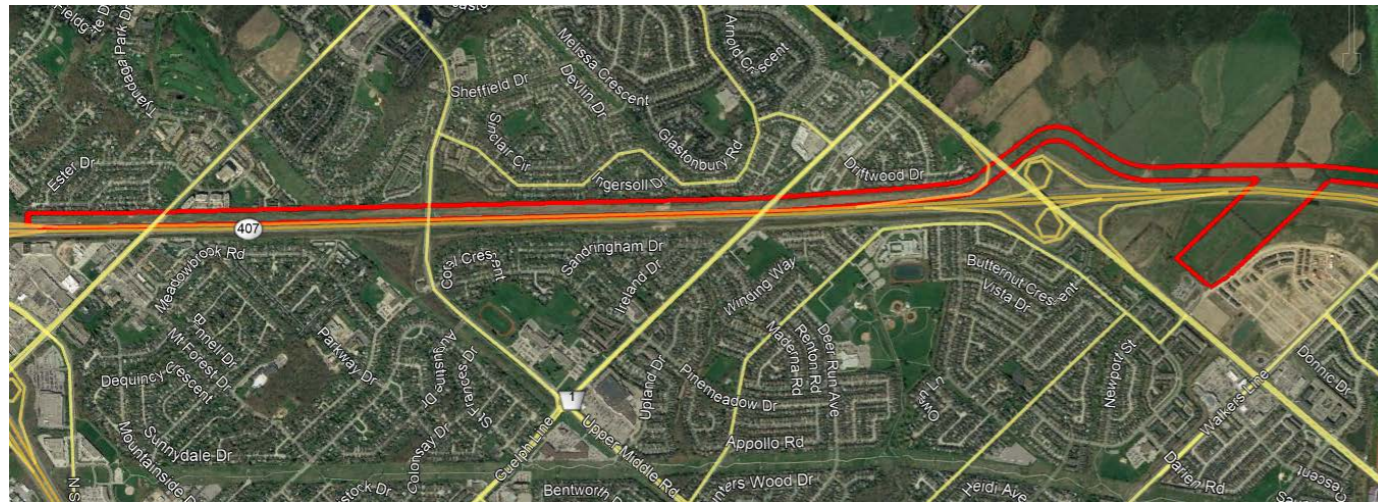
- Class 1 Soils in this class have no significant limitations in use for crops
- Class 2 Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices
- Class 3 Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices
- Class 4 Soils in this class have severe limitations that restrict the range of crops or require special conservation practices

- Class 5 Soils in this class gave very severe limitations that restrict their capability in producing perennial forage crops, and improvement practices are feasible
- Class 6 Soils in this class are capable only of producing perennial forage crops, and improvement practices are not feasible
- Class 7 Soils in this class have no capacity for arable culture or permanent pasture
- Class 0 Organic Soils (not placed in capability classes)

Class 0, 1, and 3 soils were identified within the Transitway study area in Segment S1. The runningway will approximately impact 25.5 hectares (ha) of Class 0 soils, 5.9 ha of Class 1 soils, and 3.6 ha of Class 3 soils. The total area of impacts to soil in this segment is approximately 35.1 ha. The soil classes in this segment range from soils having no significant limitations in use for crops, to soils having moderately severe limitations that restrict the range of crops.

The existing land uses encourage active transportation and alternate modes of transportation. The proposed Dundas Street Road Station will reduce the demand for surface parking through better integration with local transit service. The proposed Dundas Street Road Station will approximately have a total impact of 13.0 ha. Although the runningway travels within the Parkway Belt West area, land use changes to the City of Burlington Official Plan may be required to reflect the footprint of the Transitway.

### Segment S1: West of Brant Street to East of Dundas Street



Google Earth 2020

### Segment S2: East of Dundas Street to East of Appleby Line



Google Earth 2020

The 407 Transitway begins in the Regional Municipality of Halton and travels along the north side of the 407 ETR. The majority of the runningway is located in the City of Burlington's Urban Area, within the 'Residential' designation (high, medium, and low density). There are residential subdivision communities located north and south of the 407 ETR between Brant Street and Dundas Street. The built form is predominantly low density residential, with some residential high rises at Brant Street. Townhouses are located at a few locations and have higher densities than the single dwelling unit subdivisions.

The runningway continues through the 'Agricultural Rural Area' and the Public Use Area in the Parkway Belt West Plan, specifically on lands identified as 'Road', within the City of Burlington. The lands located south of the 407 ETR and the runningway are designated 'Business Corridor' and 'Residential- Low Density.'

The runningway travels through the 'Agricultural Rural Area' land use designation. Both the rural and urban area of the City of Burlington Official Plan identify the study area within the Public Use Area of the Parkway Belt West Plan, specifically under the 'Road' designation. The Transitway is compatible with these land use designations. East of Dundas Street, on the south side of the 407 ETR, Dundas Street Station is proposed. The Dundas Street Road Station would be located adjacent to lands designated as 'Business Corridor'. The runningway continues to travel on the north side of the 407 ETR. The transitway right-of-way avoids conflicts with the approved development applications and other future employment uses along the corridor.

Within this segment, the runningway crosses Appleby Creek and travels within the Greenbelt 'Protected Countryside' designation. A small portion of the Nelson Slope Forest Area of Natural and Scientific Interest (ANSI) Life Science (regionally significant) and the Nelson Escarpment Woods ESA is located west of Walkers Line and the 407 ETR. This feature is located within the Niagara Escarpment Plan area. The runningway travels across privately owned agricultural lands. Land use changes to existing 'Agricultural Rural Area' of the City of Burlington may be required to reflect changes in the footprint of the Transitway.

The runningway crosses three watercourses: Rambo, Roseland, and Tuck Creek. Lands located north of the 407 ETR, immediately adjacent to the study area, are identified within the Greenbelt Protected Countryside and The Niagara Escarpment Plan under 'Escarpment Natural Area', 'Escarpment Protection Area', and 'Escarpment Rural Area'.

A transit station is proposed on the northwest corner of Appleby Line and 407 ETR. Lands south of Appleby Line Station are designated as 'Residential' and 'Business Corridor'. The runningway travels along the northern side of the 407 ETR right-of-way, taking into consideration the employment lands by avoiding the existing and future employment developments along the south side of the 407 ETR.

Class 1, 3, and 5 soils were identified within the Transitway study area in Segment S2. The runningway will approximately impact 8.9 ha of Class 1 soils, 10.4 ha of Class 3 soils, and 0.7 ha of Class 5 soils. The total area of impacts to soil in this segment is approximately 19.9 ha. The soil classes in this segment range from soils having no significant limitations in use for crops, to soils having very severe limitations.

To preserve prime employment lands with the avoidance of provincial and municipal conflicting policies, applicants strongly supported the alignment traveling north of the 407 ETR and identified the north side of the 407 ETR as the preferred location for Appleby Line Station. Appleby Line Station will be accessible via collector road and will provide surplus parking for Dundas Road Station. Within Segment S2, Appleby Line Station will have a total impact of approximately 4.9 ha on soils. In addition, a small section of Dundas Road Station, approximately 0.01 ha of soils will be impacted within Segment S2.

### Segment S3: East of Appleby Line to East of Tremaine Road



Google Earth 2020

The runningway crosses Bronte Creek, designated as Greenlands (Non-Escarpment Plan Area) under the City of Burlington Official Plan. The lands lie within the 'Environmentally Sensitive Area' boundary, as delineated in the Halton Region Official Plan (2017 Office Consolidation). The runningway crosses Fourteen Mile Creek near Tremaine Road. This feature is located within the Niagara Escarpment Plan area. The Zimmerman Valley ANSI, Life Science, and Bronte Creek Valley ESA are located within the valleylands of Bronte Creek, east of Appleby Line. This ANSI is located within the Greenbelt Plan Protected Countryside.

The runningway continues to travel through the 'Agricultural Rural lands' and through a portion of the 'Mineral Resource Extraction Area', where development is not likely to occur. Lands to the east of Tremaine Road are identified as 'Land Use Designation to be Determined'. The runningway transitions to the south side of the 407 ETR when it approaches lands located east of Tremaine Road in the Town of Oakville. The runningway travels within lands designated as 'Employment District' within this segment. The runningway travels predominately within the Parkway Belt West 'Utility' corridor area, planned to accommodate public infrastructure over the long-term. The runningway footprint is compatible with the existing conditions of the lands located north of the 407 ETR where lands are primarily used for industrial

purposes and as a utility corridor.

Class 1, 3, and 5 soils were identified within the Transitway study area in Segment S3. The runningway will approximately impact 16.7 ha of Class 1 soils, 0.9 ha of Class 3 soils, and 1.0 ha of Class 5 soils. The total area of impacts to soils in this segment is approximately 18.7 ha. The classes of soil in this segment range from soils having no significant limitations in use for crops, to soils having very severe limitations.

The 407 Transitway has the potential to improve the transportation network and reduce the dependency on vehicles. The 407 Transitway will enhance regional mobility across municipalities and benefit the quality of life for existing and/or future communities such as the planned Evergreen Community located on the southwest intersection of Tremaine Road and the 407 ETR.

City of Burlington, Halton Region and MTO staff have been working together to add specific policies and mapping to the Tremaine Dundas Secondary Plan, in order to recognize the ongoing Transitway study process. Although the policies have not been finalized, a 60 metre Transitway corridor protection zone that would extend onto the Evergreen Community has been identified.

### Segment S4: East of Tremaine Road to West of Sixteen Mile Creek



Google Earth 2020

The runningway continues through the Town of Oakville within the Parkway Belt West Area, within the 'Road' designation. In addition, the runningway travels on lands designated 'Transitway' as identified within the North Oakville West Secondary Plan area and North Oakville East Secondary Plan area. In addition, the runningway travels adjacent to lands identified within the 'Natural Heritage System Area'. All the lands on the north side of the 407 ETR are part of the Greenbelt Plan Protected Countryside. On the south side of the 407 ETR, Fourteen Mile Creek, Glenorchy Conservation Area, and Sixteen Mile Creek are designated as 'Urban River Valleys' in the Greenbelt Plan. In compliance with provincial and municipal plans, the runningway travels along the south side of the 407 ETR. At the southwest intersection of Bronte Road and the 407 ETR, the runningway crosses 'Subject Lands Under Appeal'.

The proposed Bronte Road Station and bus storage yard is located on the east side of Bronte Road on Provincial property. In addition, Bronte Road Station is identified as a location for future GO Bus Park and Ride lot and a Provincial carpool lot.

Class 1, 3, and 5 soils were identified within the Transitway study area in Segment S4. The runningway

will approximately impact 9.1 ha of Class 1 soils, 7.7 ha of Class 3 soils, and 0.6 ha of Class 5 soils. The total impact to soils in this segment is approximately 17.4 ha. The Bronte Road Station and the bus storage yard will have a total impact of approximately 14.2 ha on soils. The classes of soil in this segment range from soils having no significant limitations in use for crops, to soils having very severe limitations.

### Segment S5: West of Sixteen Mile Creek to East of Trafalgar Road



Google Earth 2020

The proposed 407 Transitway route minimizes the area of land used for roadway infrastructure and other potential impacts. The watercourse through this segment includes the East Sixteen Mile Creek designated under the Greenbelt Protected Countryside. In Segment S5, the runningway continues to travel south of the 407 ETR, along the 'Transitway' designation in the Town of Oakville. The runningway travels through lands identified 'Natural Heritage System Area', west of 4th Line, 'Employment Area', east of 4th Line, and 'Trafalgar Road Urban Core Area' on the east and west sides of Trafalgar Road. The runningway also travels through the Parkway Belt West Plan area, under the 'Road', 'Public Open Space and Buffer Area', and the 'General Complementary Use Area' designation. Land use changes to the Parkway Belt West Plan may not be required.

Although there are no residential subdivisions located within the Oakville study area, there are single detached dwellings located on local roads throughout the study area and some residences are near the 407 ETR corridor (e.g., Fourth Line). On the southeast side of Neyagawa Boulevard, the runningway runs adjacent to the 'Neyagawa Boulevard- Urban Core Area'. In addition, the runningway travels through several Stormwater Management Facilities between Neyagawa Boulevard and Trafalgar Road.

Lands south of the 407 ETR bounded by the 4th line on the east and Neyagawa Boulevard to the west are subject to development applications. Similarly, development proposals have been identified on lands located between the 6th Line and Trafalgar Road.

Class 1, 3, and 5 soils were identified within the Transitway study area in Segment S5. The runningway will approximately impact 32.7 ha of Class 1 soils, 5.4 ha of Class 3 soils, and 3.1 ha of Class 5 soils. The total impact to soils in this segment is approximately 41.2 ha. The soil classes in this segment range from soils having no significant limitations in use for crops, to soils having very severe limitations.

Since Neyagawa Boulevard has less policy and geographical support for a transit station, a fully developed Trafalgar Road Station would be able to serve the residential community in the Neyagawa Boulevard area through transit and vehicular service on Burnhamthorpe Road. The proposed Trafalgar Road Station would be situated on Provincial property (MTO) and provide direct access to the station via Trafalgar Road. The proposed transit station would accommodate an existing GO Park and Ride lot on site. The Trafalgar Road Station would have a total impact of approximately 8.19 ha on soils.

Additional Provincial lands beyond the protected footprint may be required to meet the service demand. In addition, the 'Transitway' designation in the Town of Oakville will need to extend well past the Tributary of Joshua Creek to recognize and accommodate the runningway.

### Segment S6: East of Trafalgar Road to North of Lower Base Line



Google Earth 2020

Lands located north of the 407 ETR lie within the Town of Milton. The dominant land use in the Town of Milton is agricultural, as most of the lands located on the Town's eastern border with the City of Mississauga (Region of Peel), and southern border with the Town of Oakville, (within the study area) are used for agricultural purposes. The runningway travels along the south side of the 407 ETR and crosses a Tributary the Joshua's Creek and its associated floodplain area within the Town of Oakville. The impacts to the Tributary of Joshua's Creek will be further refined and assessed during future project stages.

The runningway travels on lands designated as 'Parkway Belt West', 'Greenlands' and 'Natural Hazards' along the Ninth Line within the City of Mississauga. Although the runningway travels south of the 407 ETR, predominantly within the City of Mississauga, land use changes to the Town of Milton Official Plan may be required to reflect the footprint of the Transitway south of Lower Base Line. There are several large fields throughout the study area used for cash crops or horticulture operations. Some properties are associated with a residence.

Class 1 and 3 soils were identified within the Transitway study area in Segment S6. The runningway will approximately impact 14.8 ha of Class 1 soils, and 1.41 ha of Class 3 soils. The total impact to soils in this segment is approximately 16.2 ha. The soil classes in this segment range from soils having no significant limitations in use for crops, to soils having moderately severe limitations.

A tunnel through the interchange is proposed in Segment S6. The underground tunnel section would lead to the Lower Base Line. Land use will not be affected by the tunnel section. The runningway travels primarily within the City of Mississauga into lands designated as 'Business Employment' 'Parkway Belt West' and 'Residential Medium Density.'

Lands east of Ninth Line are designated under 'Parkway Belt West', 'Business Employment', 'Residential High Density', 'Residential Medium Density', 'Residential Low Density II', 'Motor Vehicle Commercial' and 'Public Open Space'. The runningway follows the City of Mississauga's Highway 407 Transitway Corridor Assessment within the Ninth Line Lands (2016).

Currently, the Ninth Line Neighbourhood is underdeveloped. It includes several commercial properties with outside storage and dispersed residential dwellings. However, surrounding land uses within the Ninth Line Neighborhood are expected to change. Future development for the Ninth Line Lands in the City of Mississauga will be based on the Ninth Line Neighbourhood Character Area, the six Ninth Line precincts, related Official Plan policies, and the urban design guidelines.

The Ninth Line Neighbourhood Character Area is subdivided into six (6) precincts that reflect differences in planning, function, and character. Segment S6 is located within Precinct 6 – The South Employment Area, and Precinct 5- Community Park/ Residential Area.

The South Employment Area is an entry point to the City of Mississauga and the Ninth Line Neighborhood Character Area. Permitted uses include buildings that front the Ninth Line and other streets, emphasising the public realm. Within the precinct, four to ten storeys will be permitted. The Community Park/Residential Area directly serves residents of the community through a Community Park and related facilities. Within Precinct 5, development in the northwest quadrant of Eglinton Avenue West and Ninth Line will mix a range of housing forms including townhouses and midrise apartments. Depending on the location, permitted height range will include three to six storeys, or four to ten storeys. Although the proposed 407 Transitway is acknowledged within policy and included on maps in Section 16.20 Ninth Line of the City of Mississauga Official Plan, changes to Schedule 10 Land use Designation will be required to reflect the footprint of the 407 Transitway.

### Segment S7: North of Lower Base Line to North of Britannia Road



Google Earth 2020

The runningway travels along the east side of the 407 ETR within the City of Mississauga. The runningway crosses the Tributary of the East Sixteen Mile Creek and its associated floodplain area, which flows through the Town of Milton. The Tributary of East Sixteen Mile Creek is designated within the Greenbelt Plan under the 'Protected Countryside.' The impacts to the Tributary of the East Sixteen Mile Creek will be further refined and assessed during future project stages. Segment S7 consists mostly of fields, large woodlots, and natural areas.

Class 1 and 3 soils were identified within the Transitway study area in Segment S7. The runningway will approximately impact 10.7 ha of Class 1 soils, and 0.63 ha of Class 3 soils. The total impact to soils in this segment is approximately 11.3 ha. The soil classes in this segment range from soils having no significant limitations in use for crops, to soils having moderately severe limitations.

Within the City of Mississauga lands are designated 'Parkway Belt West' 'Residential High Density', 'Greenlands', 'Public Open Space', 'Natural Hazards' and 'Mixed use'.

To the east of Ninth Line are two (2) established residential neighbourhoods including the Lisgar neighbourhood, located north of Britannia Road, and the Churchill Meadows neighbourhood, located south of Britannia Road.

Britannia Road Station is proposed at the southeast intersection of Britannia Road and the 407 ETR.

The proposed Britannia Road Station is situated on partially owned Provincial property and would provide direct access to the station via Ninth Line. Britannia Road Station would have a total impact of approximately 2.32 ha on soils.

Segment S7 lies within the City of Mississauga's Official Plan (2019 Consolidation) Ninth Line Neighbourhood Character Area, specifically within the Britannia 407 Transitway Station Area Precinct 4. The Britannia 407 Transitway Station Area (Precinct 4) includes lands surrounding the proposed Britannia 407 Transitway Station. Policy Section 16.20.3.4 in the City of Mississauga Official Plan states that development will be transit supportive with a range of building heights that range from four (4) to ten (10) storeys. Lands adjacent to the 407 Transitway Station will incorporate retail/commercial uses

at grade to enable a vibrant and active public realm. The surrounding buildings will be designed to accommodate retail/commercial uses at grade, and parking will be located within the building structures or underground. Currently, the City of Mississauga designates the lands south of the Ninth Line under 'Residential High Density', 'Residential Medium Density', 'Residential Low Density II', 'Convenience Commercial', 'Motor Vehicle Commercial' and 'Greenlands'.

Although the proposed 407 transitway is acknowledged and included within policy and maps in Section 16.20 Ninth Line of the City of Mississauga Official Plan, updates to Schedule 10 Land use Designation will be required to reflect the footprint of the 407 Transitway.

### Segment S8: North of Britannia Road to North of Derry Road



Google Earth 2020

The runningway continues along the east side of the 407 ETR within the City of Mississauga. The runningway travels on lands identified entirely within the 'Parkway Belt West', 'Natural Hazard Area', 'Greenlands', and 'Residential High Density'.

The runningway crosses through the Tributary of East Sixteen Mile Creek and its associated floodplain area north and south of Derry Road West. To avoid conflicting policies at the provincial and municipal level, the runningway avoided travelling along the west side of 407 ETR.

Class 1 and 3 soils were identified within the Transitway study area in Segment S8. The runningway will approximately impact 17.5 ha of Class 1 soils, and 4.7 ha of Class 3 soils. The total impact to soils in this segment is approximately 22.2 ha. The soil classes in this segment range from soils having no significant limitations in use for crops, to soils having moderately severe limitations.

A station is proposed at the northeast intersection of Derry Road and the 407 ETR. The proposed Derry Road Station location provides direct access to the station via Ninth Line and is situated on Provincially and municipally owned properties. The location of the Derry Road station on the east side of 407 ETR optimizes accessibility from the existing and planned residential areas in the Ninth Line corridor. The Ninth Line Lands are predominantly rural in nature, with agricultural fields, meadows, and areas of forest. The Tributary of East Sixteen Mile Creek is located within these lands. Derry Road Station will have a

total impact of approximately 3.6 ha on soils.

The City of Mississauga designates the lands west of the Ninth Line under 'Parkway Belt West', 'Natural Hazards', 'Residential High Density', 'Utility' and 'Greenlands' land use designation.

Segment S8 lies within the City of Mississauga's Official Plan (2019 Consolidation) Ninth Line Neighbourhood Character Area. The proposed transitway would travel adjacent to lands located within the North Britannia Area- Precinct 3. The North Britannia Area includes a large flood protection area including hazard lands and open spaces. To enable residential development adjacent to the Ninth lands, future planning will include earth filling on hazardous lands. This area will be subject to approval and planned in consultation with Credit Valley Conservation. Permitted uses will include townhouses and midrise apartments that range from three to six storeys.

Although the proposed 407 Transitway is acknowledged and included within policy and maps in Section 16.20 Ninth Line of the City of Mississauga Official Plan, updates to Schedule 10 Land use Designation will be required to reflect the footprint of the 407 Transitway.

### Segment S9: North of Derry Road to West of Heritage Road



Google Earth 2020

The runningway in this section is located within the Parkway Belt West Plan area, from west of Ninth Line in the City of Mississauga, to east of Meadowvale Boulevard in City of Brampton. There are small portions where the runningway leaves the Parkway Belt West Plan area, and enters lands designated as 'Provincial Highways' in the City of Brampton.

The existing land use within this segment is primarily a hydro corridor, west of Ninth Line to west Winston Churchill Boulevard. The runningway within this segment is proposed to be underground (a tunnel) therefore will not impact the existing land uses. At the surface, Lisgar GO Station is proposed in Segment S9. Lisgar Go Station will approximately have a total soil impact of 1.2 ha.



In the eastern limits of the segment in the City of Brampton, the runningway travels through lands designated as ‘Provincial Highways’ and ‘Parkway Belt West’, compatible with the Transitway land uses.

Class 0, 1 and 3 soils were identified within the Transitway study area in Segment S9. The runningway will approximately impact 3.4 ha of Class 0 soils, and 18.7 ha of Class 1 soils and 1.3 ha of Class 3 soils. The total impact to soils in this segment is approximately 23.4 ha. The soil classes in this segment range from soils having no significant limitations in use for crops, to soils having moderately severe limitations that restrict the range of crops.

Segment S9 can be identified within the City of Mississauga’s Official Plan (2019 Consolidation) Ninth Line Neighbourhood Character Area. The proposed Transitway would travel adjacent to lands located within the Derry 407 Transitway Station Area- Precinct 2. In this precinct, development would focus around the Derry 407 Transitway Station to create a vibrant, active node, comprised of mixed-use transit supportive development with seamless multi-modal connections. Land use designations would include ‘Mixed Use’ and ‘Residential Medium Density’, with permitted heights of four to ten storeys. Townhouses may also be permitted in this area. This area will accommodate the greatest heights and densities for the entire Ninth Line Neighbourhood Character Area. In addition, parking for the station is proposed to be in underground structures.

#### Segment S10: West of Heritage Road to East of Credit River



Google Earth 2020

The runningway travels within ‘Provincial Highways’, ‘Parkway Belt West’ Plan area and crosses natural areas where water courses exist. As the runningway crosses the Tributary of Mullet Creek, it transitions from the south side of the 407 ETR to the north side of the 407 ETR. the Tributary of Mullet Creek is identified as ‘Open Space’ in the City of Brampton Official Plan. Within the study area on the south side of the 407 ETR, the runningway abuts lands within the City of Mississauga designated as ‘Greenlands’, ‘Public Open Space’, and ‘Natural Hazard Area’. Within the eastern portion of Segment S10, the runningway crosses Levi’s Creek, which is designated as ‘Open Space’ under the City of Brampton Official Plan. The impact on these watercourses will be further refined during future project stages.

Before the runningway transitions to the north side of the 407 ETR, it travels within the ‘Parkway Belt West’ Plan area. Mississauga Road Station is proposed at the northwest intersection of Mississauga Road and 407 ETR. The proposed Mississauga Road Station would be situated on Provincial property, and direct access to the station would be available through a municipal road. The Brampton Official Plan designates lands surrounding the Mississauga Road Station as ‘Provincial Highways’, ‘Office’, ‘Open Space’, and ‘Industrial’. The proposed Mississauga Road Station would have approximately a total impact of 3.0 ha on soils.

Since the runningway runs entirely within the ‘Provincial Highways’ designation, it is consistent with the intent of the 407 Transitway.

Towards the end of Segment 10, the runningway transitions from the north side of 407 ETR, to the south side of the 407 ETR after crossing the Credit River, which is designated ‘Urban River Valley’ under the Greenbelt Plan. The Credit River is also identified as ‘Open Space’ under the City of Brampton Official Plan. The impacts to the Credit River in Segment S10 will be further refined during detail design. Class 0 soils were identified within the Transitway study area in Segment S10. The runningway will approximately impact a total of 21.8 ha of Class 0 (organic) soils.

#### Segment S11: East of Credit River to West of Hurontario Street



Google Earth 2020

The runningway in this segment is located within the Parkway Belt West Plan area, and is designated as ‘Utility’, ‘Inter-urban Transit’ and ‘Electric Power Facility’. The majority of the runningway follows the ‘Inter-urban Transit’ land use designation. The Transitway is compatible with these land use designations; however, an amendment may be required.

The runningway travels primarily within the City of Brampton within the ‘Provincial Highway’ land use designation and continues through the ‘L.B.P.I.A Operating Area’.

Between two major watercourses, the Credit River and the Tributary of Fletcher’s Creek, a third tunnel section is proposed. The runningway crosses the Tributary of Fletcher’s Creek. The City of Brampton Official Plan designates the Tributary of Fletcher’s Creek as ‘Open Space.’ Within the City of Mississauga Official Plan, the Credit River and the Tributary of Fletcher’s Creek is identified under the ‘Natural Hazards’ and ‘Greenlands’ land use designation. The impacts to these watercourses will be further refined during future project stages. The natural heritage impact assessment will be conducted to

determine the impacts of the runningway on natural heritage features.

Class O soils were identified within the Transitway study area in Segment S11. The runningway will approximately impact a total of 9.7 ha of Class O (organic) soils.

## **NOISE AND VIBRATION**

Footprint impacts regarding noise and vibration do not apply.

## **BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES**

A Cultural Heritage Report - Existing Conditions and Preliminary Impact Assessment (June 2020) was carried out by ASI to identify known and potential built heritage resources and cultural heritage landscapes located within and adjacent to the study area, identify preliminary potential project-specific impacts and propose measures to avoid or mitigate potential negative impacts. The study area has a rural land use history dating back to the early nineteenth century. The identified built heritage resources and cultural heritage landscapes are historically and contextually associated with late-nineteenth century and early twentieth century land use patterns in the former Townships of Trafalgar and Toronto. Thirty-one built cultural heritage resources and cultural heritage landscapes were identified within/adjacent to the study area, seventeen of which face potential impacts, including seven farmscapes (CHR 13, 14, 20, 22, 26, 29, 30), five remnant farmscapes (CHR 11, 19, 25, 27,28), one residence (CHR 8), one former residence (CHR 31), one church and cemetery (CHR 24); one heritage conservation district (CHR 23) and one stable (CHR 21). See **Appendix G** for locations of the built cultural heritage resources and cultural heritage landscapes.

To assess the potential impacts of the 407 Transitway on built heritage resources and cultural heritage landscapes, the identified built heritage resources and cultural heritage landscapes were considered against a range of possible impacts as outlined in the document entitled Information Bulletin 3 – Heritage Impact Assessments for Provincial Heritage Properties 2017). See **Table 6.7** for a summary of preliminary impacts.

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**TABLE 6.7: PRELIMINARY IMPACT ASSESSMENT TO BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN/ADJACENT TO THE STUDY AREA**

CHR # AND TYPE	LOCATION	HERITAGE RECOGNITION	TYPE AND DESCRIPTION OF POTENTIAL/ANTICIPATED IMPACT	MITIGATION MEASURES: I. MITIGATION OPTIONS II. MITIGATION RECOMMENDATION
CHR 1, remnant farmscape	7420 Ninth Line, Mississauga.	Designated, Part IV (By-law 74-96)	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A.
CHR 2, Farmscape	7564 Tenth Line West, Mississauga.	Designated, Part IV (By-law 857-79)	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 3, Farmscape	3451 Tremaine Road, Oakville.	Listed by the Town of Oakville	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 4, Farmscape	2483 Burnhamthorpe Road West, Oakville.	Listed by the Town of Oakville	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 5, Residence	2381 Burnhamthorpe Road West, Oakville.	Listed by the Town of Oakville	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 6, Farmscape	2401 Burnhamthorpe Road West, Oakville.	Listed by the Town of Oakville	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 7, Residence	1495 Burnhamthorpe Road West, Oakville.	Listed by the Town of Oakville	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 8, Residence	4119 Fourth Line, Oakville.	Listed by the Town of Oakville	Direct: Impacts to CHR 8 are anticipated to include the demolition of the buildings on the property, tree clearing, grading, and potential property acquisition.	Preferred Option: Where feasible, avoid all impacts to CHR 8. The proposed runningway should be relocated to avoid this potential built heritage resource.  Alternative Option: Where revisions to the preferred alignment are determined to be infeasible, a resource-specific CHER should be conducted for the residence at 4119 Fourth Line, Oakville to evaluate CHVI.  As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.
CHR 9, Bridge	Glenorchy Bridge, Fourth Line, Oakville	Listed by the Town of Oakville	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 10, Farmscape	4022 Fourth Line, Oakville.	Listed by the Town of Oakville	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 11, Remnant farmscape	263 Burnhamthorpe Road West, Oakville.	Listed by the Town of Oakville	Direct: Impacts to CHR 11 are anticipated to include grading, tree clearing, and proposed property acquisitions.  The remnant residence, barn, and outbuildings are not anticipated to be impacted as a result of the proposed undertaking.	Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to the remnant structures in CHR 11.  Where feasible, grading limits and tree clearing should be altered in order to limit the impacts to CHR 11.  Alternative Option: Where construction is anticipated to result in grading impacts and tree removal to CHR 11, post-construction landscaping with native species should be employed to mitigate impacts to the heritage value of the resource.  Given the potential cultural heritage value of the farmscape at 263 Burnhamthorpe Road West, Oakville, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.  As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.
CHR 12, Farmscape	185 Burnhamthorpe Road West, Oakville.	Designated Part IV, (By-law 1992-237)	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 13, Farmscape	4243 Sixth Line, Oakville.	Listed by the Town of Oakville	Direct: Impacts to CHR 13 are anticipated to include grading, tree clearing, and proposed property acquisitions.  The residence, barn, and outbuildings are not anticipated to be impacted as a result of the proposed undertaking.	Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to the residence, barn, and outbuildings in CHR 13.  Where feasible, grading limits and tree removal should be altered in order to limit the impacts to CHR 13.  Alternative Option:

**TABLE 6.7: PRELIMINARY IMPACT ASSESSMENT TO BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN/ADJACENT TO THE STUDY AREA**

CHR # AND TYPE	LOCATION	HERITAGE RECOGNITION	TYPE AND DESCRIPTION OF POTENTIAL/ANTICIPATED IMPACT	MITIGATION MEASURES: I. MITIGATION OPTIONS II. MITIGATION RECOMMENDATION
				<p>Where construction is anticipated to result in grading impacts and tree removal to CHR 13, post-construction landscaping with native species should be employed to mitigate impacts to the heritage value of the resource.</p> <p>Given the potential cultural heritage value of the farmscape at 4243 Sixth Line, Oakville, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>
CHR 14, Farmscape	4233 Trafalgar Road, Oakville.	Listed by the Town of Oakville	Direct: Impacts to CHR 14 are anticipated to include the demolition of the buildings on the property, grading, tree clearing, and potential property acquisition.	<p>Preferred Option: Where feasible, the preferred alternative should be designed in a manner that avoids all impacts to CHR 14.</p> <p>The proposed runningway should be relocated to avoid this potential built heritage resource.</p> <p>Alternative Option: Given the potential cultural heritage value of the farmscape at 4233 Trafalgar Road, Oakville, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>
CHR 15, Former residence	906 Brant Street, Burlington.	Listed by the City of Burlington	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 16, Museum	2168 Guelph Line, Burlington.	Designated, Part IV of the OHA (By-Law 9-1978)	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 17, Residence	3015 Dundas Street, Burlington.	Listed by the City of Burlington	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 18, Church and Cemetery	3318 Dundas Street, Burlington.	Designated, Part IV of the OHA (By-Law 501-06)	No impacts anticipated as the preferred alternative is not adjacent to the identified cultural heritage resource.	N/A
CHR 19, Remnant farmscape	7044 Ninth Line, Mississauga.	Listed by the City of Mississauga	Direct: Impacts to CHR 19 are anticipated to include the demolition of the residence on the property, grading, tree clearing, and proposed property acquisitions.	<p>Preferred Option: Where feasible, the preferred alternative should be designed in a manner that avoids all impacts to CHR 19.</p> <p>Where feasible, the proposed runningway should be relocated to avoid this potential built heritage resource.</p> <p>Alternative Option: Given the potential cultural heritage value of the remnant farmscape at 7044 Ninth Line, Mississauga, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>
CHR 20, Farmscape	5768 Ninth Line, Mississauga.	Listed by the City of Mississauga	Direct: Impacts to CHR 20 are anticipated to include demolition of barns and outbuildings, grading, tree clearing, and proposed property acquisition.	<p>Preferred Option: Where feasible, the proposed runningway should be relocated and designed in a manner that avoids all impacts to CHR 20.</p> <p>Alternative Option: Where construction is anticipated to result in grading impacts and tree removal to CHR 20, post-construction landscaping with native tree species should be employed to mitigate impacts to the heritage value of the resource.</p> <p>Given the potential cultural heritage value of the farmscape at 5768 Ninth Line, Mississauga, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>
			The residence is not anticipated to be impacted as a result of the proposed.	

**TABLE 6.7: PRELIMINARY IMPACT ASSESSMENT TO BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN/ADJACENT TO THE STUDY AREA**

CHR # AND TYPE	LOCATION	HERITAGE RECOGNITION	TYPE AND DESCRIPTION OF POTENTIAL/ANTICIPATED IMPACT	MITIGATION MEASURES: I. MITIGATION OPTIONS II. MITIGATION RECOMMENDATION
CHR 21, Stable	2800 Meadowpine Boulevard, Brampton <sup>1</sup> .	Identified during field review	<p>Direct: Impacts to CHR 21 are anticipated to include grading, removal of an entrance drive, tree clearing, and proposed property acquisition.</p> <p>The stable is not anticipated to be impacted as a result of the proposed undertaking.</p>	<p>Preferred Option: Where feasible, grading limits and proposed tree removals should be altered in order to limit the impacts to CHR 21.</p> <p>Alternative Option: Where construction is anticipated to result in grading impacts and tree removal to CHR 21, post-construction landscaping with native tree species should be employed to mitigate impacts to the heritage value of the resource.</p> <p>Given the potential cultural heritage value of the stables at 2800 Meadowpine Boulevard, Brampton, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>
CHR 22, Farmscape	7696 Heritage Road, Brampton <sup>2</sup> .	Listed by the City of Brampton	<p>Direct: Impacts to CHR 22 are anticipated to include grading, tree clearing, and proposed property acquisitions.</p> <p>The residence, barn, and outbuildings are not anticipated to be impacted as a result of the proposed undertaking.</p>	<p>Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to the residence, barn, and outbuildings in CHR 22.</p> <p>Where feasible, grading limits and tree removal should be altered in order to limit the impacts to CHR 22.</p> <p>Alternative Option: Where construction is anticipated to result in grading impacts and tree removal to CHR 22, post-construction landscaping with native species should be employed to mitigate impacts to the heritage value of the resource.</p> <p>Given the potential cultural heritage value of the farmscape at 7696 Heritage Road, Brampton, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>
CHR 23, Heritage Conservation District	Churchville Heritage Conservation District.	Designated, Part V under the <i>Ontario Heritage Act</i> . (By-law 219-90, 221-2002 (A))	<p>Direct: Direct impacts to CHR 23 are anticipated to include grading, tree clearing, and proposed property acquisitions at 7522 and 7523 Creditview Road, both in the Churchville HCD.</p> <p>The residence at 7522 Creditview Road, a non-contributing heritage property to the Churchville HCD, is not anticipated to be impacted as a result of the proposed undertaking.</p> <p>The residence or structures at 7523 Creditview Road, a contributing heritage property to the Churchville HCD, are not anticipated to be impacted as a result of the proposed undertaking.</p>	<p>Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to CHR 23.</p> <p>Alternative Option: Given the cultural heritage value of the Churchville Heritage Conservation District, Brampton, and the anticipated impacts the properties at 7522 and 7532 Creditview Road within the HCD, a resource-specific HIA should be conducted as per City of Brampton Official Plan clauses 4.10.1.10 and 4.10.3.14.</p>
CHR 24, Church and Cemetery	6056 Ninth Line, Mississauga.	Listed by the City of Mississauga	<p>Indirect: No direct impacts anticipated as the preferred alternative will be confined to the property adjacent to CHR 24.</p>	<p>Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to CHR 24. No-go zones should be implemented to avoid impacts to the internments and church in CHR 24.</p> <p>Given the cultural heritage value of the church and cemetery at 6056 Ninth Line, Mississauga, and the anticipated impacts adjacent to the subject property, a resource-specific CHER should be conducted to determine CHVI.</p>

<sup>1</sup> The stable, landscape features, and equestrian lands identified at 2800 Meadowpine Boulevard, Brampton, and operate as Meadowlarke Stables are located on the legal property parcel associated with 7696 Heritage Road, Brampton. However, for the purposes of this assessment all lands associated with Meadowlarke Stables fronting on Meadowpine Boulevard will be assessed as part of 2800 Meadowpine Boulevard, Brampton.

<sup>2</sup> While the legal property parcel at 7696 Heritage Road, Brampton, includes the lands associated with 2800 Meadowpine Boulevard, Brampton that operates as Meadowlarke Stables (CHR 21), only the residence, barn, and active agricultural lands fronting on Heritage Road will be assessed as 7696 Heritage Road, Brampton (CHR 22).

**TABLE 6.7: PRELIMINARY IMPACT ASSESSMENT TO BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN/ADJACENT TO THE STUDY AREA**

CHR # AND TYPE	LOCATION	HERITAGE RECOGNITION	TYPE AND DESCRIPTION OF POTENTIAL/ANTICIPATED IMPACT	MITIGATION MEASURES: I. MITIGATION OPTIONS II. MITIGATION RECOMMENDATION
			Indirect impacts to CHR 24 are anticipated to include grading, tree clearing, and proposed property acquisition of the property adjacent to CHR 24.	As there are indirect impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.
CHR 25, Remnant farmscape	6136 Ninth Line, Mississauga.	Listed by the City of Mississauga*	Direct: Impacts to CHR 25 are anticipated to include grading, tree clearing, and proposed property acquisitions.  The foundation remains are not anticipated to be impacted as a result of the proposed undertaking.	Preferred Option: Staging and construction activities should be suitably planned to limit impacts to CHR 25.  Where feasible, grading limits and proposed tree removals should be altered in order to limit the impacts to CHR 25.  Alternative Option: Where construction is anticipated to result in grading impacts and tree removals to CHR 25, post-construction landscaping with native tree species should be employed to mitigate impacts to the heritage value of the resource.  Given the potential cultural heritage value of CHR 25, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.  As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.  Consultation with the City of Mississauga in March 2020 confirmed that this property was removed from the heritage register and that no CHER was required.
CHR 26, Farmscape	6432 Ninth Line, Mississauga.	Listed by the City of Mississauga*	Indirect: No direct impacts anticipated as the preferred alternative will be confined to the property adjacent to CHR 26.  Indirect impacts to CHR 26 are anticipated to include grading, tree clearing, and proposed property acquisition of the property adjacent to CHR 26.	Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to CHR 26.  No-go zones should be suitably planned to avoid impacts to CHR 26.  Given the potential cultural heritage value of CHR 26, and the anticipated impacts adjacent to the subject property, a resource-specific CHER should be conducted to determine CHVI.  As there are indirect impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.  Consultation with the City of Mississauga in March 2020 confirmed that this property was removed from the heritage register and that no CHER was required.
CHR 27, Remnant farmscape	6588-6596 Ninth Line, Mississauga.	Listed by the City of Mississauga*	Indirect: No direct impacts anticipated as the preferred alternative will be confined to the property adjacent to CHR 27.  Indirect impacts to CHR 27 are anticipated to include grading, tree clearing, and proposed property acquisition of the property adjacent to CHR 27.	Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to CHR 27.  No-go zones should be suitably planned to avoid impacts to CHR 27.  Given the potential cultural heritage value of CHR 27, and the anticipated impacts adjacent to the subject property, a resource-specific CHER should be conducted to determine CHVI.  As there are indirect impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.  Consultation with the City of Mississauga in March 2020 confirmed that this property was removed from the heritage register and that no CHER was required.
CHR 28, Remnant Farmscape	7238 Ninth Line, Mississauga.	Listed by the City of Mississauga*	Direct: Impacts to CHR 28 are anticipated to include grading, tree clearing, and proposed property acquisitions.	Preferred Option: Staging and construction activities should be suitably planned to limit impacts to CHR 28.  Where construction is anticipated to result in grading impacts and tree removals to CHR 28, post-construction landscaping with native tree species should be employed to mitigate impacts to the heritage value of the resource.  Given the potential cultural heritage value of CHR 28, and the anticipated impacts to the subject property, a resource-specific CHER should be conducted to determine CHVI.

**TABLE 6.7: PRELIMINARY IMPACT ASSESSMENT TO BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN/ADJACENT TO THE STUDY AREA**

CHR # AND TYPE	LOCATION	HERITAGE RECOGNITION	TYPE AND DESCRIPTION OF POTENTIAL/ANTICIPATED IMPACT	MITIGATION MEASURES: I. MITIGATION OPTIONS II. MITIGATION RECOMMENDATION
				<p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p> <p>Consultation with the City of Mississauga in March 2020 confirmed that this property was removed from the heritage register and that no CHER was required.</p>
CHR 29, Farmscape	5104 Ninth Line, Mississauga.	Listed by the City of Mississauga	<p>Indirect: No direct impacts anticipated as the preferred alternative will be confined to the property adjacent to CHR 29.</p> <p>Indirect impacts to CHR 29 are anticipated to include grading, tree clearing, and proposed property acquisition of the property adjacent to CHR 29.</p>	<p>Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to CHR 29.</p> <p>No-go zones should be suitably planned to avoid impacts to CHR 29.</p> <p>Alternative Option: Given the potential cultural heritage value of the former residence at 5104 Ninth Line, Mississauga, and the anticipated impacts to the adjacent property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are indirect impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>
CHR 30, Farmscape	3269-3271 Dundas Street West, Oakville.	Listed by the City of Oakville	<p>Direct: Impacts to CHR 30 are anticipated to include grading, tree clearing, and proposed property acquisitions.</p> <p>The residences, barns, and buildings are not anticipated to be impacted as a result of the proposed undertaking.</p>	<p>Preferred Option: Staging and construction activities should be suitably planned to avoid impacts to CHR 30. Where feasible, grading limits and proposed tree removals should be altered in order to limit the impacts to CHR 30.</p> <p>Alternative Option: Where construction is anticipated to result in grading impacts and tree removals to CHR 30, post-construction landscaping with native tree species should be employed to mitigate impacts to the heritage value of the resource.</p> <p>Given the potential cultural heritage value of the farmscape at 3269-3271 Dundas Street West, Oakville, and the anticipated impacts to the property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>
CHR 31, Former residence	0 Heritage Road, Brampton.	Identified during field review	<p>Direct: Impacts to CHR 31 are anticipated to include the demolition of the buildings on the property, grading, tree clearing, and potential property acquisition.</p>	<p>Preferred Option: Where feasible, the preferred alternative should be designed in a manner that avoids all impacts to CHR 31.</p> <p>Alternative Option: If retention of CHR 31 in the preferred alternative is determined to be infeasible</p> <p>Given the potential cultural heritage value of the property at 0 Heritage Road, Brampton, and the anticipated impacts to the property, a resource-specific CHER should be conducted to determine CHVI.</p> <p>As there are direct impacts anticipated, should the CHER determine that the property retains CHVI, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures.</p>

A direct adverse impact would have a permanent and irreversible negative affect on the cultural heritage value or interest of a property or result in the loss of a heritage attribute on all or part of the property. Examples of direct adverse impacts include, but are not limited to:

- removal or demolition of all or part of any heritage attribute
- removal or demolition of any building or structure on the property whether or not it contributes to the cultural heritage value or interest of the property (i.e. non-contributing buildings)
- any land disturbance, such as a change in grade and/or drainage patterns that may adversely affect the property, including archaeological resources
- alterations to the property in a manner that is not sympathetic, or is incompatible, with cultural heritage value or interest of the property. This may include necessary alterations, such as new systems or materials to address health and safety requirements, energy-saving upgrades, building performance upgrades, security upgrades or servicing needs
- alterations for access requirements or limitations to address such factors as accessibility, emergency egress, public access, security
- introduction of new elements that diminish the integrity of the property, such as a new building, structure or addition, parking expansion or addition, access or circulation roads, landscape features changing the character of the property through removal or planting of trees or other natural features, such as a garden, or that may result in the obstruction of significant views or vistas within, from, or of built and natural features
- change in use for the property that could result in permanent, irreversible damage or negates the property's cultural heritage value or interest
- continuation or intensification of a use of the property without conservation of heritage attributes.

An indirect adverse impact would be the result of an activity on or near the property that may adversely affect its cultural heritage value or interest and/or heritage attributes. Examples of indirect adverse impacts include, but are not limited to:

- shadows that alter the appearance of a heritage attribute or change the visibility of an associated natural feature or plantings, such as a tree row, hedge or garden
- isolation of a heritage attribute from its surrounding environment, context or a significant relationship

- vibration damage to a structure due to construction or activities on or adjacent to the property
- alteration or obstruction of a significant view of or from the property from a key vantage point.

Positive impacts are those that may positively affect a property by conserving or enhancing its cultural heritage value or interest and/or heritage attributes. Examples of positive impacts may include, but are not limited to:

- changes or alterations that are consistent with accepted conservation principles, such as those articulated in MTCS's Eight Guiding Principles in the Conservation of Historic Properties, Heritage Conservation Principles for Land Use Planning, Parks Canada's Standards and Guidelines for the Conservation of Historic Places in Canada
- adaptive re-use of a property – alteration of a heritage property to fit new uses or circumstances of the of property in a manner that retains its cultural heritage value of interest
- public interpretation or commemoration of the heritage property.

Based on the preliminary impacts presented in the Cultural Heritage Report - Existing Conditions and Preliminary Impact Assessment (June 2020), thirteen built cultural heritage resources and cultural heritage landscapes (CHR 8, 11, 13, 14, 19, 20, 21, 22, 23, 25, 28, 30,31) will face direct impacts, which include property acquisition, tree/vegetation removal, and/or structure demolition. Cultural Heritage Evaluations (CHERs) were recommended for 12 properties (CHR 8, 11, 13, 14, 19, 20, 21, 22, 24, 28, 30, 31) and a Heritage Impact Assessment (HIA) was recommended for CHR 23. The results of the CHERs presented that six properties required Heritage Impact Assessment (CHR 13, 22, 23, 24, 29, 30, 31).

All CHERs and HIAs were undertaken in March - July 2020 by ASI. The Cultural Heritage Report – Existing Conditions and Preliminary Impact Assessment, CHERs and HIAs are included in **Appendix G**.

See **Section 6.3.2** for construction impacts and proposed mitigation measures.

The scope of a CHER is guided by the Ministry of Heritage, Sport, Tourism and Cultural Industries (MHSTCI) *Ontario Heritage Toolkit* (2006) and the MTO *Environmental Guide for Built Heritage and Cultural Heritage Landscapes* (2007). The cultural heritage resource evaluation is guided by the *Ontario Heritage Act*. The Ontario Regulation 9/06 of the *Ontario Heritage Act* provides criteria that determine that cultural heritage value or interest of a potential heritage resource in a municipality. The Ontario Regulation 10/06 of the *Ontario Heritage Act* provides criteria that determine cultural heritage value or interest of provincial significance. **Table 6.8** presents the results of the CHERs and HIAs.



**TABLE 6.8: RESULTS OF THE CULTURAL HERITAGE RESOURCE EVALUATIONS AND HERITAGE IMPACT ASSESSMENTS**

CHR #	RESULTS OF CULTURAL HERITAGE EVALUATION REPORT	RESULTS OF HERITAGE IMPACT ASSESSMENT REPORT
CHR 8 4119 Fourth Line, Oakville.	It does not meet the criteria in Ontario Regulation 9/06 and 10/06 of the <i>Ontario Heritage Act</i> .  Property is not considered a Provincial Heritage Property or a Provincial Heritage Property of Provincial Significance.	N/A
CHR 11 263 Burnhamthorpe Road West, Oakville	It does not meet the criteria in Ontario Regulation 9/06 and 10/06 of the <i>Ontario Heritage Act</i> .  Property is not considered a Provincial Heritage Property or a Provincial Heritage Property of Provincial Significance.	N/A
CHR 13 4243 Sixth Line, Oakville	It meets the criteria in Ontario Regulation 9/06 of the <i>Ontario Heritage Act</i> . It contains the 1898 farmhouse, turn-of-the-century bank barn, and other agricultural outbuildings, retains cultural heritage value or interest. The property has design or physical value as a representative example of an evolved agricultural landscape, historical or associative value because of its direct associations with the theme of agriculture in Trafalgar Township and the important Biggar family, and contextual value because the presence of the farmhouse, bank barn, drive shed, and workshop contribute to the property's ongoing status as a defined agricultural landscape. It does not meet the criteria in Ontario Regulation 10/06 of the <i>Ontario Heritage Act</i> .  Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.	Minor direct impacts on the of the property through soil disturbance, grading, potential vibration impacts, and the introduction of a roadway that may diminish the integrity of the property. Mitigation measures are: <ul style="list-style-type: none"> <li>• The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>• Staging and construction activities will be planned and executed to mitigate or prevent any unintended impacts to any built structure on the subject property. Temporary fencing will be installed during construction to ensure ongoing access to the barn entrance on the north side and the operations of the overall site can safely continue.</li> <li>• Should construction activities necessarily involve the removal of trees and destruction of the pond: post-construction landscaping and rehabilitation which includes planting new trees on the south side of the transitway and/or the creation of a new pond.</li> <li>• Consultation and coordination with the owner(s)/operator(s) of the farm will be carried out to ensure suitable mitigation measures are employed during detail design and construction phases.</li> <li>• To ensure the residence and structures on the property are not adversely impacted during construction, a qualified engineer will undertake a condition assessment of the structures within the vibration zone of influence during detail design. Commitment to repair damages caused by vibration will be included in the construction phase.</li> </ul>
CHR 14 4233 Trafalgar Road, Oakville	It does not meet the criteria in Ontario Regulation 9/06 and 10/06 of the <i>Ontario Heritage Act</i> .  Property is not considered a Provincial Heritage Property or a Provincial Heritage Property of Provincial Significance.	N/A
CHR 19 7044 Ninth Line, Mississauga	It does not meet the criteria in Ontario Regulation 9/06 and 10/06 of the <i>Ontario Heritage Act</i> .  Property is not considered a Provincial Heritage Property or a Provincial Heritage Property of Provincial Significance.	N/A
CHR 20 5768 Ninth Line, Mississauga	It does not meet the criteria in Ontario Regulation 9/06 and 10/06 of the <i>Ontario Heritage Act</i> .  Property is not considered a Provincial Heritage Property or a Provincial Heritage Property of Provincial Significance.	N/A
CHR 21 2800 Meadowpine Boulevard, Brampton	It does not meet the criteria in Ontario Regulation 9/06 and 10/06 of the <i>Ontario Heritage Act</i> .  Property is not considered a Provincial Heritage Property or a Provincial Heritage Property of Provincial Significance.	N/A
CHR 22 7696 Heritage Road, Brampton	It meets the criteria in Ontario Regulation 9/06 of the <i>Ontario Heritage Act</i> . It retains architectural or design value as an early and representative example of a Gothic Revival farmhouse in the City of Brampton. It does not meet the criteria in Ontario Regulation 10/06 of the <i>Ontario Heritage Act</i> .  Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.	Minor direct impacts on the of the property through removal of portions of agricultural fields, soil disturbance, grading, potential vibration impacts, and the introduction of a roadway that may diminish the integrity of the property. Mitigation measures are: <ul style="list-style-type: none"> <li>• The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>• Staging and construction activities will be planned and executed to mitigate or prevent any unintended impacts to the agricultural fields, former paddocks, and any other built structure on the subject property. Prior to construction, temporary fencing will be installed along the field edge north of the residence to separate the construction area from the thick vegetation and former paddocks.</li> <li>• In locations where the preliminary design of the 407 Transitway is affecting existing access to the property, the detail design phase to be undertaken in the future prior to construction of the 407 Transitway, will ensure continued viable access. Currently, the timing for detail design and Construction is not known, thus the existing farm access roads are being maintained.</li> </ul>

**TABLE 6.8: RESULTS OF THE CULTURAL HERITAGE RESOURCE EVALUATIONS AND HERITAGE IMPACT ASSESSMENTS**

CHR #	RESULTS OF CULTURAL HERITAGE EVALUATION REPORT	RESULTS OF HERITAGE IMPACT ASSESSMENT REPORT
		<ul style="list-style-type: none"> <li>To ensure the residence and barn on the property are not adversely impacted during construction, a qualified engineer will undertake a condition assessment of the structures within the vibration zone of influence. Commitment to repair damages caused by vibration will be included in the construction phase.</li> </ul>
CHR 23 Churchville Heritage Conservation District	N/A –Designated, Part V under the <i>Ontario Heritage Act</i> (By-law 219-90, 221-2002 (A))	<p>Impacts on the Churchville Heritage Conservation District (HCD) can be mitigated by measures described in the policies and guidelines of the Churchville HCD Plan.</p> <ul style="list-style-type: none"> <li>The proposed transitway will traverse through two properties: one property on 7523 Creditview Road with a “Building of Heritage Significance” and another property on 7522 Creditview Road without “Building of Heritage Significance”. There are no impacts to the cultural heritage value of these properties as described in the policies and guidelines for properties within the Churchville HCD Plan.</li> <li>The proposed work will have an impact on the “Landscape Units” in which these two properties are contained. These impacts are not anticipated to be significant and can be mitigated using the policies and guidelines set in the Churchville HCD Plan.</li> <li>As per the policies and guidelines of the Churchville HCD Plan, a row of vegetation will be planted along the southern boundary of the properties at 7522 Creditview Road and 7523 Creditview Road as a form of mitigation to provide/maintain a vegetative buffer between these properties and the 407 Transitway.</li> <li>Documentation will be prepared to record the existing treelines prior to removal and the relationship between the southern edge of the Churchville HCD and Highway 407.</li> </ul>
CHR 24 6056 Ninth Line, Mississauga	<p>It meets the criteria in Ontario Regulation 9/06 of the <i>Ontario Heritage Act</i>. The c.1882 brick church and associated cemetery, retains cultural heritage value or interest in the City of Mississauga. The property has design or physical value as a representative example of a rural Gothic Revival style church, historical or associative value because of its direct associations with early Irish Catholic settlers and the community known as the Catholic Swamp and Nunan’s Corner, and contextual value as a cultural heritage landscape that is physically and historically linked to its surroundings having served the local community as a religious meeting place and burial ground since the early nineteenth-century. It does not meet the criteria in Ontario Regulation 10/06 of the <i>Ontario Heritage Act</i>.</p> <p>Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.</p>	<p>Temporary, indirect impact on the cultural heritage value or interest of the property through construction work occurring immediately adjacent to the property’s western boundary. It is anticipated to be minor in scale, temporary in duration and located approximately 40 m west of the church and cemetery. Mitigation measures are:</p> <ul style="list-style-type: none"> <li>Prior to commencing work, construction crews will be informed of the heritage status of the subject property and construction activities will be planned and executed to mitigate or prevent any potential impacts to the property. No-go zones will be established and temporary fencing will be installed prior to construction to ensure that there are no unintended impacts to the subject property.</li> <li>As the nineteenth-century church and cemetery on the subject property are located approximately 40 m east of the anticipated area of impact, impacts related to vibration are possible. To ensure the church and cemetery on the subject property are not adversely impacted during construction, a qualified engineer will undertake a condition assessment of the structures within the vibration zone of influence. Commitment to repair damages caused by vibration will be included in the construction phase.</li> </ul>
CHR 29 5104 Ninth Line, Mississauga	<p>It meets the criteria in Ontario Regulation 9/06 of the <i>Ontario Heritage Act</i>. It retains architectural or design value as a representative example of a Neoclassical residence in the City of Mississauga and historical or associative value from the connection with Charles O’Hara, a prominent settler and an important contributor to the religious life of local Irish Catholic settlers in the Catholic Swamp. It does not meet the criteria in Ontario Regulation 10/06 of the <i>Ontario Heritage Act</i>.</p> <p>Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.</p>	<p>No direct or indirect impacts to the subject property as construction activities will be confined to the adjacent property parcel. Construction activities are anticipated to be minor in scale, temporary in duration, and located approximately 110 m west of the property boundary and 150 m west of the residence. Mitigation measures are:</p> <ul style="list-style-type: none"> <li>Prior to commencing work, construction crews will be informed of the heritage status of the subject property and construction activities will be planned and executed to mitigate or prevent any potential impacts to the property. No-go zones will be established and temporary fencing will be installed prior to construction to ensure that there are no unintended impacts to the subject property.</li> </ul>
CHR 30 3269-3271 Dundas Street West, Oakville	<p>It meets the criteria in Ontario Regulation 9/06 of the <i>Ontario Heritage Act</i>. It retains cultural heritage value from its historical and contextual association with early settlement in the area and the theme of agricultural development. It does not meet the criteria in Ontario Regulation 10/06 of the <i>Ontario Heritage Act</i>.</p> <p>Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.</p>	<p>Minor direct adverse impact on the cultural heritage value or interest of the property through acquisition and redevelopment of a small section of the agricultural fields in the northern portion of the property. Mitigation measures are:</p> <ul style="list-style-type: none"> <li>The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>Staging and construction activities will be suitably planned and executed to mitigate or prevent any potential destruction to the crop fields, stand of mature trees, and flow of the watercourses. Temporary fencing will be installed during construction to ensure that the operations of this active farm can safely continue.             <ol style="list-style-type: none"> <li>post-construction landscaping and rehabilitation. Consideration will be given to planting new trees on the south side of the Transitway following runningway construction. The preliminary design of the 407 Transitway including grading limits and proposed structures at watercourse crossing were developed to minimize impacts to watercourses.</li> <li>Consultation and coordination with the owner(s)/operator(s) of the farm will be carried out to ensure suitable mitigation measures are employed during the detail design and construction phases.</li> </ol> </li> </ul>

**TABLE 6.8: RESULTS OF THE CULTURAL HERITAGE RESOURCE EVALUATIONS AND HERITAGE IMPACT ASSESSMENTS**

CHR #	RESULTS OF CULTURAL HERITAGE EVALUATION REPORT	RESULTS OF HERITAGE IMPACT ASSESSMENT REPORT
<p>CHR 31 7655 Heritage Road, Brampton</p>	<p>It meets the criteria in Ontario Regulation 9/06 of the <i>Ontario Heritage Act</i>. It retains architectural or design value associated with the c.1830's log house, encased in the c.1880s frame dwelling, and is considered to be a rare surviving example of an early nineteenth-century log house. It does not meet the criteria in Ontario Regulation 10/06 of the <i>Ontario Heritage Act</i>.</p> <p>Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.</p>	<p>Removal of the residential structure on property. Mitigation measures are:</p> <ul style="list-style-type: none"> <li>• The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>• During detail design, consideration will be made to relocate the residence to a new location on its current site. In this respect, a qualified structural engineer(s) with experience in assessing built heritage resources will be retained to determine if the residence can be relocated.             <ol style="list-style-type: none"> <li>a) Should relocation be determined to be technically feasible, a relocation and documentation plan will be prepared by a qualified cultural heritage professional in consultation with a qualified structural engineer(s), reputable house relocation contractor and submitted to MHSTCI, MTO, the City of Brampton, and any other relevant cultural heritage stakeholders. The relocation plan will lay out the actions required and responsibilities of stakeholders in order to relocate and re-use the resource.</li> <li>b) Where feasible the residence will be moved to an appropriate setting on the subject property to retain the historical and contextual association with the tree-lined entrance drive leading off Heritage Road and with Lot 14, Concession 5 West of Hurontario Street (WHS).</li> <li>c) Should relocation on the subject property be demonstrated to be infeasible, the residence will be relocated to a suitable and compatible setting, such as a designated heritage site or historic farm, to preserve a rare surviving example of an early nineteenth-century log house in the City of Brampton and Region of Peel.</li> </ol> </li> <li>• If relocating the log cabin in-tact is determined to be infeasible based on engineering or technical concerns, consideration will be given for the structure to be disassembled and moved to an appropriate setting for reassembly.</li> <li>• If relocating the structure either in-tact or in pieces is demonstrated to be infeasible, consideration will be given to developing a salvage plan to retain any identified cultural heritage attributes. Any salvageable materials, including but not limited to, hewn flat-sided logs, hewn joists, dormer windows, two-over-two pane sash windows, decorative shutters, fieldstones in the foundation, or any other relevant heritage elements will be salvaged and retained for incorporation in other similar historically-significant structures or for use in a commemorative interpretation program. In this respect, MTO, MHSTCI, the City of Brampton and other heritage stakeholders such as the Peel Art Gallery, Museum, and Archives will be consulted regarding salvage and commemoration.</li> <li>• Prior to relocation, salvage, or demolition, a Salvage and Documentation Report will be completed for the subject property. This heritage documentation report will include detailed photography, measured drawings, and Lidar scans. The purpose of this documentation report is to fully record the structure and its setting prior to alteration. This documentation report will be submitted to MTO, MHSTCI, the City of Brampton, and other relevant heritage stakeholders, where appropriate, for review and/or archival purposes.</li> <li>• Consideration will be given to a heritage interpretive strategy including (but not limited to) a commemorative plaque with historical information and archival photographs of the structure. Structural and decorative elements salvaged from the house could also be incorporated in this interpretive strategy. Heritage staff at the City of Brampton will be consulted regarding this heritage interpretive strategy.</li> <li>• Additional on-site investigations at this property are necessary to understand the log construction utilized, confirm integrity, and confirm building evolution. This will require removal of a section or sections of exterior vinyl cladding on this house. The CHER recommended that this additional fieldwork be undertaken during completion of the HIA, however, as this report was conducted in May 2020 during the COVID-19 global pandemic, additional fieldwork was not conducted. Following the removal of physical distancing requirements, this property will be subject to additional on-site investigations to better understand the construction and integrity of the log cabin. This additional fieldwork will be conducted as part of the documentation report.</li> </ul>

Prior to construction, where technically possible, further adjustments to the design will be explored to minimize potential impacts to the built heritage resources and cultural heritage landscapes.

Should future work require an expansion of the study area, a qualified heritage consultant will be contacted in order to confirm the impacts of the proposed work on potential built heritage resources and cultural heritage landscapes.

**ARCHAEOLOGICAL RESOURCES**

A Stage 1 Archaeological Assessment was carried out as part of the TPAP in accordance with the *Ontario Heritage Act* (amended in 2018) and the *Standards and Guidelines for Consulting Archaeologists* (2011) (S & G), administered by the Ministry of Heritage, Sport, Tourism and Culture Industries. The Stage 1 archaeological assessment made the following conclusions:

- The Study Area within the Final Preferred Design exhibits archaeological potential. These lands require Stage 2 archaeological assessment by test pit/pedestrian survey at five metre intervals, where appropriate, prior to any construction activities;
- Parts of the Additional Assessed Areas exhibit archaeological potential, and will require Stage 2 survey, if impacted, prior to any proposed development;
- AiGw-97, AiGw-165, AjGw-32, AjGw-33, and AjGw-43 are within the Study Area and is considered to retain further CHVI. The sites are recommended for Stage 2 survey to relocate them, due to the passage of time and paucity of mapping from when they were first identified;
- Parts of the Final Preferred Design and Additional Assessed Areas have been previously assessed and determined not to be cleared of further archaeological concern;
- The remainder of the Study Area does not retain archaeological potential on account of deep and extensive land disturbance, low and wet conditions, or slopes in excess of 20 degrees. These lands do not require further archaeological assessment; and
- Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment will be conducted to determine the archaeological potential of the surrounding lands.

As part of the TPAP, a Stage 2 Archaeological Assessment, including test pit and pedestrian surveys, was conducted by ASI on lands retaining archaeological potential that may be disturbed by the proposed Transitway construction lying within 300 m of watercourses/waterbodies (where permission to enter was secured) to identify any sites/lands requiring further assessment.

The total survey area for the Stage 2 Archaeological Assessment identified one historical Euro-Canadian site (H1), six pre-contact findspots (P4, P5, P6, P7, P8 and P9) and four pre-contact Indigenous sites (P1, P2, P3, and River site).

The six pre-contact findspots (P4, P5, P6, P7, P8 and P9) and site AjGw-43 (pre-contact Indigenous site) are isolated and non-diagnostic in nature. They do not have sufficient CHVI as per S & G Section 2.2, Standard 1ai, and therefore no further archaeological assessment is required.

Site AjGw-632 (P1) is a non-diagnostic precontact Indigenous site measuring 5 m in diameter and consists of two flake fragment, two secondary retouch flakes, and one secondary knapping flake. All of these were manufactured from Onondaga chert. A single Lockport secondary retouch flake was also recovered. This site exhibit CHVI as per S & G Section 2.2, Standard 1.a.ii, therefore a Stage 3 Site-specific assessment is required.

Site Aj-Gw-637(P2) is a precontact Indigenous site and is diffuse and non-diagnostic in nature. It does not have sufficient CHVI for Stage 3 Site-specific assessment as per S&G Section 2.2, Standard 1aii, and further archaeological assessment is not required.

Site AjGw-481 (P3) is a non-diagnostic precontact Indigenous site measuring 5 m in diameter and consists of two flake fragment and one secondary retouch flakes, all manufactured from Onondaga chert. Two flake fragments and one secondary knapping flake from Bois Blanc chert were also recovered. This site exhibit CHVI as per S & G Section 2.2, Standard 1.a.ii, therefore a Stage 3 Site-specific assessment

is required.

At the historical Euro-Canadian site, AjGw-631 (H1), a total of 553 artifacts were recovered from the test pit survey and test unit excavations. The scatter, measuring approximately 35 m x 25 m was located south of Highway 407 ETR and east of Trafalgar Road within a residential lot (SD Figure 6). The analysis of the artifacts recovered from Site H1 indicates that it likely represents a Euro-Canadian occupation dating from the early nineteenth century to the late nineteenth or early twentieth century. This conclusion is supported by land use history research, ceramic assemblage, as well as the presence of hand-wrought and machine cut nails. According to S & G: Section 2.2, Standard 1 (c), archaeological sites with more than 20 artifacts that pre-date 1900 are culturally significant and as such must be subject to a Stage 3 Site-Specific assessment.

The River Site, AjGw-68 is a highly significant multi-component indigenous site. It has previously documented in past studies and possess further CHVI. A portion of this site falls within the 407 Transitway runningway and will require a Stage 3 Site-Specific assessment. The Stage 3 Site-specific assessment will be conducted during detail design, prior to any construction or soil disturbing activities to clarify the nature and extent of the cultural deposit, and to aid in the determination of a Stage 4 mitigation strategy, if one is required. Within the 407 Transitway runningway footprint:

- Following S&G table 3.1, the Stage 3 archaeological assessment will commence with the creation of a recording grid on a fixed datum, the position of which has been recorded using a GPS.
- A series of 1 m square units will be excavated across the entire site area at 5 m intervals within an established grid in order to determine the natural and extend of the cultural deposits
- Following the test unit excavation, as per S&G Standard 3.3.2 mechanical removal of the topsoil may be required to establish site limits, followed by the shovel shining of the exposed surfaces and subsequent inspection for subsurface cultural features or settlement patterns.

If portions of the River site outside the 407 Transitway footprint are to be impacted, Stage 3 assessment following S&G Section 3.2 will be required (See **Appendix P**).

Stage 3 Site-specific assessments for AjGw-631, AjGw-632 and AjGw-481 will be conducted during detail design, prior to any construction or soil disturbing activities to clarify the nature and extent of the cultural deposit, and to aid in the determination of a Stage 4 mitigation strategy, if one is required. Given that it is not yet evident if these sites possess sufficient CHVI to require Stage 4 mitigation of impact, the following strategy will be done following the S&G Table 3.1:

- The Stage 3 archaeological assessment will commence with the creation of a recording grid on a fixed datum, the position of which has been recorded using a GPS.
- The sites must then be excavated by hand, placing 1 m square units in a 5 m grid across the site with additional units amounting to 20% of the grid total. These will be placed in areas of interest around units of high artifact counts or other significant areas of the site. The test units will be excavated five cm into the sterile subsoil and soil fills screening through 6 mm wire mesh to facilitate artifact recovery. The sterile subsoil will be troweled, and all soil profiles examined for undisturbed cultural deposits.

There are no previously registered burial sites located within 1 km of the study limits.

In Stage 1 Archaeological Assessment, it has been determined that 145.98 ha, 46% of the 407 Transitway preliminary design footprint area does not require further archaeological assessment. These areas have been subject to previous archaeological assessment, exhibited deep and pervasive disturbance or were found to have no archaeological potential due to low and wet conditions or excessive slope. In Stage 2 Archaeological assessment, test-pit survey at 5 m intervals following standards were conducted on approximately 7.72 ha (2.5%) and approximately 5.92 ha (2%) were subject to judgmental test pit survey at 10 m intervals to confirm previous disturbance. Pedestrian survey was also conducted on approximately 0.55 ha (<1%). Approximately 3.07 ha (1%) were found to have no potential due to deep and pervasive disturbance resulting from past construction activities associated with the 407 ETR and commercial and industrial development. Approximately 3.72 ha (1%) were found to have no archaeological potential due to low and wet conditions and excessive slope. The remaining 148 ha (47%) require further Stage 2 Archaeological assessment prior to any ground disturbing activities.

Sites AiGw-97, AiGw-165, AjGw-32 and AjGw-33 are within the study area and considered to retained further CHVI. The sites are recommended for Stage 2 archaeological assessment to relocate them, due to the passage of time and paucity of mapping from when they were first identified. All remaining Stage 2 work and any required Stage 3 and Stage 4 archaeological assessment work will be completed as early as possible, and prior to the completion of detail design. During detail design, should the proposed work extend beyond the preliminary design area, further archaeological assessment must be conducted to determine the archaeological potential within these lands.

**TABLE 6.9: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Land Use and Property Requirements	Potential impacts on designated land uses within the study area. Potential impacts on existing, planned, and future land uses within the study area. Additional property requirements/displacements	<ul style="list-style-type: none"> <li>▪ A number of changes to land use designations are required for the Transitway. Minor amendments to the Parkway Belt West Plan, City of Brampton Official Plan, City of Mississauga Official Plan, Town of Oakville Official Plan, and City of Burlington Official Plan may be required to reflect changes in the footprint of the Transitway.</li> <li>▪ A number of changes to existing land uses will result from the 407 Transitway, including areas of the runningway and stations that cross/impact private land, or existing buildings, businesses, and agricultural land.</li> <li>▪ Potential impacts to three areas designated as 'Urban River Valleys' in the Greenbelt Plan (2017) including Fourteen Mile Creek, Glenorchy Conservation Area, and Sixteen Mile Creek.</li> </ul> <p><u>Segment S1: West of Brant Street to East of Dundas Street</u></p> <ul style="list-style-type: none"> <li>▪ The majority of the runningway is located in the City of Burlington's Urban Area, within the 'Residential' designation (high, medium, and low density). There are residential subdivision communities located north and south of the 407 ETR between Brant Street and Dundas Street. The runningway travels through the 'Agricultural Rural Area' land use designation for the rest of the segment.</li> <li>▪ Both the rural and urban area of the City of Burlington Official Plan identify the study area within the Public Use Area of the Parkway Belt West Plan, specifically under the 'Road' designation.</li> <li>▪ The Dundas Street Road Station would be located adjacent to lands designated as 'Business Corridor'.</li> <li>▪ The transitway right-of-way avoids conflicts with the approved development applications and other future employment uses along the corridor.</li> <li>▪ The runningway will be below grade to the residences therefore no visual or noise impacts are anticipated.</li> <li>▪ The runningway will approximately impact 25.5 hectares (ha) of Class 0 soils, 5.9 ha of Class 1 soils, and 3.6 ha of Class 3 soils. The total area of impacts to soil in this segment is approximately 35.1 ha. The proposed Dundas Street Road Station will approximately have a total impact of 13.0 ha.</li> </ul> <p><u>Segment S2: East of Dundas Street to East of Appleby Line</u></p> <ul style="list-style-type: none"> <li>▪ 'Agricultural Rural Area' and the Public Use Area in the Parkway Belt West Plan, specifically on lands identified as 'Road', within the City of Burlington</li> <li>▪ Greenbelt 'Protected Countryside' designation and Niagara Escarpment Plan area</li> <li>▪ The runningway travels across privately owned agricultural lands.</li> <li>▪ The runningway travels along the northern side of the 407 ETR right-of-way, taking into consideration the employment lands by avoiding the existing and future employment developments along the south side of the 407 ETR.</li> <li>▪ The runningway will approximately impact 8.9 ha of Class 1 soils, 10.4 ha of Class 3 soils, and 0.7 ha of Class 5 soils. The total area of impacts to soil in this segment is approximately 19.9 ha. Appleby Line Station will have a total impact of approximately 4.9 ha on soils.</li> </ul> <p><u>Segment S3: East of Appleby Line to East of Tremaine Road</u></p> <ul style="list-style-type: none"> <li>▪ 'Greenland's (Non-Escarpment Plan Area) City of Burlington Official Plan.</li> <li>▪ 'Environmentally Sensitive Area' boundary, Halton Region Official Plan</li> <li>▪ 'Agricultural Rural lands' and through a portion of the 'Mineral Resource Extraction Area', 'Employment District' Town of Oakville.</li> <li>▪ the Parkway Belt West 'Utility' corridor area</li> </ul>	<p>Efforts have been made to ensure that the 407 Transitway is located in lands that are compatible with current land use designations. Any amendments required to the Parkway Belt West Plan and/or to municipal Official Plans have been discussed with the municipalities, Ministry of Municipal Affairs/Ministry of Housing and MECP throughout the duration of the TPAP.</p> <p>Efforts have been made to design the Transitway to avoid/minimize impacts to existing and planned land uses and adjacent sensitive land uses (i.e. businesses, residences, agricultural land, private properties) to the extent possible.</p> <p>Impacts to the areas designated as 'Urban River Valleys' in the Greenbelt Plan (2017) have been minimized to the extent possible. The watercourse crossings were designed in close proximity to the 407 ETR, keeping the crossings close to an already disturbed highway corridor. Spanned bridges are proposed at the watercourse crossings to ensure no impacts within the bankfull channel and to minimize overall impacts to the watercourses at these locations. The following protection measures were considered: establishment or increasing the extent/width of the vegetation protection zone; increasing or improving fish habitat; and, including landscaping and habitat restoration to increase the use of the valleys as a corridor for wildlife habitat and movement.</p> <p>The design of the runningway and stations will adhere to hydro tower clearance requirements, as required.</p> <p>Impacts to natural heritage features and associated land use designations have been minimized to the extent possible. Appropriate environmental protection/mitigation measures have been identified for natural heritage features (see <b>Table 6.6</b>). A number of sites along the 407 Transitway facility have been protected for future environmental compensation (see <b>Section 6.2.1</b>).</p>	<p>Further assessment of the areas where designated land uses will be affected will be undertaken as part of implementing the 407 Transitway, and any amendments to the Parkway Belt West Plan and/or Official Plans will be made by the appropriate agency.</p> <p>Consultation with affected property owners has taken place and will continue prior to construction, as necessary. Further assessment will be conducted prior to construction to refine impacts to existing and planned land uses that are in close proximity to the Transitway runningway and stations based on the current conditions at the time of construction. In particular, design details in the vicinity of private properties that will be affected by the Transitway will be investigated in greater detail prior to construction to determine if possible refinements can be made to reduce or minimize impacts. If expropriation is required, the standard MTO process for acquiring properties will be followed. Acquisition of any municipal properties affected will be the subject of discussion with the appropriate municipality.</p> <p>Any design refinements necessary at the watercourses designated as 'Urban River Valleys' in the Greenbelt Plan will be completed prior to construction and will address the policies of the Greenbelt Plan.</p> <p>Where portions/edges of agricultural fields are displaced by the runningway and stations, further assessment will be required prior to construction to determine appropriate mitigation measures. Consideration will be given to repairing any agricultural infrastructure (i.e., fences, agricultural tile drain), if applicable.</p> <p>The study team will continue to work with utility and infrastructure</p>

**TABLE 6.9: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
		<ul style="list-style-type: none"> <li>▪ The runningway footprint is compatible with the existing conditions of the lands located north of the 407 ETR where lands are primarily used for industrial purposes and as a utility corridor.</li> <li>▪ The runningway will approximately impact 16.7 ha of Class 1 soils, 0.9 ha of Class 3 soils, and 1.0 ha of Class 5 soils. The total area of impacts to soils in this segment is approximately 18.7 ha.</li> <li>▪ City of Burlington, Halton Region and MTO staff have been working together to add specific policies and mapping to the Tremaine Dundas Secondary Plan, in order to recognize the ongoing Transitway study process. Although the policies have not been finalized, a 60 metre Transitway corridor protection zone that would extend onto the Evergreen Community has been identified.</li> </ul> <p><u>Segment S4: East of Tremaine Road to West of Sixteen Mile Creek</u></p> <ul style="list-style-type: none"> <li>▪ Parkway Belt West Area, 'Road' designation</li> <li>▪ 'Transitway' as identified within the North Oakville West Secondary Plan area and North Oakville East Secondary Plan area.</li> <li>▪ 'Urban River Valleys' in the Greenbelt Plan</li> <li>▪ The proposed Bronte Road Station and bus storage yard is located on the east side of Bronte Road on Provincial property. Bronte Road Station is identified as a location for future GO Bus Park and Ride lot and a Provincial carpool lot.</li> <li>▪ The runningway will approximately impact 9.1 ha of Class 1 soils, 7.7 ha of Class 3 soils, and 0.6 ha of Class 5 soils. The total impact to soils in this segment is approximately 17.4 ha. The Bronte Road Station and the bus storage yard will have a total impact of approximately 14.2 ha on soils.</li> </ul> <p><u>Segment S5: West of Sixteen Mile Creek to East of Trafalgar Road</u></p> <ul style="list-style-type: none"> <li>▪ Parkway Belt West Plan area, under the 'Road', 'Public Open Space and Buffer Area', and the 'General Complementary Use Area'</li> <li>▪ 'Transitway', 'Natural Heritage System Area', 'Employment Area', 'Trafalgar Road Urban Core Area' designation in the Town of Oakville</li> <li>▪ Lands south of the 407 ETR bounded by the 4th line on the east and Neyagawa Boulevard to the west are subject to development applications. Similarly, development proposals have been identified on lands located between the 6th Line and Trafalgar Road.</li> <li>▪ The runningway will approximately impact 32.7 ha of Class 1 soils, 5.4 ha of Class 3 soils, and 3.1 ha of Class 5 soils. The total impact to soils in this segment is approximately 41.2 ha. The Trafalgar Road Station would have a total impact of approximately 8.19 ha on soils.</li> </ul> <p><u>Segment S6: East of Trafalgar Road to North of Lower Base Line</u></p> <ul style="list-style-type: none"> <li>▪ The runningway travels primarily within the City of Mississauga into lands designated as 'Business Employment' 'Parkway Belt West' and 'Residential Medium Density.'</li> <li>▪ There are several large fields throughout the study area used for cash crops or horticulture operations. Some properties are associated with a residence.</li> <li>▪ Class 1 and 3 soils were identified within the Transitway study area in Segment S6. The runningway will approximately impact 14.8 ha of Class 1 soils, and 1.41 ha of Class 3 soils. The total impact to soils in this segment is approximately 16.2 ha.</li> <li>▪ Land use will not be affected by the tunnel section (through the highway interchange area)</li> <li>▪ Future development for the Ninth Line Lands in the City of Mississauga will be based on the Ninth Line</li> </ul>		<p>stakeholders (Hydro One, Enbridge, GO Transit, Canadian National Railway, Canadian Pacific Railway, among others) to co-ordinate the planning of this Transitway with the requirements and future expansion plans for utility and other infrastructure within the Parkway Belt West Plan area.</p>

**TABLE 6.9: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
		<p>Neighbourhood Character Area, the six Ninth Line precincts, related Official Plan policies, and the urban design guidelines.</p> <p><u>Segment S7: North of Lower Base Line to North of Britannia Road</u></p> <ul style="list-style-type: none"> <li>City of Mississauga lands are designated 'Parkway Belt West' 'Residential High Density', 'Greenlands', 'Public Open Space', 'Natural Hazards' and 'Mixed use'.</li> <li>City of Mississauga's Official Plan (2019 Consolidation) Ninth Line Neighbourhood Character Area, specifically within the Britannia 407 Transitway Station Area Precinct 4.</li> <li>Class 1 and 3 soils were identified within the Transitway study area in Segment S7. The runningway will approximately impact 10.7 ha of Class 1 soils, and 0.63 ha of Class 3 soils. The total impact to soils in this segment is approximately 11.3 ha. The proposed Britannia Road Station is situated on partially owned Provincial property and would provide direct access to the station via Ninth Line. Britannia Road Station would have a total impact of approximately 2.32 ha on soils.</li> </ul> <p><u>Segment S8: North of Britannia Road to North of Derry Road</u></p> <ul style="list-style-type: none"> <li>'Parkway Belt West', 'Natural Hazards', 'Greenlands', and 'Residential High Density', Ninth Line Neighbourhood Character Area in the City of Mississauga</li> <li>The runningway will approximately impact 17.5 ha of Class 1 soils, and 4.7 ha of Class 3 soils. The total impact to soils in this segment is approximately 22.2 ha. Derry Road Station will have a total impact of approximately 3.6 ha on soils.</li> </ul> <p><u>Segment S9: North of Derry Road to West of Heritage Road</u></p> <ul style="list-style-type: none"> <li>the Parkway Belt West Plan area, from west of Ninth Line in the City of Mississauga, to east of Meadowvale Boulevard in City of Brampton</li> <li>'Provincial Highways' in the City of Brampton.</li> <li>primarily a hydro corridor, west of Ninth Line to west Winston Churchill Boulevard.</li> <li>The runningway will approximately impact 3.4 ha of Class 0 soils, 18.7 ha of Class 1 soils and 1.3 ha of Class 3 soils. The total impact to soils in this segment is approximately 23.4 ha. Lisgar GO Station will approximately have a total soil impact of 1.2 ha.</li> </ul> <p><u>Segment S10: West of Heritage Road to East of Credit River</u></p> <ul style="list-style-type: none"> <li>'Open Space', 'Provincial Highways', 'Office', and 'Industrial'. in the City of Brampton Official Plan</li> <li>Parkway Belt West' Plan area</li> <li>'Urban River Valley' under the Greenbelt Plan</li> <li>The runningway will approximately impact a total of 21.8 ha of Class 0 (organic) soils.</li> </ul> <p><u>Segment S11: East of Credit River to West of Hurontario Street</u></p> <ul style="list-style-type: none"> <li>Utility', 'Inter-urban Transit' and 'Electric Power Facility', in the Parkway Belt West Plan</li> <li>'Provincial Highways' and 'Open Space in the City of Brampton.</li> <li>'Natural Hazards' and 'Greenlands' in the City of Mississauga.</li> <li>The runningway continues through the 'L.B.P.I.A Operating Area'. Lester B. Pearson International Airport.</li> <li>The runningway will approximately impact a total of 9.7 ha of Class 0 (organic) soils.</li> </ul>		



**TABLE 6.9: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Noise and Vibration	Footprint impacts regarding noise and vibration do not apply.			
Built Heritage Resources and Cultural Heritage Landscapes	<p>Displacement of built heritage resources and/or cultural heritage landscapes by removal and/or demolition, and/or disruption by isolation.</p> <p>Disruption of resources by the introduction of physical, visual, audible or atmospheric elements that are not in keeping with the character and setting of the built heritage resources and/or cultural heritage landscapes.</p>	<p>Seventeen built cultural heritage resources and cultural heritage landscapes face potential impacts, including seven farmscapes (CHR 13, 14, 20, 22, 26, 29, 30), five remnant farmscapes (CHR 11, 19, 25, 27,28), one residence (CHR 8), one former residence (CHR 31), one church and cemetery (CHR 24); one heritage conservation district (CHR 23) and one stable (CHR 21).</p> <p>Thirteen built heritage resource and cultural landscapes will face impacts, which include property acquisition, soil disturbance, potential vibration, tree/vegetation removal, and/or structure demolition. The 13 built heritage resource and cultural landscapes heritage resources are CHR 8, 11, 13, 14, 19,20, 21, 22, 23, 24, 28, 30,31.</p> <p>Cultural Heritage Evaluation Reports (CHERs) were prepared for 12 properties (CHR 8, 11, 13, 14, 19, 20, 21, 22, 24, 29, 30, 31) that could be directly impacted and Heritage Impact Assessments (HIAs) were prepared for seven properties (CHR 13, 22,23, 24, 29, 30, 31).</p> <p>Seven of the 13 built heritage resource and cultural landscapes are considered a Provincial Heritage Property but not a Provincial Heritage Property of Provincial Significance (CHR 13, 22, 24, 23, 29, 30, 31).</p> <p><b>CHR 13 – 4243 Sixth Line:</b> Minor direct impacts on the of the property through soil disturbance, grading, potential vibration impacts, and the introduction of a roadway that may diminish the integrity of the property. Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.</p> <p><b>CHR 22 – 7696 Heritage Road:</b> Minor direct impacts on the of the property through removal of portions of agricultural fields, soil disturbance, grading, potential vibration impacts, and the introduction of a roadway that may diminish the integrity of the property. Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.</p> <p><b>CHR 23 – Churchville Heritage Conservation District:</b> The proposed transitway will traverse through two properties: one property on 7523 Creditview Road with a “Building of Heritage Significance” and another property on 7522 Creditview Road without “Building of Heritage Significance”. There are no impacts to the cultural heritage value of these properties as described in the policies and guidelines for properties within the Churchville HCD Plan. The proposed work will have an impact on the “Landscape Units” in which these two properties are contained. These impacts are not anticipated to be significant and can be mitigated using the policies and guidelines set in the Churchville HCD Plan. This property is Designated, Part V under the <i>Ontario Heritage Act</i> (By-law 219-90, 221-2002 (A)).</p> <p><b>CHR 24 – 6056 Ninth Line:</b> Temporary, indirect impact on the cultural heritage value or interest of the property through construction work occurring immediately adjacent to the property’s western boundary. It is anticipated to be minor in scale, temporary in duration and located approximately 40 m west of the church and cemetery. Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.</p> <p><b>CHR 29 – 5104 Ninth Line:</b> No direct or indirect impacts to the subject property as construction activities will be confined to the adjacent property parcel. Construction activities are anticipated to be minor in scale, temporary in duration, and located approximately 110 m west of the property boundary and 150 m west of the residence. .</p>	<p><b>CHR 13 – 4243 Sixth Line</b> - mitigation measures are:</p> <ul style="list-style-type: none"> <li>The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>Staging and construction activities will be planned and executed to mitigate or prevent any unintended impacts to any built structure on the subject property. Temporary fencing will be installed during construction to ensure ongoing access to the barn entrance on the north side and the operations of the overall site can safely continue.</li> <li>Should construction activities necessarily involve the removal of trees and destruction of the pond: post-construction landscaping and rehabilitation which includes planting new trees on the south side of the transitway and/or the creation of a new pond.</li> <li>Consultation and coordination with the owner(s)/operator(s) of the farm will be carried out to ensure suitable mitigation measures are employed during detail design and construction phases.</li> <li>To ensure the residence and structures on the property are not adversely impacted during construction, a qualified engineer will undertake a condition assessment of the structures within the vibration zone of influence during detail design. Commitment to repair damages caused by vibration will be included in the construction phase.</li> </ul> <p><b>CHR 22 – 7696 Heritage Road</b> - Mitigation measures are:</p> <ul style="list-style-type: none"> <li>The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>Staging and construction activities will be planned and executed to mitigate or prevent any unintended impacts to the agricultural fields, former paddocks, and any other built structure on the subject property. Prior to construction, temporary fencing will be installed along the field edge north of the residence to separate the construction area from the thick vegetation and former paddocks.</li> <li>In locations where the preliminary design of the 407 Transitway is affecting existing access to the property, the detail design phase to be undertaken in the future prior to construction of the 407 Transitway, will ensure continued viable access. Currently, the timing for detail design and Construction is not known, thus the existing farm access roads are being maintained.</li> <li>To ensure the residence and barn on the property are not adversely impacted during construction, a qualified engineer will undertake a condition assessment of the structures within the vibration zone of influence. Commitment to repair damages caused by vibration will be included in the construction phase.</li> </ul> <p><b>CHR 23 – Churchville Heritage Conservation District</b> Impacts on the Churchville Heritage Conservation District (HCD) can be mitigated by</p>	<p>During detail design, further measures to minimize impacts will be considered. Mitigation measures presented will be prepared during detail design and implemented during construction.</p> <p>Should future work require an expansion of the study area, a qualified heritage consultant will be contacted in order to confirm the impacts of the proposed work on potential cultural heritage resources.</p>

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ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
		<p>Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance.</p> <p><b>CHR 30 – 3269-3271 Dundas Street West:</b> Minor direct adverse impact on the cultural heritage value or interest of the property through acquisition and redevelopment of a small section of the agricultural fields in the northern portion of the property. Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance</p> <p><b>CHR 31 – 7655 Heritage Road:</b> Removal of residential structure on property. Property is considered a Provincial Heritage Property. Property is not considered a Provincial Heritage Property of Provincial Significance</p>	<p>measures described in the policies and guidelines of the Churchville HCD Plan:</p> <ul style="list-style-type: none"> <li>As per the policies and guidelines of the Churchville HCD Plan, a row of vegetation will be planted along the southern boundary of the properties at 7522 Creditview Road and 7523 Creditview Road as a form of mitigation to provide/maintain a vegetative buffer between these properties and the 407 Transitway.</li> <li>Documentation will be prepared to record the existing treelines prior to removal and the relationship between the southern edge of the Churchville HCD and Highway 407.</li> </ul> <p><b>CHR 24 – 6056 Ninth Line -</b> Mitigation measures are:</p> <ul style="list-style-type: none"> <li>Prior to commencing work, construction crews will be informed of the heritage status of the subject property and construction activities will be planned and executed to mitigate or prevent any potential impacts to the property. No-go zones will be established and temporary fencing will be installed prior to construction to ensure that there are no unintended impacts to the subject property.</li> <li>As the nineteenth-century church and cemetery on the subject property are located approximately 40 m east of the anticipated area of impact, impacts related to vibration are possible. To ensure the church and cemetery on the subject property are not adversely impacted during construction, a qualified engineer will undertake a condition assessment of the structures within the vibration zone of influence. Commitment to repair damages caused by vibration will be included in the construction phase.</li> </ul> <p><b>CHR 29 – 5104 Ninth Line –</b> Mitigation Measures are:</p> <ul style="list-style-type: none"> <li>Prior to commencing work, construction crews will be informed of the heritage status of the subject property and construction activities will be planned and executed to mitigate or prevent any potential impacts to the property. No-go zones will be established and temporary fencing will be installed prior to construction to ensure that there are no unintended impacts to the subject property.</li> </ul> <p><b>CHR 30 – 3269-3271 Dundas Street West –</b> Mitigation measures are:</p> <ul style="list-style-type: none"> <li>The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>Staging and construction activities will be suitably planned and executed to mitigate or prevent any potential destruction to the crop fields, stand of mature trees, and flow of the watercourses. Temporary fencing will be installed during construction to ensure that the operations of this active farm can safely continue.             <ol style="list-style-type: none"> <li>post-construction landscaping and rehabilitation. Consideration will be given to planting new trees on the south side of the Transitway following runningway construction. The preliminary design of the 407 Transitway including grading limits and proposed structures at watercourse crossing were developed to minimize impacts to watercourses.</li> </ol> </li> </ul>	

**TABLE 6.9: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
			<p>b. Consultation and coordination with the owner(s)/operator(s) of the farm will be carried out to ensure suitable mitigation measures are employed during the detail design and construction phases.</p> <p><b>CHR 31 – 7655 Heritage Road</b> – Mitigation measures are:</p> <ul style="list-style-type: none"> <li>• The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>• During detail design, consideration will be made to relocate the residence to a new location on its current site. In this respect, a qualified structural engineer(s) with experience in assessing built heritage resources will be retained to determine if the residence can be relocated. <ul style="list-style-type: none"> <li>a) Should relocation be determined to be technically feasible, a relocation and documentation plan will be prepared by a qualified cultural heritage professional in consultation with a qualified structural engineer(s), reputable house relocation contractor and submitted to MHSTCI, MTO, the City of Brampton, and any other relevant cultural heritage stakeholders. The relocation plan will lay out the actions required and responsibilities of stakeholders in order to relocate and re-use the resource.</li> <li>b) Where feasible the residence will be moved to an appropriate setting on the subject property to retain the historical and contextual association with the tree-lined entrance drive leading off Heritage Road and with Lot 14, Concession 5 West of Hurontario Street (WHS).</li> <li>c) Should relocation on the subject property be demonstrated to be infeasible, the residence will be relocated to a suitable and compatible setting, such as a designated heritage site or historic farm, to preserve a rare surviving example of an early nineteenth-century log house in the City of Brampton and Region of Peel.</li> </ul> </li> <li>• If relocating the log cabin in-tact is determined to be infeasible based on engineering or technical concerns, consideration will be given for the structure to be disassembled and moved to an appropriate setting for reassembly.</li> <li>• If relocating the structure either in-tact or in pieces is demonstrated to be infeasible, consideration will be given to developing a salvage plan to retain any identified cultural heritage attributes. Any salvageable materials, including but not limited to, hewn flat-sided logs, hewn joists, dormer windows, two-over-two pane sash windows, decorative shutters, fieldstones in the foundation, or any other relevant heritage elements will be salvaged and retained for incorporation in other similar historically-significant structures or for use in a commemorative interpretation program. In this respect, MTO, MHSTCI, the City of Brampton and other heritage stakeholders such as the Peel Art Gallery, Museum, and Archives will be consulted regarding salvage and commemoration.</li> <li>• Prior to relocation, salvage, or demolition, a Salvage and Documentation Report will be completed for the subject property. This heritage documentation report</li> </ul>	

**TABLE 6.9: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
			<p>will include detailed photography, measured drawings, and Lidar scans. The purpose of this documentation report is to fully record the structure and its setting prior to alteration. This documentation report will be submitted to MTO, MHSTCI, the City of Brampton, and other relevant heritage stakeholders, where appropriate, for review and/or archival purposes.</p> <ul style="list-style-type: none"> <li>• Consideration will be given to a heritage interpretive strategy including (but not limited to) a commemorative plaque with historical information and archival photographs of the structure. Structural and decorative elements salvaged from the house could also be incorporated in this interpretive strategy. Heritage staff at the City of Brampton will be consulted regarding this heritage interpretive strategy.</li> <li>• Additional on-site investigations at this property are necessary to understand the log construction utilized, confirm integrity, and confirm building evolution. This will require removal of a section or sections of exterior vinyl cladding on this house. The CHER recommended that this additional fieldwork be undertaken during completion of the HIA, however, as this report was conducted in May 2020 during the COVID-19 global pandemic, additional fieldwork was not conducted. Following the removal of physical distancing requirements, this property will be subject to additional on-site investigations to better understand the construction and integrity of the log cabin. This additional fieldwork will be conducted as part of the documentation report.</li> </ul>	
Archaeological Resources -Cemetery	Disturbance or destruction of archaeological resources and cemeteries.	<p>In Stage 1 Archaeological Assessment, it has been determined that 145.98 ha, 46% of the 407 Transitway preliminary design footprint area, does not require further archaeological assessment. These areas have been subject to previous archaeological assessment, exhibited deep and pervasive disturbance or were found to have no archaeological potential due to low and wet conditions or excessive slope.</p> <p>In Stage 2 Archaeological assessment conducted as part of this TPAP, test-pit survey at 5 m intervals following standards were conducted on approximately 7.72 ha (2.5%) and approximately 5.92 ha (2%) were subject to judgmental test pit survey at 10 m intervals to confirm previous disturbance. Pedestrian survey was also conducted on approximately 0.55 ha (&lt;1%). Approximately 3.07 ha (1%) were found to have no potential due to deep and pervasive disturbance resulting from past construction activities associated with the 407 ETR and commercial and industrial development. Approximately 3.72 ha (1%) were found to have no archaeological potential due to low and wet conditions and excessive slope.</p> <p>The remaining 148 ha (47%) require further archaeological assessments (i.e. Stage 2 and 3) prior to any ground disturbing activities.</p> <p>One historical Euro-Canadian site (H1) and three pre-contact Indigenous sites (P1, P2, P3, and River site) were identified as having Cultural Heritage Value or Interest (CHVI), therefore further archaeological assessment (i.e. Stage 3 Site-specific assessment) is required.</p> <p>One cemetery associated with St. Peter’s Mission Church (6056 Ninth Line, also CHR 24) is located approximately 40 m east of the transitway runningway. No cemeteries will be directly impacted by the footprint of the Transitway. There are no previously registered burial sites located within 1 km of the study limits.</p>	<p>The Stage 3 Site-specific assessment for River Site (AjGw-68) will be conducted during detail design, prior to any construction or soil disturbing activities to clarify the nature and extent of the cultural deposit, and to aid in the determination of a Stage 4 mitigation strategy, if one is required. Within the 407 Transitway runningway footprint:</p> <ul style="list-style-type: none"> <li>• Following S&amp;G table 3.1, the Stage 3 archaeological assessment will commence with the creation of a recording grid on a fixed datum, the position of which has been recorded using a GPS.</li> <li>• A series of 1 m square units will be excavated across the entire site area at 5 m intervals within an established grid in order to determine the natural and extend of the cultural deposits</li> <li>• Following the test unit excavation, as per S&amp;G Standard 3.3.2 mechanical removal of the topsoil may be required to establish site limits, followed by the shovel shining of the exposed surfaces and subsequent inspection for subsurface cultural features or settlement patterns.</li> </ul> <p>If portions of the River site outside the 407 Transitway footprint are to be impacted, Stage 3 assessment following S&amp;G Section 3.2 will be required</p> <p>Stage 3 Site-specific assessments for AjGw-631, AjGw-632 and AjGw-481 will be conducted during detail design, prior to any construction or soil disturbing activities to clarify the nature and extent of the cultural deposit, and to aid in the</p>	<p>Stage 2 and 3 work required for land retaining archaeological potential not completed during the TPAP will be completed as early as possible, and prior to the completion of detail design.</p> <p>The 407 Transitway will be cleared of all archaeological concerns prior to construction. Should the proposed work extend beyond the current footprint of the Transitway, then further archaeological assessment will be required prior to construction to determine the archaeological potential of the surrounding lands.</p>

**TABLE 6.9: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
			<p>determination of a Stage 4 mitigation strategy, if one is required. Given that it is not yet evident if these sites possess sufficient CHVI to require Stage 4 mitigation of impact, the following strategy will be done following the S&amp;G Table 3.1:</p> <ul style="list-style-type: none"> <li>The Stage 3 archaeological assessment will commence with the creation of a recording grid on a fixed datum, the position of which has been recorded using a GPS.</li> <li>The sites must then be excavated by hand, placing 1 m square units in a 5 m grid across the site with additional units amounting to 20% of the grid total. These will be placed in areas of interest around units of high artifact counts or other significant areas of the site. The test units will be excavated five cm into the sterile subsoil and soil fills screening through 6 mm wire mesh to facilitate artifact recovery. The sterile subsoil will be troweled and all soil profiles examined for undisturbed cultural deposits.</li> </ul> <p>See <b>Table 6.13</b> for further measures.</p>	

### 6.2.3 Transportation

The footprint of the Transitway will provide positive effects to the transportation system by encouraging transit usage and carpooling through the presence of park and ride facilities at all stations; as well as convenient transfer opportunities between the various transit agencies, through the inclusion of bus looping and lay-by facilities at most stations. There will be no negative footprint effects to transportation as described in **Table 6.10**

**TABLE 6.10: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR TRANSPORTATION**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
<b>Segment 1 – West of Brant Street to East of Dundas Street</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under Brant Street. Transitway crosses under Uppermiddle Road Transitway crosses under Guelph Line. Transitway crosses under Dundas Street.	No action required. No action required. No action required. No action required.	N/A N/A N/A N/A
Impact to existing road network	New roads, new intersections.	New signalized intersection located in the intersection of Palladium Way and the proposed access road to Dundas Street Station will be installed at approximately 300 m east of the Dundas Street/Palladium way signalized intersection.	No action required	N/A
Impact on 407 ETR infrastructure	No impact to ramps	No impact.	No action required.	N/A
<b>Segment 2 – East of Dundas Street to East of Appleby Line</b>				

**TABLE 6.10: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR TRANSPORTATION**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under Walkers Line.	No action required.	N/A
		Transitway crosses under Appleby Line.	No action required.	N/A
Impact to existing road network	New roads, new intersections.	No impact.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	No impact .	No action required.	N/A
<b>Segment 3 – East of Appleby to East of Tremaine Road</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under CNR Halton Subdivision.	No action required.	N/A
		Transitway crosses under Tremaine Road.	No action required.	N/A
Impact to existing road network	New roads, new intersections.	No impact.	No action required.	N/A
Impact on 407 infrastructure	Impact to ramps	No impact.	No action required.	N/A
<b>Segment 4 – East of Tremaine Road to West of Sixteen Mile Creek</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under Bronte Road.	No action required.	N/A
Impact to existing road network	New roads, new intersections.	Signalized intersection at Bronte Road and ETR W-N/S off-ramp to be reconfigured as part of the new Bronte carpool, will be used to access proposed Bronte Station and Maintenance and Storage facility.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	Existing ETR S-E on-ramp planned to be reconfigured by others.	No action required.	N/A
<b>Segment 5 – West of Sixteen Mile Creek to East of Trafalgar Road</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses over Neyagawa Boulevard.	No action required.	N/A
		Transitway crosses under Sixth Line.	No action required.	N/A
		Transitway crosses over Trafalgar Road.	No action required.	N/A

**TABLE 6.10: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR TRANSPORTATION**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Impact to existing road network	New roads, new intersections.	Current intersection of Trafalgar Road and the existing access to the MTO carpool lot will be up-graded to adequately suit the access road to the 407 Transitway Station.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	No impact.	No action required.	N/A
<b>Segment 6 – East of Trafalgar Road to North of Lower Base Line</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under Lower Base Line	No action required.	N/A
Impact to existing road network	New roads, new intersections.	No impact.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	No impact to 407 ETR ramps as Transitway tunnels under 407-403 Interchange.	No action required.	N/A
<b>Segment 7 – North of Lower Base Line to North of Britannia Road</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses over Britannia Road.	No action required.	N/A
Impact to existing road network	New roads, new intersections.	Existing intersection of Ninth Line and McDowell Drive will be reconfigured and signalized to allow all movements to Britannia Station access road which will be located on west side of Ninth Line, aligned with McDowell Drive.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	No impact.	No action required.	N/A
<b>Segment 8 – North of Britannia Road to North of Derry Road</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses over Derry Road	No action required.	N/A
Impact to existing road network	New roads, new intersections.	New signalized intersection located in the intersection of Ninth Line and the access road to Derry Road Station will be installed at approximately 250 m north of existing signal at intersection of Ninth Line and Derry Road. New right in/right out T intersection for secondary access to Derry Road Station off Ninth Line.	No action required.	N/A

**TABLE 6.10: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR TRANSPORTATION**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Impact on 407 ETR infrastructure	Impact to ramps.	No impact.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	No impact.	No action required.	N/A
<b>Segment 9 – North of Derry Road to West of Heritage Road</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing	Transitway crosses under CP Rail Galt Subdivision . Transitway crosses under Ninth Line. Transitway crosses under Tenth Line. Transitway crosses under Highway 401 Transitway crosses under Winston Churchill Boulevard.	No action required. No action required. No action required. No action required. No action required.	N/A N/A N/A N/A N/A
Impact to existing road network	New roads, new intersections.	No impact.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	No impact.	No action required.	N/A
<b>Segment 10 – West of Heritage Road to East of Credit River</b>				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses over Mississauga Road Transitway crosses over Financial Drive	No action required. No action required.	N/A N/A
Impact to existing road network	New roads, new intersections.	New intersection off Hereford Street to connect to Mississauga Road Station access.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps and/or core lanes	Transitway crosses over 407 ETR west of Mississauga Road Transitway crosses over 407 ETR east of Financial Drive	No action required. No action required.	N/A N/A
<b>Segment 11 – East of Credit River to West of Hurontario Street</b>				



**TABLE 6.10: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR TRANSPORTATION**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under McLaughlin Road	No action required. No action required.	N/A N/A
Impact to existing road network	New roads, new intersections.	No impact.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	Transitway tunnels under 407 ETR – Mavis Interchange.	No action required.	N/A

### 6.2.4 Utilities

As indicated in **Chapter 5**, effects to utilities and municipal services by the construction and operations of the Transitway occur mostly at the underpass crossings of the Transitway with regional and local roads. The utilities and municipal services located within the Transitway footprint are identified in **Chapter 3** “Existing Study Area Conditions”.

Meetings were conducted with utility agencies and municipalities to discuss the relocation strategy of affected plants. Based on the information available it was determined that there are no major utility conflicts with the preferred alignment. It was concluded that, in the majority of cases, the relocation of affected utilities is feasible and conventional.

Prior to construction, further field investigation and consultations with the utility owners will be carried out to confirm the type of solution. Prior to construction, the loading capacity will be assessed where utilities and municipal services are located under high embankments, to define protection measures and/or special construction techniques to assure these plants are not damaged during construction or operations of the Transitway.

## 6.3 Construction Impacts

This section discusses the temporary impacts from construction activities to the existing environmental features found within the 407 Transitway corridor. The 407 Transitway, being a new transit facility in the study area, consists of new structures such as the runningway, bridges, underpasses, and stations. The following are the major construction activities or components that the assessment of construction impacts focused on:

- Surface Excavation;

- Clearing and Grubbing;
- Utility Relocation;
- Roadwork;
- Soil Removal and Disposal;
- Dewatering;
- Erosion and Sedimentation Control;
- Heavy Equipment Operations and Maintenance;
- Traffic Management;
- Material Import/Stockpiling; and,
- Concrete Forming.

### 6.3.1 Natural Environment

Construction impacts to the natural environment relate to the temporary disturbance to natural heritage features during construction as well as impacts to surface water, drainage and stormwater, contaminated properties and waste, groundwater resources, and air quality, which are generally typical to Transitway construction activities. Refer to **Table 6.12** which shows the construction impacts, proposed mitigation measures and recommended monitoring for the Natural Environment.

#### PHYSIOGRAPHY AND SOILS

Generally, the soils within the study area have imperfect or poor drainage (with the exception of Oneida loam soils, which are moderately well-drained). The clay and loam soils located along the runningway and at station locations are susceptible to erosion and will be impacted during construction of the mainline and station facilities. Consequently, soil disturbance associated with drainage improvements,

earth moving, culvert modifications, etc. may result in erosion of, and sedimentation to, sensitive receiving watercourses. For this reason, standard erosion and sedimentation control measures will be followed during construction in accordance with Ontario Provincial Standard Specification (OPSS) 805 (Construction Specification for Temporary Erosion and Sediment Control Measures) to minimize construction-related impacts on vegetation and vegetated communities. Site-specific erosion and sedimentation control measures to be implemented prior to construction will be identified prior to construction following the Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects (MTO 2007). Erosion and sedimentation control measures will include:

- placing flow checks at regular intervals in ditches down-gradient from areas of soil disturbance in rural sections;
- stabilizing/reinforcing ditches based on ditch slope down-gradient from areas of soil disturbance in rural sections;
- managing surface water at the construction site to prevent contact with exposed soils and/or treat surface water that comes in contact with exposed soils using stormwater detention ponds, basins, traps and bags;
- protecting inlets to catch basins and maintenance holes in urban sections;
- placing silt fence along stream margins in areas of soil disturbance;
- limiting the extent and duration that soils are exposed to the elements to the minimum area and time necessary to perform the work;
- applying seed and mulch, tackifier and/or erosion control blanket in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization; and,
- monitoring and maintenance of erosion and sedimentation control measures during construction to ensure their effectiveness.

These environmental protection measures will greatly reduce the potential for soil erosion and impairment of surface water quality and fish habitat.

A large volume of soil will be displaced in areas where the Transitway will travel below grade. This may generate excess soil that cannot be reused within the project. Excess soil that is stained, odorous, contains debris or has been analyzed and found to be contaminated will require management as a waste. Final profiles will be defined prior to construction.

Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (i.e. OPSS 180 – General Specification for the *Management of Excess Materials, Management of Excess Soil – A Guide for Best Management Practices* (2016)) will be used when developing an Excess Materials Management Plan.

In addition, the disposal of excess soil in the Niagara Escarpment Area will be avoided, in accordance with the landform conservation policies in the Niagara Escarpment Plan (NEP). If such disposal is unavoidable, Niagara Escarpment Commission (NEC) Development Permits for the receiving site(s) will be required. The *On-Site and Excess Soil Management Regulation* (O. Reg. 406/19) under the *Environmental Protection Act* also requires that any fill placed in environmentally sensitive areas

(including Escarpment Protection and Natural Areas) meets Table 1 standards. Any soil placed on cropland or pasture must meet the definition of topsoil as per the *Municipal Act*.

### CONTAMINATED PROPERTIES AND WASTE

If excavation is required in areas identified to be ‘highly likely’ to have waste or contamination, intrusive environmental investigations (i.e. Phase I and Phase II Environmental Site Assessments) will be conducted. The investigations will be conducted in accordance with provincial regulatory requirements to assess the environmental site conditions, disposal requirements for soil as well as health and safety requirements. In addition, MTO will implement standard construction methods and BMPs regarding contaminated property/waste issues.

A Designated Substances Survey (DSS) shall be completed for any structures that will be removed as part of implementation of the 407 Transitway in order to meet the requirements of the *Occupational Health and Safety Act*.

As per MTO objectives, to the extent possible, this project will strive for zero waste generation. Where recommendations for re-use of materials are made, geotechnical and structural implications of the re-use of materials will be reviewed by a qualified professional. The wastes which may be generated by the project could generally consist of:

- Reclaimed asphalt pavement (“RAP”) from milling of existing asphalt surfaces;
- Concrete, likely reinforced, from the removal of bridge or pavement structures;
- Manufactured wood waste from guide rails and the like removals; and,
- Scrap metal such as wire, corrugated steel pipe, and bridge guide rails.

RAP can be re-used on site for a variety of purposes as part of the construction activities, including, but not necessarily limited to, shoulder treatments, general fill and sub-grade fill. Non-reinforced concrete can be broken up and re-used within the project limits. Manufactured wood waste will require off-site disposal at licensed receiving facilities. Natural wood waste may be left on site within the ROW. Scrap metal will be collected for recycling at an off-site receiving facility.

The disposal of contaminated materials will be directed to an MECP approved soil treatment site or waste disposal site.

Should impacts to soil and/or groundwater and/or issues of potential environmental concern be identified during subsequent, more detailed phases of work, additional assessment will be conducted and appropriate steps will be taken following the MTO’s *Environmental Reference for Highway Design* (2013).

### SURFACE WATER, DRAINAGE AND STORMWATER

The erosion and sediment control practices to be developed during project implementation will follow the latest MTO’s reference documents including the *Environmental Reference for Highway Design* (MTO, June 2013), the *Environmental Guide for Erosion and Sediment Control during Construction of Highway*

Projects (MTO, September 2015), as well as the *Ontario Provincial Standards for Roads and Public Works* (OPSS), and the *Erosion and Sediment Control Guidelines for Urban Construction* (Greater Golden Horseshoe Conservation Authority, December 2006).

Impacts on the surrounding environment related to highway projects can be mitigated by proper erosion and sediment control measures. It is recommended that a multi-barrier approach be undertaken during construction using the following measures as a minimum:

- Stabilize exposed soils with vegetation where possible to reduce the amount of sediments that would be conveyed further downstream to existing watercourses;
- Implement construction phasing to limit the duration of soil exposure;
- Install heavy-duty double silt fence at each water crossing;
- Double silt fence to be supported by straw-bale within Reside Dace regulated areas;
- Install rock check dams to reduce high flow velocities in the ditches/swales adjacent to the proposed Transitway;
- Erosion and sediment control blankets for the road embankments;
- Dewatering, temporary channel diversions; and,
- Use erosion prevention controls and sediment control measures as necessary.

All topsoil stock piles will be surrounded with sediment fence. Silty/sediment laden water from the work area is to be pumped to filter bags or equivalent prior to discharge. Disturbed areas will be minimized to the extent possible, and temporary or permanently stabilized or restored as the work progresses. All points of construction egress or ingress shall be maintained to prevent tracking or flowing of sediment onto public roads or abutting properties.

Implementation of BMPs during construction will reduce the potential for spills or other materials / equipment entering the water. The following measures will be employed:

- All equipment maintenance and refueling will be controlled to prevent any discharge of petroleum products. Vehicular maintenance and refueling will be conducted at least 30 m distance from any surface drainage feature to prevent the entry of petroleum, oil or lubricants to the watercourses;
- Storage, stockpiling and staging areas will be delineated prior to construction and inspected in accordance with the current MTO Construction Administration and Inspection Task Manual;
- Construction material, excess material, construction debris, and empty containers will be stored at least 30 m distance from any surface drainage features to prevent their entry into the watercourse;
- All spills that could potentially cause damage to the environment will be reported to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up shall be completed quickly and effectively. A “Spill Response Plan” and the appropriate contingency materials to absorb or contain a spill will be on the site at all times; and,
- No construction machinery or vehicles will cross any watercourse at any time during construction.

Weight dissipation measures such as mats may be required to minimize rutting and destabilization of the valley and floodplain during construction due to heavy equipment operations. The need for additional

stabilization measures will be decided prior to start of the work.

## GROUNDWATER

The groundwater assessment completed as part of the TPAP presents a generalized interpretation of hydrogeological conditions and has been based on available background information in addition to a limited windshield reconnaissance. Hydrogeological conditions within the study area will vary locally and are subject to confirmation with actual site specific investigations prior to construction, as necessary, including (but not limited to) boreholes, monitoring wells, test pits, groundwater hydraulic testing, chemical analysis, etc. During detail design, the potential impacts of the proposed construction works on groundwater resources will be reassessed along with more detailed site specific hydrogeological data prior to construction of the project and further investigation/monitoring will be completed and appropriate mitigation measures be incorporated into the design.

In vulnerable areas that may not be identifiable through high-level studies, additional detailed studies may be conducted, such as door-to-door well surveys to identify shallow dug wells which may not have been included in the MECP Water Well Records (WWR). Where there is potential for well interference, it will be confirmed that there is a suitable alternative water supply available. During Detail Design, it will be confirmed properties along Trafalgar Road, west of the 407 ETR, and near Winston Churchill Boulevard and Mississauga Road have access to municipal water supplies prior to construction

Construction activities associated with the development of the 407 Transitway are expected to consist of construction of the Transitway road bed and pavement, drainage infrastructure, bridges and culverts for road and stream crossings, station vehicular and pedestrian access(es), tunnelling, park and ride and passenger pick-up/drop off (PPUDO) facilities, bus lay-by facilities, on street integration with local transit, shelters, buildings and other amenities. Most physical interaction with groundwater is expected to be as a result of deep excavations below the water table. Most excavation activities for the project are expected to be relatively shallow; however, deeper excavations may be necessary for bridge and buried utility and sewer construction. In cases where nearby wells are in the vicinity of the construction area, monitoring of groundwater flow and quality will be conducted to ensure potential sources of contamination do not affect existing wells during construction and operation of the 407 Transitway. Discharge functions at the bridge construction locations may be impacted temporarily during construction activities. Prior to construction, the potential impact of the proposed construction works will be reassessed and further investigation and monitoring carried out as necessary.

### Physical Alteration of the Existing Groundwater Regime During Construction

Based on potential construction works and the hydrogeologic conditions, potential alterations to the groundwater regime during construction include:

- Construction excavation below the water table. Given the relatively fine-grained soil which predominates through the study area it is expected that construction excavation below the water would result in localized lowering of the water table which will be temporary and recover once the excavations are backfilled. Consideration will be given to installation of trench plugs in permanent

buried services where warranted by the proposed construction design and local groundwater resources to prevent permanent lowering of the water table;

- Profile lowering and drainage improvements which have the potential to permanently de-water or lower the local water table;
- Bridge construction may cause temporary impacts to local groundwater discharge to water courses; however, this impact is expected to be temporary once water table conditions equilibrate around the new structures;
- Impacts associated with any positive dewatering implemented during construction. There is a strong possibility of positive dewatering being needed for bridge crossings for the deeper stream valleys and may be required elsewhere for culvert and buried utility construction, although this is considered less likely given the relatively fine grained soil in the study area. The measured impacts and effective radius of influence from any dewatering will be dependent on specific local hydrogeologic conditions and will be reviewed by a qualified hydrogeologist and additional investigation completed as necessary prior to construction. The impacts associated with the construction dewatering activities are expected to be temporary. Any pumping of water for road construction above 50,000 litres per day will require either registration on the Environmental Activity and Sector Registry (“EASR” - under certain criteria) or a Permit to Take Water from the MECP prior to construction.

Given the fine-grained soil expected to underlie much of the study area, the impact of any physical alteration of the groundwater flow system is not expected to be widespread, however, this will be re-assessed prior to construction based on additional site specific hydrogeologic data.

#### **Water Well Interference**

Water wells may be susceptible to quality and/or supply interference during construction as a result of active aquifer dewatering, passive dewatering from groundwater seepage into excavations, sediment mobilization in the wells from construction equipment vibration and chemical impacts related to fueling and de-icing salt application.

In general, shallow wells (<10 m deep) are the most susceptible to physical impacts including sediment mobilization. Given the relatively fine-grained soils in the area, the small proportion of shallow wells, a localized decrease in discharge is not expected to be measurable. Any physical impacts of the type outlined above will be temporary and abate once the groundwater table has recovered post construction. Nevertheless, the potential for water well interference will be further assessed by a qualified hydrogeology specialist through detail design phase.

#### **Impacts of High Water Table During Construction**

Areas of high water table (i.e., less than 3 m below ground surface) may affect construction progress and technique. Based on topography, geology and field observations there is the potential for a high water table to be present within the study area. In areas of relatively fine grained soils such as till or clay, the presence of the high water table will not represent a significant constraint for construction. For areas of

relatively coarse silt and sand such as those thought to exist to the in the Sixteen Mile Creek Valley, Credit River Valley and the area between Derry Road and Britannia Road, the presence of a high water table could impact on construction techniques and progress. Excavation and construction below the water table in saturated sandy and/or silty soils may present challenges, including the need for dewatering and the increased potential for water well interference.

While not strictly a high water table issue, a total of eight flowing wells were documented in the well records, six of which are located in the vicinity of Highway 401 and 407 ETR interchange and south of Derry Road. Geologic mapping for this area shows glacial till at ground surface, but the well record cross-sections indicate the presence of water bearing sand layers beneath the till veneer at depths less than 3 m, which may be under flowing artesian conditions. It is possible that the overlying glacial till confining layer has allowed for artesian pressure to develop in the underlying sand aquifer. The presence of these flowing artesian water bearing zones may present challenges for the construction of the 407 Transitway. Excavation into the underlying sand or even within the overlying confining layer may result in difficult to manage groundwater flow. This issue will be analyzed during detail design.

The other two flowing wells are located directly east of the Credit River and along Trafalgar Road respectively. The plot of water well locations suggest that the Trafalgar Road flowing well maybe within the footprint of the proposed station location. No stratigraphic information for this well was recorded on the well record and it is not possible to speculate on the potential impact on construction. This issues will be investigated during detail design.

#### **Potential for Groundwater Contamination During Construction**

Mobile vehicle re-fuelling during construction presents a risk of impact to groundwater as a result of accidental releases of fuel. This risk can be minimized or managed by allowing re-fuelling only in designated areas, preferably situated on a paved, impermeable surface, and by having an emergency response plan in place to clean up all releases of fuel. Contaminated groundwater will be managed in accordance with provincial legislation and regulations including the MECP *Guidelines for Use at Contaminated Sites in Ontario* (1997).

#### **FISH AND FISH HABITAT**

Potential impacts to fish and fish habitat during construction could include erosion and sediment inputs to the watercourses, temporary disruption of flows, increased water temperatures, barriers to fish movement and potential impacts to rare, threatened or endangered fish species (i.e. Silver Shiner, American Eel, Redside Dace). **Table 6.11** presents a summary of proposed works, net environmental effects, and site specific mitigation measures during construction. Net environmental effects are calculated assuming all general proposed mitigation measures outlined in this chapter for fish and fish habitat are applied. See **Section 6.2.1** for additional mitigation measures and the assessment of residual effects for each impacted watercourse.

### **In-Water Works**

Where possible, structures shall be constructed outside of the watercourse banks, eliminating the need for in-water works. However, at some of the crossings, in-water work may be necessary. At all locations where in-water work is proposed, cofferdams (pea gravel bags, sheet piles, etc.) will be used to isolate the work area from the watercourse to enable work to be done in-the-dry (OPSS 517 Construction Specification for Dewatering). Flow will be maintained through either damming and pumping or fluming. If possible, work shall be done during the driest part of the year when the lowest flows are present. This will minimize disturbance to fish habitat at the site and downstream. To further reduce the potential for serious harm, the following environmental protection measures will be implemented:

- No in-water work (or work on watercourse banks) will be permitted from April 1 to June 30 to protect spawning warmwater fish, incubating eggs and fry emergence and from September 16 to June 30 to protect cool and coldwater fish spawning, egg incubation and fry emergence, and to protect Redside Dace;
- Where cofferdams are to be employed, dewatering effluent will be treated prior to discharge to receiving watercourse (OPSS 517);
- Cofferdams will be constructed using pea gravel bags, sheet piling or other appropriate material to isolate the work area: flow will be maintained at all stations;
- Only clean material free of particulate matter will be placed in the watercourse (OPSS 1005 Streambed Material); and,
- Fish isolated by construction activities (if present) will be captured by a qualified fisheries specialist and safely released to the watercourse (OPSS 182 Construction In and Around Waterbodies and on Waterbody Banks). Permitting under SARA will likely be required for activities occurring in occupied Redside Dace (Site 58) and Silver Shiner habitat (Sites 15 and 29).

See **Surface Water, Drainage and Stormwater** below in **Table 6.12** for the BMPs to be implemented during construction.

### **Erosion and Sedimentation Control**

See **Physiography and Soils** below in **Table 6.12** for standard erosion and sedimentation control measures to be implemented pre, during and post construction. A number of special provisions related to erosion and sedimentation control are recommended to be included in the contract package to ensure that the mitigation measures are implemented including:

- General Specification for Environmental Protection for Construction in and Around Waterbodies and on Waterbody Banks (OPSS 182) to cover the environmental protection requirements and mitigation measures that apply to construction involving work in and around waterbodies and on waterbody banks;
- Construction Specification for Seed and Cover (OPSS 803) to stabilize disturbed areas;

- Construction Specification for Topsoil (OPSS 802) and Sodding (OPSS 803) to address the requirements for stockpiling, placing and supplying topsoil and to cover the requirements for sodding;
- Construction Specification for Temporary Erosion and Sediment Control Measures (OPSS 805) to cover the installation, maintenance, monitoring and removal of the temporary erosion and sediment control measures and the removal of sediment accumulated by the control measures;
- Amendments to the Construction Specification for Temporary Erosion and Sediment Control Measures to specify the type of temporary erosion and sedimentation control measures to be installed and the timing constraints for the installation and removal of the control measures;
- Any Non-Standard Special Provisions (NSSPs) required to stipulate the time interval (i.e., maximum of 20 calendar days) between the commencement and completion of any work that disturbs earth surfaces, and to provide direction for seeding, mulching or use of an erosion control blanket to be placed in areas of soil disturbance to provide slope protection and long-term slope stabilization; and,
- General Specification for the Management of Excess Materials (OPSS 180) to ensure material generated during maintenance of sediment control measures will be taken off-site for disposal.

Erosion and sedimentation will have a minor effect on surface water quality provided these measures are installed pre-construction, maintained during construction, and removed post-construction following soil re-stabilization.

### **Maintenance of Riparian Vegetation**

Maintaining riparian vegetation to the extent possible will help to stabilize the watercourse banks, provide shading/cover for the watercourse, filter contaminants, and improve wildlife habitat and aesthetics. The Contractor will be responsible for vegetation management.

- Prior to construction, trees/shrubs to be retained will be clearly identified in the field by the installation of tree/shrub protection barrier in accordance with OPSS 801 (Construction Specification for the Protection of Trees);
- Trees/shrubs identified to remain, which become damaged by construction activities, will be repaired or replaced in accordance with MTO's NSSP - landscaping specifications; and,
- In areas where riparian vegetation removal is necessary to accommodate construction, measures to protect the local fish communities shall include the following: no clearing of mature trees providing a bank stabilization function; no felling of trees into the watercourse; minimize the amount of debris produced from entering the watercourse; and, only clearing the vegetation required to complete the necessary works.

### **Stormwater Management**

A storm water management study has been completed to ensure construction and post-construction conditions maintain flow to downstream habitats, maintain existing water temperatures and ensure water quality is not impaired.

- A storm water management plan has been prepared to address both water quantity and quality, in accordance with MTO guidelines and in consultation with regulatory agencies;
- The proponent will strive to design storm water management ponds to detain the minimum of a 2-hour 25 mm storm event for 24 hours to address water quality and erosion concerns. Where agencies demonstrate a need, other detention times or additional quantity sizing requirements will be considered prior to construction in consultation with stakeholders;
- When designing BMPs, consideration will be given to measures for reducing adverse environmental impacts to surface and groundwater, including those related to temperature and salt;
- Bridge runoff will be discharged to storm water management facilities (preferably a pond or swale) prior to discharge to watercourses where this can be achieved and will not cause unacceptable environmental, highway design, safety or operational problems; and,

Where feasible, opportunities for providing ease of containment of accidental spills will be provided during the design of storm water management facilities.

**TABLE 6.11: SUMMARY OF PROPOSED IN-STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS**

NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
Site 6: Tributary of Shoreacres Creek	Concrete Box Culvert Length 30 m Width 3.0 m Realignment 130 m	Permanent enclosure of ~600 m <sup>2</sup> of indirect, warmwater fish habitat if upstream of barrier. No effect to direct habitat downstream of barrier.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry". An open footed structure, or box structure with embedded natural substrates should be considered.
Site 7: Tributary of Shoreacres Creek	Concrete Box Culvert Length 20 m Width 3.0 m	Permanent enclosure of ~40 m <sup>2</sup> of seasonal, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry". An open footed structure, or box structure with embedded natural substrates should be considered.
Site 8: Tributary of Shoreacres Creek	Concrete Box Culvert Length 25 m Width 4.0 m Realignment 300 m	Permanent enclosure of ~540 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 9: Appleby Creek	Concrete Box Culvert Length 40 m Width 4.0 m	Permanent enclosure of ~60 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 10: Tributary of Appleby Creek	Concrete Box Culvert Length 25 m Width 2.4 m	Permanent enclosure of ~25 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 11: Tributary of Sheldon Creek	Concrete Box Culvert Length 20 m Width 3.0 m	Permanent enclosure of ~20 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 12: Tributary of Sheldon Creek	Realignment to Site 11 (200 m)	Alteration of ~200 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 13: Tributary of Sheldon Creek	Concrete Box Culvert Length 20 m Width 4.0 m	Permanent enclosure of ~20 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".

**TABLE 6.11: SUMMARY OF PROPOSED IN-STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS**

NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
Site 14: Tributary of Sheldon Creek	No in-water works (road tunnel)	No impacts within bankfull channel.	Tunneling should be deep enough to avoid potential for effects to channel bed.
Site 15: Bronte Creek	Bridge Span 160 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.
Site 15a: Tributary of Bronte Creek	Circular Pipe Culvert Length 35 m Diameter 1.6 m	Permanent enclosure of ~105 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 16: Tributary of Fourteen Mile Creek	Concrete Box Culvert Length 20 m Width 2.4 m	Permanent enclosure of ~20 m <sup>2</sup> of indirect, coldwater fish habitat.	In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. Work will be done "in the dry".
Site 17: Tributary of Fourteen Mile Creek	Concrete Box Culvert Length 20 m Width 2.4 m	Permanent enclosure of ~20 m <sup>2</sup> of indirect, coldwater fish habitat.	In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. Work will be done "in the dry".
Site 18: Tributary of Fourteen Mile Creek	Bridge (over 407 ETR & watercourse) Span 325 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.
Site 19: Tributary of Fourteen Mile Creek	Concrete Box Culvert Length 25 m Width 1.8 m	Permanent enclosure of ~25 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. Work will be done "in the dry".
Site 20: Tributary of Fourteen Mile Creek	Concrete Box Culvert Length 20 m Width 2.4 m	Permanent enclosure of ~20 m <sup>2</sup> of indirect, coldwater fish habitat.	In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. Work will be done "in the dry".
Site 21: Tributary of Fourteen Mile Creek	Concrete Box Culvert Length 20 m Width 2.4 m	Permanent enclosure of ~20 m <sup>2</sup> of indirect, coldwater fish habitat.	In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. Work will be done "in the dry".
Site 22: Fourteen Mile Creek	Concrete Box Culvert Length 20 m Width 3.0 m	Permanent enclosure of ~22 m <sup>2</sup> of indirect, coldwater fish habitat.	In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. Work will be done "in the dry".
Site 23: Tributary of Fourteen Mile Creek	Concrete Box Culvert Length 20 m Width 1.8 m	Permanent enclosure of ~20 m <sup>2</sup> of indirect, coldwater fish habitat.	In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. Work will be done "in the dry".
Site 24: Tributary of Fourteen Mile Creek	Bridge (over Bronte Rd & watercourse) Span 450 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.
Site 26: Tributary of McCraney Creek	Concrete Box Culvert Length 30 m Width 2.4 m	Permanent enclosure of ~30 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 28: Tributary of Sixteen Mile Creek	Concrete Box Culvert Length 15 m Width 3.0 m	Permanent enclosure of ~15 m <sup>2</sup> of indirect, coolwater fish habitat.	In-water works to be conducted within the Silver Shiner timing window (July 1 to September 15), but flexible. Work will be done "in the dry".
Site 29: Sixteen Mile Creek	Bridge Span 440 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.
Site 36: Tributary of Joshua's Creek	CSP Length 20 m Diameter 0.9 m	Permanent enclosure of ~20 m <sup>2</sup> of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".

**TABLE 6.11: SUMMARY OF PROPOSED IN-STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS**

NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
Site 37: Tributary of Joshua's Creek	Concrete Box Culvert Length 30 m Width 1.8 m	Permanent enclosure of ~30 m2 of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 39: Tributary of Joshua's Creek	Concrete Box Culvert Length 30 m Width 3.0 m	Permanent enclosure of ~30 m2 of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 40: Tributary of Joshua's Creek	Concrete Box Culvert Length 30 m Width 2.4 m	Alteration of ~30 m2 of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 41: Tributary of Joshua's Creek	No in-water works (road tunnel)	No impacts within bankfull channel.	Tunneling should be deep enough to avoid potential for effects to channel bed.
Site 44: Tributary of East Sixteen Mile Creek	Bridge Span 40 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.
Site 49: Mullet Creek	Bridge (over 407 ETR & watercourse) Span 470 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.
Site 50: Levi Creek	Bridge Span 215 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.
Site 51: Credit River	Bridge (over CPR & watercourse) Span 290 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.
Site 52-54: Tributary of the Credit River	Concrete Box Culvert Length 20 m Width 4.0 m	Permanent enclosure of ~150 m2 of indirect, warmwater fish habitat.	In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry".
Site 58: Fletcher's Creek	Bridge Span 90 m Width 13 m	No impacts within bankfull channel.	All works must follow MTO Fisheries BMP for Clear Span Bridges and Table 6.9 below.

**VEGETATION AND VEGETATION COMMUNITIES**

The displacement of and/or disturbance to vegetation and vegetation communities will occur as a result of the construction of the 407 Transitway and Transitway stations including grading, the construction of bridges, and the installation of culverts.

Vegetation impacts from construction may be associated with equipment operating in areas identified for protection. Therefore, areas designated for protection will be clearly shown on all construction plans and marked in the field using tree protection barriers. Efforts will be taken during construction to minimize impacts to existing forest and wetland vegetation communities located within the study area. Wherever possible, regionally rare species will be avoided. Where these plant species cannot be avoided, they will be salvaged through transplanting into nearby vegetation communities with suitable habitat characteristics that will afford ongoing protection, where possible. Mitigation measures will be further developed prior to construction. The *Construction Administration and Inspection Task Manual* (MTO

2014) will be followed and monitoring will take place during construction.

Siltation of natural vegetation arising from soil erosion of exposed soils can arise if appropriate sediment control is not undertaken. A sediment control plan will be in place prior to the start of construction.

Non-native invasive plants can establish in natural areas during construction displacing native plant species over time. The inadvertent spread of aggressive or non-native plant species shall be appropriately managed. Efforts to control non-native species that have become established, as well as to prevent the establishment of new non-native plants is important to maintain the health and diversity of natural ecological systems.

In addition, at a minimum, the following general construction best management practices and mitigation measures will be implemented during construction:

- identify regionally rare plants that will be impacted due to the proposed 407 Transitway and associated stations and, where possible, transplant any impacted species into vegetation communities with suitable habitat characteristics that are afforded protection;
- surplus lands or Protected Sites have been identified to offset impacts for the removal of forest, wetland and species at risk habitat;
- review sites protected for forest and wetland restoration/enhancement opportunities as part of compensation (with the rate of compensation to be determined through further discussion with regulatory agencies (e.g., MNRF, MECP, and conservation authorities) as part of project implementation), with a minimum of 1:1 for forest and wetland restoration recommended;
- identify all forest and wetland restoration areas required for compensation, as well as all forest edge, riparian and valleyland areas where vegetation management is required prior to construction commencement;
- ensure forest edge, riparian and valleyland management for those vegetation communities where such management is recommended;
- develop detailed planting plan(s) once areas identified for compensation/restoration have been determined in consultation with the respective regulatory agencies;
- control non-native and invasive plant species that have become established and prevent the establishment of new non-native and invasive plant species;
- ensure the policies of the Greenbelt Plan (2017) are reviewed/adhered to;
- during construction implement methods for the short-term stabilization of soils, including but not limited to coir fibre or a suitable alternative, as required;
- utilize vegetation cover to protect any exposed surfaces in accordance with OPSS 804 (Construction Specification for Seed and Cover);
- topsoil from stockpiles to be in accordance with OPSS 802 (Construction Specification for Topsoil);

- place tree protection fencing 1 m outside of the dripline of trees to minimize impacts and ensure no construction activity shall occur within the tree protection zone in accordance with OPSS 801 (Construction Specification for the Protection of Trees);
- filter fabric will be placed along the tree protection fencing to mitigate the colonization of wind dispersed invasive species during construction along forest edges; and,
- prepare construction access management plans for work to be carried out at Bronte Creek, Sixteen Mile Creek and the Credit River, in order to minimize encroachment into the stream valley to the extent possible.

### **Riparian Habitat and Valley Management**

Riparian habitat will be retained at a minimum of 3 m to 5 m from the bank edge of any watercourse impacted during construction. This measure is expected to ensure bank stability, mitigate erosion, and mitigate negative impacts to aquatic habitat. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Restoration/enhancement of riparian habitat will be undertaken immediately following the completion of work in riparian zones. Suitable deep rooting graminoid, herbaceous and shrub species, with a variety of trees where suitable, will be installed to prevent streambank erosion and improve riparian conditions. Plant species selected will be native and/or non-invasive.

The 407 Transitway will cross three large valleylands associated with Bronte Creek, Sixteen Mile Creek and the Credit River. At these three crossing locations, consideration will be given to providing an access management plan to minimize encroachment into the stream valley to the extent possible. Where valleylands are impacted, the zone of construction impacts will be limited, and staging areas will be well outside of forested valleys. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Restoration of newly impacted edges will be undertaken, and methods for the enhancement of these areas will be carried out as outlined in **Section 6.2.1** under Forest Edge Management. Plant species selected will be native and/or non-invasive.

### **DESIGNATED NATURAL AREAS**

The 407 Transitway spanning from west of Brant Street to west of Hurontario Street is planned to travel adjacent to/or near to several designated natural areas and Plan Policy Areas. These include three Provincially Significant Wetlands (PSW) and one Unevaluated Wetland; the North Oakville-Milton West PSW and the Drumquin unevaluated wetland are all over 120 m from the study area. There are several wetlands associated with the North Oakville-Milton East PSW that are within 120 m of the study area. Part of this PSW is located just east of Sixteen Mile Creek associated with the Sugar Maple-Beech Deciduous Forest (FOD5-2), within Segment S5. Impacts to the forest will not directly impact the wetland, but forest removal may cause indirect wetland impacts. Just west of Trafalgar Road still in Segment S5, several small wetland pockets are located within a forest to the south of the Oak-Hardwood Deciduous Forest (FOD2-4a). These wetlands will not be directly impacted, but forest removal may cause indirect wetland impacts. Within Segment S10 and S11, direct impacts related to wetland removals are

expected associated with a large Reed-canary Grass Mineral Marsh Wetland (MAM2-2m) which is part of the Churchville-Norval Wetland Complex.

Five designated natural areas are present within the study area. Four are Areas of Natural and Scientific Interest (ANSI), including the provincially significant Zimmerman Valley Life Science and Trafalgar Moraine Earth Science ANSIs, and the candidate Sixteen Mile Creek and Oakville-Milton Wetlands and Uplands Life Science ANSIs. North Oakville-Milton West Wetland Complex PSW is also within the study area.

Impacts to vegetation communities within the Zimmerman Valley Life Science ANSI, along Bronte Creek, are associated with runningway impacts in Segments 2 and 3. Impacted vegetation communities include a mineral open bluff, cultural meadow, cultural thicket, cultural woodland, deciduous forest and shallow wetland communities. Forested communities include a Fresh-Moist Sugar Maple-Black Maple Deciduous Forest (FOD6-4) associated with the Bronte Creek floodplain. This is a vulnerable community type provincially ranked as S3. Several regionally rare species and Butternut trees/seedlings were identified within this ANSI. Butternut trees are listed as Endangered under the Endangered Species Act, 2007. Mitigation will include tree fencing with filter cloth to minimize edge impacts along the construction limit.

Within the Trafalgar Moraine Earth Science ANSI within Segment S3, impacts will occur to a small portion of cultural meadow (CUM1-1c) and hedgerow (H), just east of Tremaine Road. These impacts are associated with the construction of the runningway.

Within the Sixteen Mile Creek Candidate Life Science ANSI within Segments 4 and 5, impacts will occur to a small portion of cultural meadow. As well, 0.62 ha of Sugar Maple- Oak Deciduous Forest (FOD5-3e) will be impacted within this ANSI where several regionally rare species were identified.

Just west of Trafalgar Road within Segment S5, the northern portion (2.6 ha) of an Oak-Hardwood Deciduous Forest (FOD2-4a) will be impacted by the runningway. This portion of forest is located outside of the Oakville-Milton Wetlands and Uplands Life Science Candidate ANSI, but is contiguous with forest to the south, which is within the ANSI where 0.11 ha of forest habitat will also be impacted. The removal of forest both outside and within the ANSI may cause indirect impacts to remaining forest habitat. These impacts will be mitigated to the extent possible. Mitigation will include tree fencing with filter cloth to minimize edge impacts to the extent possible, and edge management plantings.

Further to the west, west of Neyagawa Boulevard, the runningway is approximately 15 m to 30 m north of another forest community associated with the Oakville-Milton Wetlands and Uplands Life Science Candidate ANSI. No direct, inadvertent impacts shall occur to the forest, and indirect impacts will be minimized to the extent possible. Mitigation will include tree fencing with filter cloth to minimize edge impacts along the construction limit.

Within Segments 3, 4 and 6, impacts are expected to wetland habitat within the North Oakville-Milton West Wetland Complex PSW. This includes impacts to 0.05 ha of meadow marsh and shallow marsh (MAM2-2e and MAS2-1d) habitat. As previously noted, the meadow marsh is likely additionally supported by runoff from the highway and it is expected that the wetland remnant would persist with



wetland species colonizing suitable spaces between the 407 ETR and the runningway where runoff from infrastructure is expected to provide adequate conditions to support its continued existence. Impacts to the shallow marsh where the proposed infrastructure is immediately adjacent, may cause negative impacts. During detail design, design consideration will be given to mitigate negative impacts to this wetland, to the extent possible.

Overall, the environmental protection/mitigation measures outlined in this report will help maintain/enhance habitat within the Protected Countryside and the Urban River Valleys designations to ensure that the policies of the Greenbelt Plan will be adhered to at these features. Such measures will also help to support connections between the Natural Heritage System and the local, regional and broader natural heritage systems of southern Ontario.

### **WILDLIFE AND WILDLIFE HABITAT**

The majority of species residing in habitats within or directly adjacent to the right-of-way are generally tolerant of anthropogenic disturbances. However, efforts will be made to ensure that impacts to areas containing more sensitive wildlife habitat (e.g. natural areas/valleylands, ANSIs, PSWs) are minimized during construction to the extent possible and to maintain opportunity for wildlife movement through the natural areas/valleylands.

A total of 28 wildlife species at risk have been recorded within the vicinity of the study area and/or are having the potential to be found within the study area. Five species at risk were confirmed in the study area by LGL during 2018-2019 field investigations including Barn Swallow, Bobolink, Eastern Meadowlark, Eastern Wood Peewee and Western Chorus Frog. Impacts to wildlife species at risk/species at risk habitat during construction will be minimized to the extent possible. Targeted species-specific field investigations during the appropriate timing window is necessary to confirm whether these species and their habitat are present, and to determine whether any additional wildlife species at risk and species at risk habitat are present in the study area. Environmental protection/mitigation measures to protect species at risk and their habitat will be developed later in the design process. **Section 6.2.1** provides more details on species at risk.

Construction duration and disturbance in the vicinity of existing culverts and bridges will be minimized to the extent possible to reduce the potential for increase in road mortality caused by wildlife avoidance of these structures. Where it is necessary to construct new roads, expand existing highways, or similar infrastructure, wildlife crossing structures (e.g., bridges and culverts) can be used to enable wildlife movement across roads (Beier et al. 2008). Funnel and/or barrier fencing is the most effective way to guide wildlife to a given crossing structure and reduce road-mortality (Clevenger 2011; Ministry of Transportation 2006). Wildlife fencing is recommended at the crossings structures identified in **Section 6.2.1**, to improve their effectiveness at safely moving wildlife across the landscape. Further analysis at a site-specific level will be required to determine fencing requirements and to further explore fencing type required (e.g. small animal fencing vs. large animal fencing). Given the level of disturbance and lack of extensive natural cover, wildlife fencing would be constructed in close association with valleylands identified in **Section 6.2.1**.

Wildlife salvage shall occur prior to clearing and grubbing activities associated within construction where possible, particularly in wetland habitats, to preserve vulnerable wildlife species (e.g., herpetofauna). All applicable permits will be obtained prior to any salvage activities.

### **Potential Impacts to Migratory Birds**

A number of bird species listed under the MBCA are located within the study area. The MBCA prohibits the killing, capturing, injuring, taking, or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. While migratory insectivorous and non-game birds are protected year-round, migratory game birds are only protected from March 10 to September 1. Environment Canada provides Nesting Periods when migratory birds are most likely to be nesting, within a respective geographic zone. The 407 Transitway falls within Environment Canada's Nesting Zone C2 (Nesting Period: end of March – end of August). To comply with the requirements of the MBCA, disturbance, clearing or disruption of vegetation where birds may be nesting will be completed outside the migratory bird nesting timing window of April 1 to August 31. In the event that these activities must be undertaken from April 1 to August 31, a pre-clearing nest survey will be conducted by a qualified avian biologist to identify and locate active nests of species covered by the MBCA.

### **AIR QUALITY**

The construction of the 407 Transitway has the potential to affect the air quality in the vicinity of the site during the temporary construction phase. There are several ways that particulate emissions can be mitigated during the construction phase of the project. High temperatures and wind have the potential to cause the release and disbursement of particulate emissions. Therefore, it is recommended that, if possible, construction activities that are likely to cause the release of particulates be avoided under such conditions. If avoidance is not possible, it is recommended that residents within the immediate surrounding area be notified of the potential for particulate emissions during construction or high wind and high temperature scenarios. The Environment and Climate Change Canada (ECCC) publication "*Best Practices for the Reduction of air Emissions from Construction and Demolition Activities*" provides several mitigation measures for reducing emissions during construction activities. It is recommended that these best management practices be followed during construction of the road to reduce any adverse air quality impact that may occur. Mitigation of road dust, as recommended in the ECCC document, includes the use of wind barriers (i.e., solid barriers, or trees and shrubs), wetting or non-chloride dust suppressants, equipment washing, and limiting the exposed area which may be a source of dust.

**TABLE 6.12: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Physiography and Soils	Soil disturbance may result in erosion (and sedimentation) during construction. Excess soil may be generated during construction.	The soils in the study area are susceptible to erosion and will be impacted during construction of the mainline and station facilities. Consequently, soil disturbance associated with drainage improvements, earth moving, culvert modifications, etc. may result in erosion of, and sedimentation to, sensitive receiving watercourses.  A large volume of soil will be displaced in areas where the Transitway will travel below grade. This may generate excess soil that cannot be reused within the project. The excess soil may be stained, odorous, or contain debris, or found to be contaminated.	Standard erosion and sedimentation control measures will be followed during construction in accordance with OPSS 805 to minimize construction-related impacts on surface water quality and fish habitat. Site-specific erosion and sedimentation control measures to be implemented prior to construction, maintained during construction and removed after construction (once soils have stabilized) will be identified prior to construction following the <i>Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects</i> (MTO 2007). Erosion and sedimentation control measures will include: <ul style="list-style-type: none"> <li>■ placing flow checks at regular intervals in ditches down-gradient from areas of soil disturbance in rural sections;</li> <li>■ stabilizing/reinforcing ditches based on ditch slope down-gradient from areas of soil disturbance in rural sections;</li> <li>■ managing surface water at the construction site to prevent contact with exposed soils and/or treat surface water that comes in contact with exposed soils using stormwater detention ponds, basins, traps and bags;</li> <li>■ protecting inlets to catch basins and maintenance holes in urban sections;</li> <li>■ placing silt fence along stream margins in areas of soil disturbance;</li> <li>■ limiting the extent and duration that soils are exposed to the elements to the minimum area and time necessary to perform the work;</li> <li>■ applying seed and mulch, tackifier and/or erosion control blanket in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization; and,</li> <li>■ monitoring and maintenance of erosion and sedimentation control measures during construction to ensure their effectiveness.</li> </ul> These environmental protection measures will greatly reduce the potential for soil erosion and impairment of surface water quality and fish habitat. Excess soil that is stained, odorous, contains debris or has been analyzed and found to be contaminated during construction will require management as a waste. Final profiles will be defined prior to construction. Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (i.e. OPSS 180) will be used when developing an Excess Materials Management Plan.  In addition, the disposal of excess soil in the Niagara Escarpment Area will be avoided, in accordance with the landform conservation policies in the Niagara Escarpment Plan (NEP). If such disposal is unavoidable, Niagara Escarpment Commission (NEC) Development Permits for the receiving site(s) will be required. The <i>On-Site and Excess Soil Management Regulation</i> (O. Reg. 406/19) under the <i>Environmental Protection Act</i> also requires that any fill placed in environmentally sensitive areas (including Escarpment Protection and Natural Areas) meets Table 1 standards. Any soil placed on cropland or pasture must meet the definition of topsoil as per the <i>Municipal Act</i> .	An Erosion and Sedimentation Control Plan will be developed prior to construction including measures to monitor and maintain erosion and sedimentation control during construction to ensure their effectiveness.  An Excess Materials Management Plan will be developed prior to construction and will include management for any excess (and contaminated) soils.
Contaminated Property and Waste	Potential for disturbance to and/or disposal of contaminated waste (and/or soils) during construction.	Disturbance of contaminated waste and/or soils during construction.	If excavation is required in areas identified to be 'highly likely' to have waste or contamination, intrusive environmental investigations (i.e. Phase I and Phase II Environmental Site Assessments) will be conducted. The investigations will be conducted in accordance with provincial regulatory requirements to assess the environmental site conditions, disposal requirements for soil as well as health and safety requirements. In addition, MTO will implement standard construction methods and BMPs regarding contaminated property/waste issues.  As per MTO objectives, to the extent possible, this project will strive for zero waste generation. Where recommendations for re-use of materials are made, geotechnical and structural implications of the re-use of materials will be reviewed by a qualified professional. Reclaimed asphalt pavement can be re-used on site for a variety of purposes as part of the construction activities, including, but not necessarily limited to, willer treatments, general fill and sub-grade fill. Non-reinforced concrete can be broken up and re-used within the project limits. Manufactured wood waste will require off-site disposal at licensed receiving facilities. Natural wood waste may be left on site within the ROW. Scrap metal will be collected for recycling at an off-site receiving facility.	Should impacts to soil and/or groundwater and/or issues of potential environmental concern be identified during subsequent, more detailed phases of work, additional assessment will be conducted and appropriate steps will be taken following the MTO's Environmental Reference for Highway Design (2013).  A Designated Substances Survey (DSS) shall be completed for any structures that will be removed as part of implementation of the 407

**TABLE 6.12: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
			The disposal of contaminated materials will be directed to an MECP approved soil treatment site or waste disposal site.	Transitway in order to meet the requirements of the <i>Occupational Health and Safety Act</i> .
Surface Water, Drainage and Stormwater	Impact to quality and quantity of water.	Erosion and sedimentation impacts from construction. Impacts associated with any positive dewatering implemented during construction. There is a strong possibility of positive dewatering being needed for bridge crossings for the deeper stream valleys and may be required elsewhere for culvert and buried utility construction. The impacts associated with the construction dewatering activities are expected to be temporary. Potential impact from spills during construction. Floodplain disturbance.	<p>Surface roughening will take place wherever possible as a means of temporary erosion and sediment control measures. Sediment barriers, rock check dams and temporary construction access will be installed prior to any topsoil stripping. All erosion and sediment control measures (temporary silt fencing, temporary catchbasin sediment control, temporary mudmats, temporary tree protection (if required), straw bale protection, and rock check dams) will be installed prior to construction and will be left in place until the site is fully restored and stabilized including final ditching. Silt fences will be installed in a manner that minimizes the build-up of water at low points along the fence.</p> <p>All topsoil stock piles will be surrounded with sediment fence. Silty/sediment laden water from the work area is to be pumped to filter bags or equivalent prior to discharge. Disturbed areas will be minimized to the extent possible, and temporary or permanently stabilized or restored as the work progresses. All points of construction egress or ingress shall be maintained to prevent tracking or flowing of sediment onto public roads or abutting properties.</p> <p>Implementation of BMPs during construction will reduce the potential for spills or other materials / equipment entering the water. The following measures will be employed:</p> <ul style="list-style-type: none"> <li>■ All equipment maintenance and refueling will be controlled to prevent any discharge of petroleum products. Vehicular maintenance and refueling will be conducted at least 30 m distance from any surface drainage feature to prevent the entry of petroleum, oil or lubricants to the watercourses;</li> <li>■ Storage, stockpiling and staging areas will be delineated prior to construction and inspected in accordance with the current MTO Construction Administration and Inspection Task Manual;</li> <li>■ Construction material, excess material, construction debris, and empty containers will be stored at least 30 m distance from any surface drainage features to prevent their entry into the watercourse;</li> <li>■ All spills that could potentially cause damage to the environment will be reported to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up shall be completed quickly and effectively. A "Spill Response Plan" and the appropriate contingency materials to absorb or contain a spill will be on the site at all times; and,</li> <li>■ No construction machinery or vehicles will cross any watercourse at any time during construction.</li> </ul> <p>Weight dissipation measures such as mats may be required to minimize rutting and destabilization of valley and floodplain during construction due to heavy equipment operations. The need for additional stabilization measures will be decided prior to start of the work.</p>	Erosion will be monitored and a sediment removal program will be followed. Cleaning of sediments in the temporary stormwater ponds will be undertaken as needed. Monitoring of potential spills will be carried out during construction.
Groundwater	Potential alteration of the existing groundwater regime during construction. Impacts to high water table during construction. Potential for groundwater contamination during construction.	Potential alterations to the groundwater regime during construction include: <ul style="list-style-type: none"> <li>■ Construction excavation below the water table;</li> <li>■ Profile lowering and drainage improvements which have the potential to permanently de-water or lower the local water table;</li> <li>■ Bridge construction may cause temporary impacts to local groundwater discharge to water courses (although this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures); and,</li> </ul>	Given the fine grained soil expected to underlie much of the study area, the impacts of any physical alteration of the groundwater flow system is not expected to be widespread. The impacts associated with the construction dewatering activities are expected to be temporary. This risk of impacts to groundwater as a result of accidental releases of fuel can be minimized or managed by allowing re-fuelling only in designated areas, preferably situated on a paved, impermeable surface, and by having an emergency response plan in place to clean up all releases of fuel. Contaminated groundwater will be managed in accordance with provincial legislation and regulations including the MECP <i>Guidelines for Use at Contaminated Sites in Ontario</i> (1997). Any pumping of water for road construction above 50,000 litres per day will require either registration on the Environmental Activity and Sector Registry ("EASR" - under certain criteria) or a Permit to Take Water from the MECP prior to construction.	A hydrogeological analysis will be conducted during Detail Design where there may be construction dewatering under flowing artesian conditions, or where there are nearby wells, and where deep excavations, or tunnelling are required. Mitigation strategy, including contingency plan will be developed for cases where potential impacts are predicted. In vulnerable areas that may not be identifiable through high-level studies, additional detailed studies may be conducted, such as door-to-door well surveys to identify

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		<ul style="list-style-type: none"> <li>Impacts associated with any positive dewatering implemented during construction. There is a strong possibility of positive dewatering being needed for bridge crossings for the deeper stream valleys and may be required elsewhere for culvert and buried utility construction. Impacts associated with construction dewatering activities are expected to be temporary.</li> </ul> <p>Areas of high water table (i.e., less than 3 metres below ground surface) may affect construction progress and technique. There is the potential for a high water table to be present within the study area. Excavation and construction below the water table in saturated sandy and/or silty soils may present challenges, including the need for de-watering.</p> <p>Mobile vehicles re-fueling during construction presents a risk of impact to groundwater as a result of accidental releases of fuel.</p>		<p>shallow dug wells which may not have been included in the MECP Water Well Records (WWR). Where there is potential for well interference, it will be confirmed that there is a suitable alternative water supply available.</p> <p>During Detail Design, it will be confirmed properties along Trafalgar Road, west of the 407 ETR, and near Winston Churchill Boulevard and Mississauga Road have access to municipal water supplies prior to construction.</p> <p>Further investigation/monitoring will be completed and appropriate mitigation measures will be incorporated into the design prior to construction, as required.</p> <p>Based on the findings of the reassessment of the design and hydrogeological/subsurface data prior to construction, and the impacts of the suspected areas of high water table, Environmental Activity and Sector Registry registration or Permit(s) to Take Water for construction will be applied for as necessary.</p> <p>In cases where nearby wells are in the vicinity of the construction area, monitoring of groundwater flow and quality will be conducted to ensure potential sources of contamination do not affect existing wells during construction and operation of the 407 Transitway.</p>
Fish and Fish Habitat	Potential impacts to fish and fish habitat during construction.	<p>Potential impacts to fish and fish habitat during construction could include erosion and sediment inputs to the watercourses, temporary disruption of flows, increased water temperatures, barriers to fish movement and potential impacts to rare, threatened or endangered fish species (i.e. Redside Dace).</p> <p>The proposed works identified at each of the crossings, which include bridge and culvert installations, will result in a temporary alteration and disruption of fish habitat. In some cases, where a channel realignment is proposed and/or retaining walls are proposed, "Serious harm" may occur.</p>	<p>The mitigation measures proposed will minimize negative impacts to fish and fish habitat. For details on mitigation measures and potential residual effects at each watercourse crossing see <b>Section 6.2.1.</b></p> <p><u>In-Water Works</u></p> <p>Where possible, structures shall be constructed outside of the watercourse banks, eliminating the need for in-water works. However, at some of the crossings, in-water work may be necessary. At all locations where in-water work is proposed, cofferdams (pea gravel bags, sheet piles, etc.) will be used to isolate the work area from the watercourse to enable work to be done in-the-dry (OPSS 517 Construction Specification for Dewatering). Flow will be maintained through either damming and pumping or fluming. If possible, work shall be done during the driest part of the year when the lowest flows are present. This will minimize disturbance to fish habitat at the site and downstream. To further reduce the potential for serious harm, the following environmental protection measures will be implemented:</p>	<p>An Erosion and Sedimentation Control Plan will be developed prior to construction including measures to monitor and maintain erosion and sedimentation control during construction to ensure their effectiveness.</p>

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			<ul style="list-style-type: none"> <li>▪ No in-water work (or work on watercourse banks) will be permitted from April 1 to June 30 to protect spawning warmwater fish, incubating eggs and fry emergence and from September 16 to June 30 to protect cool and coldwater fish spawning, egg incubation and fry emergence, and to protect Redside Dace;</li> <li>▪ Where cofferdams are to be employed, dewatering effluent will be treated prior to discharge to receiving watercourse (OPSS 517);</li> <li>▪ Cofferdams will be constructed using pea gravel bags, sheet piling or other appropriate material to isolate the work area: flow will be maintained at all stations;</li> <li>▪ Only clean material free of particulate matter will be placed in the watercourse (OPSS 1005 Streambed Material); and,</li> <li>▪ Fish isolated by construction activities (if present) will be captured by a qualified fisheries specialist and safely released to the watercourse (OPSS 182 Construction In and Around Waterbodies and on Waterbody Banks). Permitting under SARA will likely be required for activities occurring in occupied Redside Dace (Site 58) and Silver Shiner habitat (Sites 15 and 29).</li> </ul> <p><u>Best Management Practices</u> See <b>Surface Water, Drainage and Stormwater</b> above for the BMPs to be implemented during construction.</p> <p><u>Erosion and Sedimentation Control</u> See <b>Physiography and Soils</b> above for standard erosion and sedimentation control measures to be implemented pre, during and post construction. A number of special provisions related to erosion and sedimentation control are recommended to be included in the contract package to ensure that the mitigation measures are implemented including:</p> <ul style="list-style-type: none"> <li>▪ General Specification for Environmental Protection for Construction In and Around Waterbodies and on Waterbody Banks (OPSS 182) to cover the environmental protection requirements and mitigation measures that apply to construction involving work in and around waterbodies and on waterbody banks;</li> <li>▪ Construction Specification for Seed and Cover (OPSS 803) to stabilize disturbed areas;</li> <li>▪ Construction Specification for Topsoil (OPSS 802) and Sodding (OPSS 803) to address the requirements for stockpiling, placing and supplying topsoil and to cover the requirements for sodding;</li> <li>▪ Construction Specification for Temporary Erosion and Sediment Control Measures (OPSS 805) to cover the installation, maintenance, monitoring and removal of the temporary erosion and sediment control measures and the removal of sediment accumulated by the control measures;</li> <li>▪ Amendments to the Construction Specification for Temporary Erosion and Sediment Control Measures to specify the type of temporary erosion and sedimentation control measures to be installed and the timing constraints for the installation and removal of the control measures;</li> <li>▪ Any Non-Standard Special Provisions (NSSPs) required to stipulate the time interval (i.e., maximum of 20 calendar days) between the commencement and completion of any work that disturbs earth surfaces, and to provide direction for seeding, mulching or use of an erosion control blanket to be placed in areas of soil disturbance to provide slope protection and long-term slope stabilization; and,</li> <li>▪ General Specification for the Management of Excess Materials (OPSS 180) to ensure material generated during maintenance of sediment control measures will be taken off-site for disposal.</li> </ul> <p>Erosion and sedimentation will have a minor effect on surface water quality provided these measures are installed pre-construction, maintained during construction, and removed post-construction following soil re-stabilization.</p> <p><u>Maintenance of Riparian Vegetation</u> Maintaining riparian vegetation to the extent possible will help to stabilize the watercourse banks, provide shading/cover for the watercourse, filter contaminants, and improve wildlife habitat and aesthetics. The Contractor will be responsible for vegetation management.</p>	

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			<ul style="list-style-type: none"> <li>▪ Prior to construction, trees/shrubs to be retained will be clearly identified in the field by the installation of tree/shrub protection barrier in accordance with OPSS 801 (Construction Specification for the Protection of Trees);</li> <li>▪ Trees/shrubs identified to remain, which become damaged by construction activities, will be repaired or replaced in accordance with MTO's NSSP - landscaping specifications; and,</li> <li>▪ In areas where riparian vegetation removal is necessary to accommodate construction, measures to protect the local fish communities shall include the following: no clearing of mature trees providing a bank stabilization function; no felling of trees into the watercourse; minimize the amount of debris produced from entering the watercourse; and, only clearing the vegetation required to complete the necessary works.</li> </ul> <p><u>Stormwater Management</u></p> <p>A storm water management study has been completed to ensure construction and post-construction conditions maintain flow to downstream habitats, maintain existing water temperatures and ensure water quality is not impaired.</p> <ul style="list-style-type: none"> <li>▪ A storm water management plan has been prepared to address both water quantity and quality, in accordance with MTO guidelines and in consultation with regulatory agencies;</li> <li>▪ The proponent will strive to design storm water management ponds to detain the minimum of a 2-hour 25 mm storm event for 24 hours to address water quality and erosion concerns. Where agencies demonstrate a need, other detention times or additional quantity sizing requirements will be considered prior to construction in consultation with stakeholders;</li> <li>▪ When designing BMPs, consideration will be given to measures for reducing adverse environmental impacts to surface and groundwater, including those related to temperature and salt;</li> <li>▪ Bridge runoff will be discharged to storm water management facilities (preferably a pond or swale) prior to discharge to watercourses where this can be achieved and will not cause unacceptable environmental, highway design, safety or operational problems; and,</li> <li>▪ Where feasible, opportunities for providing ease of containment of accidental spills will be provided during the design of storm water management facilities.</li> </ul>	
Vegetation and Vegetation Communities	<p>Displacement of and/or disturbance to vegetation and vegetation communities during construction.</p> <p>Inadvertent spread of non-native invasive plants during construction.</p>	<p>The displacement of and/or disturbance to vegetation and vegetation communities will occur as a result of the construction of the 407 Transitway and Transitway stations including grading, the construction of bridges, and the installation of culverts.</p> <p>Vegetation impacts from construction may be associated with equipment operating in areas identified for protection.</p> <p>Siltation of natural vegetation arising from soil erosion of exposed soils can arise if appropriate sediment control is not undertaken.</p> <p>Non-native invasive plants can establish in natural areas during construction displacing native plant species over time.</p>	<p>Areas designated for protection will be clearly shown on all construction plans and marked in the field using tree protection barriers. Efforts will be taken during construction to minimize impacts to existing forest and wetland vegetation communities located within the study area. Wherever possible, regionally rare species will be avoided. Where these plant species cannot be avoided, they will be salvaged through transplanting into nearby vegetation communities with suitable habitat characteristics that will afford ongoing protection, where possible.</p> <p>The inadvertent spread of aggressive or non-native plant species shall be appropriately managed.</p> <p>In addition, at a minimum, the following general construction best management practices and mitigation measures will be implemented during construction:</p> <ul style="list-style-type: none"> <li>▪ identify regionally rare plants that will be impacted due to the proposed 407 Transitway and associated stations and, where possible, transplant any impacted species into vegetation communities with suitable habitat characteristics that are afforded protection;</li> <li>▪ surplus lands or Protected Sites have been identified to offset impacts for the removal of forest, wetland and species at risk habitat;</li> <li>▪ review sites protected for forest and wetland restoration/enhancement opportunities as part of compensation (with the rate of compensation to be determined through further discussion with regulatory agencies (e.g., MNRF, MECP, and conservation authorities) as part of project implementation), with a minimum of 1:1 for forest and wetland restoration recommended;</li> <li>▪ identify all forest and wetland restoration areas required for compensation, as well as all forest edge, riparian and valleyland areas where vegetation management is required prior to construction commencement;</li> </ul>	<p>Mitigation measures associated with salvaging impacted regionally rare species through transplanting will be further developed prior to construction. The <i>Construction Administration and Inspection Task Manual</i> (MTO 2014) will be followed and monitoring will take place during construction.</p> <p>A sediment control plan will be in place prior to the start of construction.</p>

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			<ul style="list-style-type: none"> <li>▪ ensure forest edge, riparian and valleyland management for those vegetation communities where such management is recommended;</li> <li>▪ develop detailed planting plan(s) once areas identified for compensation/restoration have been determined in consultation with the respective regulatory agencies;</li> <li>▪ control non-native and invasive plant species that have become established and prevent the establishment of new non-native and invasive plant species;</li> <li>▪ ensure the policies of the Greenbelt Plan (2017) are reviewed/adhered to;</li> <li>▪ during construction implement methods for the short-term stabilization of soils, including but not limited to coir fibre or a suitable alternative, as required;</li> <li>▪ utilize vegetation cover to protect any exposed surfaces in accordance with OPSS 804 (Construction Specification for Seed and Cover);</li> <li>▪ topsoil from stockpiles to be in accordance with OPSS 802 (Construction Specification for Topsoil);</li> <li>▪ place tree protection fencing 1 m outside of the dripline of trees to minimize impacts and ensure no construction activity shall occur within the tree protection zone in accordance with OPSS 801 (Construction Specification for the Protection of Trees)</li> <li>▪ filter fabric will be placed along the tree protection fencing to mitigate the colonization of wind dispersed invasive species during construction along forest edges;</li> <li>▪ prepare construction access management plans for work to be carried out at Bronte Creek, Sixteen Mile Creek and the Credit River, in order to minimize encroachment into the stream valley to the extent possible</li> </ul> <p><u>Riparian Habitat and Valley Management</u> Riparian habitat will be retained at a minimum of 3 m to 5 m from the bank edge of any watercourse impacted during construction. This measure is expected to ensure bank stability, mitigate erosion, and mitigate negative impacts to aquatic habitat. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Restoration/enhancement of riparian habitat will be undertaken immediately following the completion of work in riparian zones. Suitable deep rooting graminoid, herbaceous and shrub species, with a variety of trees where suitable, will be installed to prevent streambank erosion and improve riparian conditions. Plant species selected will be native and/or non-invasive. Where valleylands are impacted, the zone of construction impacts will be limited, and staging areas will be well outside of forested valleys. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Restoration of newly impacted edges will be undertaken, and methods for the enhancement of these areas will be carried out as outlined in <b>Table 6.6</b> for forest edge management. Plant species selected will be native and/or non-invasive.</p>	
Designated Natural Areas	Impacts to designated natural areas in the study area during construction.	Five designated natural areas are present within the study area. Four are Areas of Natural and Scientific Interest (ANSI) were identified, including the provincially significant Zimmerman Valley Life Science and Trafalgar Moraine Earth Science ANSIs, and the candidate Sixteen Mile Creek and Oakville-Milton Wetlands and Uplands Life Science ANSIs. North Oakville-Milton West Wetland Complex PSW is also within the study area.  Within the Greenbelt Plan Area, cultural, forest and wetland habitat will be impacted within Segments 1, 2 and 3. These impacts are within the Protected Countryside designation which includes the Greenbelt Natural Heritage System. This includes	Protection of vegetation communities within designated natural and plan policy areas is important to mitigate impacts to the extent possible. Mitigation will include tree fencing with filter cloth to minimize edge impacts to the extent possible, and edge management plantings.  Overall, the environmental protection/mitigation measures for Vegetation and Vegetation Communities (above) and Wildlife and Wildlife Habitat (below) will help maintain/enhance habitat within the Protected Countryside and the Urban River Valleys designations to ensure that the policies of the Greenbelt Plan will be adhered to at these features. Such measures will also help to support connections between the Natural Heritage System and the local, regional and broader natural heritage systems of southern Ontario.	Any design refinements necessary at will be completed prior to construction to delineate the designated natural areas and the construction area within them as well as address the policies of the Greenbelt Plan.

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		<p>impacts along Bronte Creek. Similar habitat within Segments 3, 4, 5 and 10 will be impacted within the Urban River Valley Area. Watercourses across the study area located within this plan area include Fourteen Mile Creek and Sixteen Mile Creek.</p> <p>Within the Niagara Escarpment Area, cultural and wetland habitat will be impacted within Segments 1 and 2, associated with the Escarpment Natural Area and the Escarpment Protection Area (between Dundas Street and Walkers Line). Impacts are primarily to agricultural lands and cultural meadow habitat. Several meadow marsh and shallow marsh communities will also be impacted, these communities are typically supported by intermittent watercourses that bisect the 407 ETR, as well as by runoff from infrastructure.</p>		
Wildlife and Wildlife Habitat	<p>Displacement of and/or disturbance to wildlife and wildlife habitat during construction.</p> <p>Displacement of rare, threatened or endangered wildlife or significant wildlife habitat during construction.</p> <p>Barrier effects on wildlife passage during construction.</p> <p>Wildlife/vehicle conflicts during construction.</p> <p>Potential impacts to migratory birds during construction.</p>	<p>Displacement of and/or disturbance to wildlife and wildlife habitat as a result of the construction of the 407 Transitway runningway and stations.</p> <p>A total of 28 wildlife species at risk have been recorded within the vicinity of the study area or have been identified as having the potential to be found within the study area. Five species at risk were confirmed in the study area by LGL during 2018-2019 field investigations including Western Chorus Frog; Eastern Wood Pewee; Barn Swallow; Bobolink; and, Eastern Meadowlark.</p> <p>The construction of the 407 Transitway has the potential to result in new barriers to wildlife passage, wildlife/vehicle conflicts, and impacts to migratory birds.</p>	<p>Efforts will be made to ensure that impacts to areas containing more sensitive wildlife habitat (e.g. natural areas/valleylands) are minimized during construction to the extent possible and to maintain opportunity for wildlife movement through the natural areas/valleylands.</p> <p>Impacts to wildlife species at risk/species at risk habitat during construction will be minimized to the extent possible. See <b>Table 6.6</b> (Wildlife and Wildlife Habitat) for details on mitigation measures/further work required for species at risk.</p> <p>Construction duration and disturbance in the vicinity of existing culverts and bridges will be minimized to the extent possible to reduce the potential for increase in road mortality caused by wildlife avoidance of these structures.</p> <p>Wildlife crossing structures (e.g., bridges and culverts) can be used to enable wildlife movement across roads. Wildlife fencing is recommended at the crossings structures identified in <b>Section 6.2.1</b> to improve their effectiveness at safely moving wildlife across the landscape. Given the level of disturbance and lack of extensive natural cover, wildlife fencing would be constructed in close association with valleylands identified in <b>Section 6.2.1</b>.</p> <p>Wildlife salvage shall occur prior to clearing and grubbing activities associated within construction where possible, particularly in wetland habitats, to preserve vulnerable wildlife species (e.g., herpetofauna).</p> <p>To comply with the requirements of the MBCA ( as per NSSP Operational Constraint – Migratory Bird Protection – General), disturbance, clearing or disruption of vegetation where birds may be nesting will be completed outside the migratory bird nesting timing window of April 1 to August 31.</p>	<p>Further correspondence shall take place with MNRF prior to construction to discuss the wildlife species at risk that have been identified or have the potential to be located in the vicinity of the study area, in particular Western Chorus Frog; Eastern Wood Pewee; Barn Swallow; Bobolink; and, Eastern Meadowlark, any potential impacts of the proposed work (including construction) on species at risk, and any requirements for permitting under the Ontario ESA. Prior to construction, further field investigations will be undertaken as required for species at risk during the appropriate season using MNRF protocols. Surveying for these species will be conducted to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</p> <p>Further analysis at a site-specific level will be required prior to construction to determine wildlife fencing requirements and to further explore fencing type required (e.g. small animal fencing vs. large animal fencing).</p> <p>Prior to construction (and clearing/grubbing), all applicable permits will be obtained prior to any wildlife salvage activities.</p> <p>In the event that disturbance, clearing or disruption of vegetation where birds may be nesting must be undertaken from April 1 to August 31, a pre-clearing nest survey will be conducted by a qualified avian biologist to</p>



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				identify and locate active nests of species covered by the MBCA.
Air Quality	Potential air quality impacts during construction.	The construction of the 407 Transitway has the potential to affect the air quality in the vicinity of the site during the temporary construction phase. High temperatures and wind have the potential to cause the release and disbursement of particulate emissions. Road dust can cause air quality impacts.	If possible, construction activities that are likely to cause the release of particulates will be avoided during high temperatures and wind conditions. If avoidance is not possible, it is recommended that residents within the immediate surrounding area be notified of the potential for particulate emissions during construction or high wind and high temperature scenarios. BMPs outlined in the "Best Practices for the Reduction of air Emissions from Construction and Demolition Activities" will be followed during construction to reduce emissions during construction activities as well as any adverse air quality impacts that may occur. Mitigation of road dust includes the use of wind barriers (i.e., solid barriers, or trees and shrubs), wetting or non-chloride dust suppressants, equipment washing, and limiting the exposed area which may be a source of dust.	Notify residents within immediate surrounding area of the potential for particulate emissions during construction or high wind and high temperature scenarios.

### 6.3.2 Socio-Economic and Cultural Environment

Refer to **Table 6.13** which shows the construction impacts, proposed mitigation measures and recommended monitoring for the Socio-Economic and Cultural Environment.

#### LAND USE AND PROPERTY REQUIREMENTS

Construction activities are anticipated to temporarily affect socio-economic activities within the study area. Temporary impacts associated with construction are anticipated to affect all land use factors (i.e. agricultural, residential, commercial and industrial businesses, and community and recreational facility users) and may include: traffic disruption and/or delays, access restrictions, noise, and dust. These temporary impacts will be mitigated with the following measures:

- access and egress for emergency vehicles and school buses will be maintained at all times during construction;
- to prevent the emission of pollutants, including dust, to the atmosphere, provisions will be made to ensure there is no unnecessary idling of vehicles. Dust suppressants will be used to combat dust, where appropriate. Emissions during construction will not result in health effects on motorists and local residents and employees;
- construction activities will adhere to local noise by-law regulations. Should there be a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to notify MTO and affected residents in advance of any work performed outside of the allowable time periods;
- construction activities will be staged to avoid/minimize traffic delays to residents, business owners and motorists, and facility owners/users travelling within the study area to the extent possible;

- access to the 407 ETR, regional roads and local municipal roads will be maintained at all times, or detours will be identified; and,
- the local public will be kept informed of the progress of the Transitway construction and notified of any disruptions such as road closings.

The mitigation measures listed above will be reviewed prior to construction, and refined where necessary to address the anticipated impacts of the Transitway during construction.

#### NOISE AND VIBRATION

The MTO *Environmental Guide for Noise* (2006) outlines that construction must be conducted in a manner that minimizes noise and abides by the municipal by-laws. A procedure by which to address noise complaints during construction must be in place as part of the contract documents. Such procedures involve responding to persistent complaints by completing sound testing of the construction equipment to ensure operating sound levels are within those recommended by the MECP. **Appendix K (Noise and Vibration Impact Assessment)** summarizes MECP's construction equipment guideline limits, and relevant requirements of the applicable municipalities with regard to construction noise.

Noise and vibration impacts during construction will be temporary and will occur within time and place restrictions outlined in the various applicable municipal noise by-laws. Should there be a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to notify MTO and affected residents in advance of any work performed outside of the allowable time periods. The impacts of construction noise and vibration on nearby sensitive receptors will be monitored. Provincial guidelines with regard to construction sound levels that place specific restrictions on source sound levels will be followed. The guidelines are written to restrict maximum allowable sound levels for equipment used in certain construction activities. **Table 6.13** presents the noise control mitigation measures during construction.

Implementation of the following measures will help to mitigate potential noise impacts during construction. Best management practices will be used to minimize impacts on local land uses:

- Limit construction to the time periods allowed by the City of Brampton, City of Mississauga, Town of Oakville and City of Burlington's noise by-laws;
- Should there be a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to notify MTO and affected residents in advance of any work performed outside of the allowable time periods;
- The Contractor is expected to comply with all applicable requirements of the contract;
- Contracts shall include explicit indication that all construction equipment used on the project is to meet the sound level criteria from NPC-115 and NPC-118, and be well maintained and operating with effective muffling devices that are in good working order;
- The separation distance between construction vehicle staging areas and nearby sensitive receptors is to be maximized to the extent possible to reduce noise impacts;
- Any temporary roads for construction vehicle access are to be well maintained and free of pot-holes and ruts to avoid excessive noise from heavy vehicles travelling on uneven surfaces;
- A complaints protocol is to be established for receiving, investigating and addressing construction noise complaints from the public, including a plan for how the public is to be notified of their options for lodging a complaint;
- A noise complaint will trigger an investigation to verify whether the noise mitigation has been implemented, including verification of construction equipment sound levels per NPC-115 and NPC-118.; and,
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration will be given to the technical, administrative and economic feasibility of the various alternatives.

The implementation of the following measures will help to mitigate potential vibration impacts during construction:

- The Contractor will be responsible for identifying the implications of the vibration generated, especially for work with high potential for vibration impacts (e.g. pile driving), and to make construction work plans available for review;
- Construction equipment with potential to cause off-site vibrations will be operated as far away from vibration-sensitive sites as possible;
- Where possible, activities that have potential to cause off-site vibrations will be phased such that as few as possible are occurring simultaneously;
- Construction activities that have potential to cause off-site vibration during the night-time hours will be avoided;

- A complaints protocol is to be established for this project for receiving, investigating and addressing construction vibration complaints received from the public;
- The Contract documents shall contain a provision that any initial vibration complaint will trigger verification that any general vibration control measures agreed to are in effect;
- In the presence of persistent vibration complaints, the MTO and its Contractor shall consider implementing a measurement program to evaluate the vibration impacts; and,
- In the presence of persistent complaints and subject to the results of a field investigation, alternative vibration control measures may be required, where reasonably available. In selecting appropriate vibration control measures, consideration will be given to the technical, administrative and economic feasibility of the various alternatives.

### **BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES**

Construction activities associated with the 407 Transitway will result in soil disturbance, alterations in topography, and tree removal. The built heritage resources and cultural heritage landscapes that will be affected by construction activities and the proposed mitigation measures are listed below. See **Section 6.2.2 and Table 6.9** for footprint impacts and proposed mitigation measures.

All staging and construction activities will be suitably planned and undertaken to avoid impacts to identified built heritage resources and cultural heritage landscapes, where possible.

### **ARCHAEOLOGICAL RESOURCES**

As noted in **Section 6.2.2**, any Stage 2 and 3 work required for land retaining archaeological potential (that will be impacted by the proposed Transitway construction) not completed during the TPAP will be completed by a licensed archaeologist as early as possible, and prior to the completion of detail design.

The 407 Transitway will be cleared of all archaeological concerns prior to construction. Will the proposed work extend beyond the current footprint of the Transitway, then further archaeological assessment will be required prior to construction to determine the archaeological potential of the surrounding lands.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister of Tourism, Culture and Sport stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec.

48 (1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner.

Should a cemetery be discovered during further archaeological investigations (Stage 3 and Stage 4) or construction, appropriate mitigation measures will be discussed with the Municipalities and corresponding authorities, and implemented to the satisfaction of applicable provincial agencies and the Commissioner, Planning and Development Services.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48(1) of the *Ontario Heritage Act* and may not be altered, nor may artifacts be removed from them, except by a person holding an archaeological license.

**TABLE 6.13: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Land Use and Property Requirements	Temporary construction impacts to existing and planned land uses within the study area.	Temporary impacts associated with construction are anticipated to affect all land use factors within the study area (i.e. agricultural, residential, commercial and industrial businesses, and community and recreational facility users). Temporary impacts may include: traffic disruption and/or delays, access restrictions, noise, and dust.	<p>Temporary impacts to agricultural land, residences, commercial and industrial businesses, and community and recreational facility users will be mitigated with the following measures:</p> <ul style="list-style-type: none"> <li>▪ access and egress for emergency vehicles and school buses will be maintained at all times during construction;</li> <li>▪ to prevent the emission of pollutants, including dust, to the atmosphere, provisions will be made to ensure there is no unnecessary idling of vehicles. Dust suppressants will be used to combat dust, where appropriate. Emissions during construction will not result in health effects on motorists and local residents and employees;</li> <li>▪ construction activities will adhere to local noise by-law regulations. Should there be a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to notify MTO and affected residents in advance of any work performed outside of the allowable time periods;</li> <li>▪ construction activities will be staged to avoid/minimize traffic delays to residents, business owners and motorists, and facility owners/users travelling within the study area to the extent possible.</li> <li>▪ access to the 407 ETR, regional roads and local municipal roads will be maintained at all times, or detours will be identified; and,</li> <li>▪ the local public will be kept informed of the progress of the Transitway construction and notified of any disruptions such as road closings.</li> </ul>	Temporary construction impacts to existing and planned land uses will be reviewed prior to construction, and refined where necessary.
Noise and Vibration	Potential noise and vibration impacts during construction.	Temporary noise and vibration impacts during construction.	<p>Implementation of the following measures will help to mitigate potential noise impacts during construction. Best management practices will be used to minimize impacts on local land uses.</p> <ul style="list-style-type: none"> <li>▪ Limit construction to the time periods allowed by the City of Brampton, City of Mississauga, Town of Oakville and City of Burlington's noise by-laws;</li> <li>▪ Should there be a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to notify MTO and affected residents in advance of any work performed outside of the allowable time periods;</li> <li>▪ The Contractor is expected to comply with all applicable requirements of the contract;</li> <li>▪ Contracts shall include explicit indication that all construction equipment used on the project is to meet the sound level criteria from NPC-115 and NPC-118, and be well maintained and operating with effective muffling devices that are in good working order;</li> <li>▪ The separation distance between construction vehicle staging areas and nearby sensitive receptors is to be maximized to the extent possible to reduce noise impacts;</li> <li>▪ Any temporary roads for construction vehicle access are to be well maintained and free of pot-holes and ruts to avoid excessive noise from heavy vehicles travelling on uneven surfaces;</li> <li>▪ A complaints protocol is to be established for receiving, investigating and addressing construction noise complaints from the public, including a plan for how the public is to be notified of their options for lodging a complaint;</li> <li>▪ A noise complaint will trigger an investigation to verify whether the noise mitigation has been implemented, including verification of construction equipment sound levels per NPC-115 and NPC-118.; and,</li> <li>▪ In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration will be given to the technical, administrative and economic feasibility of the various alternatives.</li> </ul> <p>The implementation of the following measures will help to mitigate potential vibration impacts during construction:</p> <ul style="list-style-type: none"> <li>▪ The Contractor will be responsible for identifying the implications of the vibration generated, especially for work with high potential for vibration impacts (e.g. pile driving), and to make construction work plans available for review;</li> <li>▪ Construction equipment with potential to cause off-site vibrations will be operated as far away from vibration-sensitive sites as possible;</li> </ul>	A Complaints Protocol will be developed prior to construction for receiving, investigating and addressing construction noise and vibration complaints from the public. For persistent complaints (and after field investigation) alternative noise and vibration control measures may be considered, where feasible.

**TABLE 6.13: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
			<ul style="list-style-type: none"> <li>▪ Where possible, activities that have potential to cause off-site vibrations will be phased such that as few as possible are occurring simultaneously;</li> <li>▪ Construction activities that have potential to cause off-site vibration during the night-time hours will be avoided;</li> <li>▪ A complaints protocol is to be established for this project for receiving, investigating and addressing construction vibration complaints received from the public;</li> <li>▪ The Contract documents shall contain a provision that any initial vibration complaint will trigger verification that any general vibration control measures agreed to are in effect;</li> <li>▪ In the presence of persistent vibration complaints, the MTO and its Contractor shall consider implementing a measurement program to evaluate the vibration impacts; and,</li> <li>▪ In the presence of persistent complaints and subject to the results of a field investigation, alternative vibration control measures may be required, where reasonably available. In selecting appropriate vibration control measures, consideration will be given to the technical, administrative and economic feasibility of the various alternatives.</li> </ul>	
Built Heritage Resources and Cultural Heritage Landscapes	<p>Displacement of built heritage resources and/or cultural heritage landscapes by removal and/or demolition and/or disruption by isolation</p> <p>Disruption of resources by the introduction of physical, visual, audible or atmospheric elements that are not in keeping with the character and setting of the built heritage resources and/or cultural heritage landscapes.</p>	<p>Thirteen built heritage resource and cultural landscapes will face impacts, which include property acquisition, soil disturbance, potential vibration, tree/vegetation removal, and/or structure demolition. The 13 built heritage resource and cultural landscapes heritage resources are CHR 8, 11, 13, 14, 19,20, 21, 22, 23, 24, 28, 30,31.</p> <p>Seven of the 13 built heritage resource and cultural landscapes are considered a Provincial Heritage Property but not a Provincial Heritage Property of Provincial Significance (CHR 13, 22, 24, 23, 29, 30, 31).</p> <p>Construction activities associated with the 407 Transitway will result in soil disturbance, vibration, alterations in topography, and tree removal. See <b>Section 6.2.2</b> for footprint impacts and proposed mitigation measures.</p> <p>Cultural Heritage Evaluations and Heritage Impact Assessments were conducted and presented in <b>Section 6.2.2</b>.</p>	<p>Prior to commencing work, construction crews will be informed of the heritage status of the subject properties and construction activities will be planned and executed to mitigate or prevent any potential impacts to the properties.</p> <p>Minor direct impacts on the of the property through soil disturbance, grading, potential vibration impacts, tree/vegetation removal, and/or the introduction of a roadway that may diminish the integrity of the property. Mitigation measures are:</p> <ul style="list-style-type: none"> <li>• The location of the runningway alignment and the grading limits were designed to minimize impacts to the property as much as possible while meeting technical requirements of the transitway design. During detail design, further measures to minimize impacts will be considered.</li> <li>• Staging and construction activities will be planned and executed to mitigate or prevent any unintended impacts to any built structure on the subject property. Temporary fencing will be installed during construction;</li> <li>• Should construction activities necessarily involve the removal of trees: post-construction landscaping and rehabilitation will be considered;</li> <li>• In locations where the preliminary design of the 407 Transitway is affecting existing access to the property, the detail design phase to be undertaken in the future prior to construction of the 407 Transitway, will ensure continued viable access. Currently, the timing for detail design and Construction is not known, thus the existing farm access roads are being maintained.</li> <li>• Consultation and coordination with the owner(s)/operator(s) of the property (farm) will be carried out to ensure suitable mitigation measures are employed during detail design and construction phases.</li> <li>•</li> </ul> <p>Impacts on the Churchville Heritage Conservation District (HCD) (CHR 23) will be mitigated by measures described in the policies and guidelines of the Churchville HCD Plan.</p> <p>Removal of CHR 31 will be carried out as per mitigation measures presented in <b>Table 6.9</b>.</p> <p>Mitigation measures for each Built Heritage Resource and/or Cultural Heritage Landscape are presented in <b>Table 6.9</b>.</p>	<p>To ensure the properties (CHR 13, 22, 24, 3) are not adversely impacted during construction, a qualified engineer will undertake a condition assessment of the structures within the vibration zone of influence. Commitment to repair damages caused by vibration will be included in the construction phase.</p>
<p>Archaeological Resources</p> <ul style="list-style-type: none"> <li>• Cemeteries</li> </ul>	<p>Disturbance or destruction of archaeological resources and/or cemeteries</p>	<p>In Stage 1 Archaeological Assessment, it has been determined that 145.98 ha, 46% of the 407 Transitway preliminary design footprint area, does not require further archaeological assessment.</p> <p>In Stage 2 Archaeological assessment conducted as part of this TPAP, test-pit survey at 5 m intervals following standards were conducted on</p>	<p>Any Stage 2 and 3 work required for land retaining archaeological potential not completed during the TPAP will be completed as early as possible, and prior to the completion of Detail Design and prior to construction.</p> <p>It is an offence under Sections 48 and 69 of the <i>Ontario Heritage Act</i> for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the</p>	<p>See Archaeological Resources under <b>Table 6.9</b>.</p>

**TABLE 6.13: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
		<p>approximately 7.72 ha (2.5%) and approximately 5.92 ha (2%) were subject to judgmental test pit survey at 10 m intervals to confirm previous disturbance. Pedestrian survey was also conducted on approximately 0.55 ha (&lt;1%). Approximately 3.07 ha (1%) were found to have no potential due to deep and pervasive disturbance resulting from past construction activities associated with the 407 ETR and commercial and industrial development. Approximately 3.72 ha (1%) were found to have no archaeological potential due to low and wet conditions and excessive slope.</p> <p>The remaining 148 ha (47%) require further archaeological assessments (i.e. Stage 2 and 3) prior to any ground disturbing activities.</p> <p>One historical Euro-Canadian site (H1) and three pre-contact Indigenous sites (P1, P2, P3, and River site) were identified as having Cultural Heritage Value or Interest (CHVI), therefore further archaeological assessment (i.e. Stage 3 Site-specific assessment) is required.</p> <p>One cemetery associated with St. Peter's Mission Church (6056 Ninth Line, also CHR 24) is located approximately 40 m east of the transitway runningway. No cemeteries will be directly impacted by the footprint of the Transitway. There are no previously registered burial sites located within 1 km of the study limits.</p>	<p>site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister of Tourism, Culture and Sport stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the <i>Ontario Heritage Act</i>.</p> <p>Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the <i>Ontario Heritage Act</i>. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the <i>Ontario Heritage Act</i>.</p> <p>The <i>Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33</i> requires that any person discovering human remains must notify the police or coroner.</p> <p>Should a cemetery be discovered during further archaeological investigations (Stage 3 and Stage 4) or construction, appropriate mitigation measures will be discussed with the Municipalities and corresponding authorities and implemented to the satisfaction of applicable provincial agencies and the Commissioner, Planning and Development Services.</p> <p>Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48(1) of the <i>Ontario Heritage Act</i> and may not be altered, nor may artifacts be removed from them, except by a person holding an archaeological license.</p>	

### 6.3.3 Transportation

During the construction of the 407 Transitway, the potential for transportation related impacts arise. These specific potential transportation concerns include traffic management and pedestrian circulation as well as construction activities triggering traffic congestion and delays and the potential for traffic accidents.

The management of traffic during the construction of the Transitway will be a particular challenge of the project’s underpasses. During the construction of the underpasses, the general-purpose traffic of several regional arterial roads and directional ramps between these roads and 407 ETR have the potential to be affected. The mitigation or minimization of any interferences to traffic during the periods of construction, will involve increasing the number of lanes available for traffic flow for the peak flow direction. Specifically, the construction staging sequence of the arterial road underpasses will ensure opening of

three lanes of the road in peak direction. As an additional mitigation measure, temporary detours of the existing 407 ETR ramps will be built to allow construction of the crossings under the ramps, thereby minimizing disruptions to traffic.

The proposed mitigation measures for the environmental issues/concerns presented in **Table 6.1** will be carried out during construction. A Traffic Management Plan will be developed prior to the initiation of construction to address the potential congestion and delays that could be caused by 407 Transitway construction activities. Also, prior to the initiation of construction, consultation with the corresponding municipal and Provincial Authorities (Region of Halton, Region of Peel, City of Burlington, City of Mississauga, Town of Oakville and MTO), as well as other stakeholders, such as 407 ETR, will be sought to determine the requirements to maintain safe operations of traffic on the road network affected by the construction of the 407 Transitway.

**TABLE 6.14: CONSTRUCTION IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Road traffic flow and pedestrian circulation during construction	Underpasses: Ability to maintain or improve road traffic and pedestrian circulation during construction on all arterial roads where new underpasses are proposed to allow the 407 Transitway to cross the road ROW.	Likelihood of delay to arterial traffic resulting in increased safety problems and potential accidents due to the need for temporary diversion or lane closure to allow construction of transitway works under arterial roads crossing the transitway ROW.	<p>Prior to initiation of construction, a Traffic Management Plan will be developed to define all temporary works and procedures necessary to accommodate vehicular and pedestrian traffic on the following arterials during construction of the transitway underpasses:</p> <ul style="list-style-type: none"> <li>▪ Brant Street</li> <li>▪ Upper Middle Road</li> <li>▪ Guelph Line</li> <li>▪ Dundas Street</li> <li>▪ Walkers Line</li> <li>▪ Appleby Line</li> <li>▪ Tremaine Road</li> <li>▪ Ninth Line</li> <li>▪ Tenth Line</li> <li>▪ Winston Churchill Boulevard</li> <li>▪ Heritage Road</li> <li>▪ Financial Drive</li> <li>▪ McLaughlin Road</li> </ul> <p>The Traffic Management Plan will describe all measures to allow safe passage of traffic in both directions. The appropriate number of lanes per road crossing will be defined in coordination with the municipalities. In addition to temporary pedestrian circulation measures, the plan will detail all barriers, lane markings and signing for the temporary roadwork.</p>	On a regular basis during construction, traffic conditions will be monitored and safety audits performed to verify that all temporary traffic accommodation measures are maintaining safe traffic operations at reasonable speeds through the work sites.
Cut and covering under 407 ETR ramps	Ability to maintain 407 ETR traffic during crossing construction.	There are not any cut and cover crossings under 407 ETR ramps.	<p>No action required</p> <p>No action required</p>	<p>N/A</p> <p>N/A</p>

**TABLE 6.14: CONSTRUCTION IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Tunnelling under 407 ETR Interchanges	Ability to maintain 407 ETR traffic during crossing construction.	The Transitway will be tunneled under the Highway 403 – 407 ETR Interchange, and under The ETR - Mavis Road Inerchange. avoiding impacts to Highway traffic	No action required	N/A
Tunnelling under Rail Corridors	Ability to maintain rail operations during construction	The Transitway will undepass the CNR Halton Subdivision just west of Tremaine Road, and the CPR Galt Subdivision, just west of Ninth Line.	Further discussions between MTO and the utility/municipal service owners will take place prior to the design/construction of the relocation of existing utilities affected by the 407 Transitway infrastructure. The detail design Phase will also assess loading capacity to define protection measures and/or special construction techniques to assure these plants are not damaged during construction or operations of the Transitway; and will provide permanent access to operate and maintain the corresponding infrastructure.	N/A
Utility Relocates	Ability to maintaing existing utilities functioning during Transitway construction	Existing utilities could be affected by construction of Transitway Grade Separations	The municipality and private utility owners will participate in any relocation plan, construction procedures, responsibility for connections, liability matters, etc. prior to initiation of construction."	



## 6.4 Operations and Maintenance Impacts

The impacts resulting from the operation and maintenance of the 407 Transitway are similar to those of roadways. These impacts are anticipated to be relatively minor since the 407 Transitway will be located within a corridor consisting of major highways and previously disturbed open areas and industrial areas.

The 407 Transitway will contribute to the further integration of the transit systems of the area. It will support municipalities within the study area to be more vibrant by ensuring that transit is a more attractive travel option by improving travel times, comfort, and reliability of service; providing alternative travel choices for non-drivers; and, ensuring the long-term economic stability and environmental sustainability.

### 6.4.1 Natural Environment

In general, the operations and maintenance activities associated with the 407 Transitway will not significantly affect the natural environment provided BMPs are implemented. Refer to **Table 6.13** which shows the operation and maintenance impacts, proposed mitigation measures and recommended monitoring for the Natural Environment.

#### PHYSIOGRAPHY AND SOILS

Soils will not be disturbed by the operation and maintenance activities of the 407 Transitway.

#### CONTAMINATED PROPERTY AND WASTE

Care will be taken during the operations and maintenance phase to ensure that the 407 Transitway facilities do not contribute to contamination. The disposal of any contaminated materials will be directed to an MECP approved waste disposal site. Other impacts to contaminated property and waste are discussed under the footprint and construction impacts sections of this chapter.

#### SURFACE WATER, DRAINAGE AND STORMWATER

Future maintenance activities are not expected to involve any in-water works. Road salt application for the safe operations of the 407 Transitway may pose adverse impacts to the quality of the surface water and groundwater of the study area. Mitigation measures will follow MECP's *Code of Practice for the Environmental Management of Road Salts* (April 2004) as well as the *Five-Year Review of Progress: Code of Practice for the Environmental Management of Road Salts* (March 2012).

#### GROUNDWATER

Although groundwater discharge functions at the bridge construction locations may be impacted temporarily during construction activities, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures.

The development of the Transitway has the potential to impact groundwater quality with corresponding risk to water well users and ecological receptors. Groundwater is susceptible to impact by de-icing salt application during operation and maintenance activities. Because of the mobility of road salt constituents, mitigation of road salt impacts is difficult. However, where practical, road salt application within the right-of-way will be at the minimum levels allowed within the context of MTO's standard road salt application procedures. Given that the project consists of the construction of a new runningway and station areas, a new area of salt application will result from the construction of the project.

Implementation of BMPs will reduce potential impacts for spills or other materials / equipment entering the water. The following measures will be employed:

- All equipment maintenance and refueling will be controlled to prevent any discharge of petroleum products. Vehicular maintenance and refueling will be conducted at least 30 m distance from any surface drainage feature to prevent the entry of petroleum, oil, or lubricants to the watercourses.
- All spills that could potentially cause damage to the environment will be reported to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up shall be completed quickly and effectively. A "Spill Response Plan" and the appropriate contingency materials to absorb or contain a spill will be on the site at all times.
- Implementation of slope protection and vegetation establishment.

#### FISH AND FISH HABITAT

Impacts to fish and fish habitat post construction of the Transitway include thermal impacts to watercourses and road salt applications on the 407 Transitway. Stormwater management facilities outletting to the watercourses will explore opportunities to reduce thermal impacts. This could include enhanced infiltration measures, shading of outfalls and ponds, drawing water from deep portions of the ponds or other treatment options (bio-retention units, grassed swales, etc.).

#### VEGETATION AND VEGETATION COMMUNITIES

All impacts to vegetation and vegetation communities are transient and relate to footprint and construction impacts. It is expected that post-construction, new wetland areas will be created as a result of changes in drainage related to the construction of the 407 Transitway and its related components and this can, in part, mitigate for removals of similar wetland types. On-going maintenance of the 407 Transitway facilities and fencing will take place during the operations and maintenance phase, including removal of dumped garbage.

Efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species at a minimum will be implemented (see **Table 6.6**).

#### DESIGNATED NATURAL AREAS

The operation and maintenance activities of 407 Transitway will not affect the designated natural areas

located in the vicinity of the study area.

### **WILDLIFE AND WILDLIFE HABITAT**

No new barriers to wildlife passage are expected to occur as a result of the construction of the 407 Transitway. All major corridors associated with valleylands will be maintained and new crossings will mimic the existing crossings to facilitate wildlife passage.

Noise, light and visual intrusion may alter wildlife activities and patterns. In the 407 ETR setting, wildlife has generally become acclimatized to the noise, light and visual conditions associated with the operation of the multi-lane highway and only those fauna that are tolerant of human activities tend to persist. Given that wildlife found within the study area are generally acclimatized to the presence of road infrastructure, disturbance to wildlife from any increase in noise, light and visual intrusion potentially caused by the operation of the 407 Transitway are not expected to have any significant adverse effects.

Potential disturbance caused by light pollution from the proposed improvements to the transportation network can be mitigated by using reflectors to focus light beams onto the facility and away from natural heritage features adjacent to the 407 Transitway.

#### **Wildlife/Vehicle Conflicts**

Wildlife/vehicle conflicts appear to be minor at present within the 407 ETR corridor as large corridors exist at the larger watercourse crossings (valleylands), which are typically spanned by bridges. Because these corridors will be maintained under the 407 Transitway through construction of similarly dimensioned structures, no additional conflicts are expected to occur, and the structures will allow for the continued use of these wildlife corridors for all species of wildlife.

Construction duration and disturbance in the vicinity of existing culverts and bridges will be minimized to the extent possible to reduce the potential for increase in road mortality caused by wildlife avoidance of these structures.

#### **Disturbance to Wildlife from Noise, Light and Visual Intrusion**

Noise, light and visual intrusion may alter wildlife activities and patterns. In the 407 ETR setting, wildlife has generally become acclimatized to the noise, light and visual conditions associated with the operation of the multi-lane highway and only those fauna that are tolerant of human activities tend to persist. Given that wildlife found within the study area are generally acclimatized to the presence of road infrastructure, disturbance to wildlife from any increase in noise, light and visual intrusion potentially caused by the operation of the 407 Transitway are not expected to have any significant adverse effects.

Potential disturbance caused by light pollution from the proposed improvements to the transportation network can be mitigated by using reflectors to focus light beams onto the facility and away from natural heritage features adjacent to the 407 Transitway.

### **AIR QUALITY**

An air quality and greenhouse gas (GHG) emissions inventory was completed for the future reference year 2041, with and without the proposed 407 Transitway. The air quality impacts of the proposed 407 Transitway were evaluated using detailed air dispersion modelling. Estimated concentrations of all pollutants of concern were shown to be below their corresponding ambient air quality criteria and standards for all scenarios, except benzo[a]pyrene, benzene, and NO<sub>2</sub>. These pollutants except for NO<sub>2</sub> have background concentrations already above or approaching their respective criteria and standards. There is only one receptor location where there is exceedance for NO<sub>2</sub>. In the future, it is anticipated that the NO<sub>2</sub> levels will not exceed with no discernable difference between the with and without the 407 Transitway scenarios.

The results of the assessment show, through modelling and monitoring data, that the existing air quality in the study area is typical of a suburban setting, which is characterized by elevated pollution concentrations in relation to rural areas, with periodic exceedances of applicable air quality criteria. Available historical monitoring data near to the study area indicates that background concentrations of all contaminants assessed in this AQIA are within applicable criteria with the exception of benzene and benzo[a]pyrene concentrations which periodically exceed applicable criteria.

The assessment identified that compared to existing conditions, concentrations of gaseous contaminants, with the exception of SO<sub>2</sub> for which there is an insignificant increase, are predicted to improve despite increases in traffic resulting from population growth in the study area. This improvement is a result of assumptions regarding future low emission engine technologies and fuels. For particulate matter which is affected by tail pipe emissions, traffic volumes and road conditions (primarily silt loading of roads), predicted concentrations at sensitive receptor locations will generally increase in both future scenarios due to increased road dust attributable to higher traffic volumes, but will be below the applicable criteria. CO<sub>2</sub>e emissions are shown to increase in the future scenarios relative to Existing Conditions due to increased traffic volumes, with changes, representing less than a 2% increase in CO<sub>2</sub>e emissions, with the increase largely attributable to 407 ETR traffic.

The assessment identified that, with the exception of TSP and PM<sub>10</sub> concentrations, the Future Build scenario will generally result in a 2% increase in pollutant concentrations at sensitive receptor locations compared to the Future No-Build scenario. As a result, the increase in gaseous and particulate air pollutants attributable to the Project is deemed to be insignificant (i.e. <10%). The increase in predicted 24-hour maximum PM<sub>10</sub> and annual TSP concentrations from Future No Build to Future Build is not significant (i.e. less <10%). Predicted 24-hour maximum TSP concentrations show a significant increase from Future No Build to Future Build at sensitive receptors in close vicinity of the proposed Transitway attributable to road dust from the 407 Transitway. Despite this increase, predicted 24-hour TSP concentrations are still below its respective criteria. Emissions of CO<sub>2</sub>e are also shown to increase in the Future Build scenario relative to Future No-Build, however, the percent change is insignificant at less than 2%. To reduce particulate impacts at nearby sensitive receptors, areas will be vegetated with evergreen trees, particularly in areas with the highest predicted levels of TSP, PM<sub>10</sub> and PM<sub>2.5</sub> (e.g. between the ETR 407 intersection with Winston Churchill and with Ninth Line).

During the operations/maintenance phase, there are many fuel and technology pathways available to reduce tailpipe emissions of the Transitway buses. Switching from diesel to alternative fuels such as natural gas or dimethyl ether can reduce tailpipe emissions. Another option is blending biological-based fuels such as biodiesel or hydrogenation-derived renewable diesel with conventional petroleum-based

diesel. Moreover, upgrading transit buses from conventional internal combustion engine technology to hybrid or electric technology can improve fuel economy or eliminate tailpipe emissions altogether. These pathways would simultaneously reduce air pollution and GHG emissions. **Appendix J** (Air Quality Impact Assessment) provides further details regarding the air quality and GHG emissions assessment.

**TABLE 6.15: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Physiography and Soils	Impacts to physiography and soils.	Soils will not be disturbed by the operation and maintenance activities of the 407 Transitway.		
Contaminated Property and Waste	Potential for 407 Transitway facilities to contribute to contamination/waste.	Contribution to contamination/waste from 407 Transitway facilities during the operations/maintenance phase.	Care will be taken during the operations/maintenance phase to ensure the new 407 Transitway facilities do not contribute to contamination. The disposal of any contaminated materials will be directed to an MECP approved waste disposal site.	
Surface Water, Drainage and Stormwater	Possible impacts on existing watercourses and drainage patterns.	Erosion at creek crossings. Erosion at each outlet to the creeks. Potential spills from vehicles and equipment used in the operation and/or maintenance of the transitway. Road salt application for the safe operations of the 407 Transitway may pose adverse impacts to the quality of the surface water.	Slope protection and vegetation establishment. Implementation of BMPs will reduce potential impacts for spills or other materials / equipment entering the water. The following measures will be employed: <ul style="list-style-type: none"> <li>All equipment maintenance and refueling will be controlled to prevent any discharge of petroleum products. Vehicular maintenance and refueling will be conducted at least 30 m distance from any surface drainage feature to prevent the entry of petroleum, oil or lubricants to the watercourses.</li> <li>All spills that could potentially cause damage to the environment will be reported to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up shall be completed quickly and effectively. A "Spill Response Plan" and the appropriate contingency materials to absorb or contain a spill will be on the site at all times.</li> </ul>	Erosion monitoring and sediment removal program will be undertaken. Monitoring will occur after large storm events. Best practices will be employed for potential spills.  Use of road salt will be kept to a minimum, where practical.
Groundwater	Potential for impacts to groundwater discharge functions. Potential for groundwater contamination.	Although groundwater discharge functions at the bridge construction locations may be impacted temporarily during construction activities, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures. Groundwater is susceptible to impact by de-icing salt application during operation and maintenance activities. Given that the project consists of the construction of a new runningway, a new area of salt application will result from the construction of the project.	Mitigation of road salt impacts is difficult due to the mobility of road salt constituents. However, where practical, road salt application within the right-of-way will be at the minimum levels allowed within the context of MTO's standard road salt application procedures.	
Fish and Fish Habitat	Potential impacts to fish and fish habitat during operation and maintenance.	Impacts to fish and fish habitat post construction of the Transitway include thermal impacts to watercourses and road salt applications on the 407 Transitway.	Stormwater management facilities outletting to the watercourses will explore opportunities to reduce thermal impacts. This could include enhanced infiltration measures, shading of outfalls and ponds, drawing water from deep portions of the ponds or other treatment options (bio-retention units, grassed swales, etc.).	See details of stormwater management plan.
Vegetation and Vegetation Communities	Displacement of and/or disturbance to vegetation and vegetation communities.	All impacts to vegetation and vegetation communities are transient and relate to footprint and construction impacts.	It is expected that post-construction, new wetland areas will be created as a result of changes in drainage related to the construction of the 407 Transitway and its related components and this can, in part, mitigate for removals of similar wetland types. On-going maintenance of the 407 Transitway facilities and fencing will take place during the operations and maintenance phase, including removal of dumped garbage. Efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species at a minimum will be implemented (see <b>Table 6.6</b> ).	

**TABLE 6.15: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Designated Natural Areas	Potential impacts to designated natural areas	The operation and maintenance activities of 407 Transitway will not affect the designated natural areas located in the vicinity of the study area.		
Wildlife and Wildlife Habitat	Barrier effects on wildlife passage.  Potential for wildlife/vehicle conflicts  Potential disturbance to wildlife from noise, light and visual intrusion.	The construction of the 407 Transitway has the potential to result in new barriers to wildlife passage.  Noise, light and visual intrusion may alter wildlife activities and patterns.	No new barriers to wildlife passage are expected to occur as a result of the construction of the 407 Transitway. All major corridors associated with valleylands will be maintained and new crossings will mimic the existing crossings to facilitate wildlife passage.  Given that wildlife found within the study area are generally acclimatized to the presence of road infrastructure, disturbance to wildlife from any increase in noise, light and visual intrusion potentially caused by the operation of the 407 Transitway are not expected to have any significant adverse effects.  Wildlife/vehicle conflicts appear to be minor at present within the 407 ETR corridor as large corridors exist at the larger watercourse crossings (valleylands), which are typically spanned by bridges. Because these corridors will be maintained under the 407 Transitway through construction of similarly dimensioned structures, no additional conflicts are expected to occur, and the structures will allow for the continued use of these wildlife corridors for all species of wildlife.  Potential disturbance caused by light pollution from the proposed improvements to the transportation network can be mitigated by using reflectors to focus light beams onto the facility and away from natural heritage features adjacent to the 407 Transitway.	
Air Quality	Air quality impacts due to the operation of a 43 kilometre busway, fuelled by diesel.	The results of the assessment show, through modelling and monitoring data, that the existing air quality in the study area is typical of a suburban setting, which is characterized by elevated pollution concentrations in relation to rural areas, with periodic exceedances of applicable air quality criteria. Available historical monitoring data near to the study area indicates that background concentrations of all contaminants assessed in this AQIA are within applicable criteria with the exception of benzene and benzo[a]pyrene concentrations which periodically exceed applicable criteria.  The assessment identified that compared to existing conditions, concentrations of gaseous contaminants, with the exception of SO <sub>2</sub> for which there is an insignificant increase, are predicted to improve despite increases in traffic resulting from population growth in the study area. This improvement is a result of assumptions regarding future low emission engine technologies and fuels. For particulate matter which is affected by tail pipe emissions, traffic volumes and road conditions (primarily silt loading of roads), predicted concentrations at sensitive receptor locations will generally increase in both future scenarios due to increased road dust attributable to higher traffic volumes, but will be below the applicable criteria. CO <sub>2e</sub> emissions are shown to increase in the future scenarios relative to Existing Conditions due to increased traffic volumes, with changes, representing less than a 2% increase in CO <sub>2e</sub> emissions, with the increase largely attributable to 407 ETR traffic.  The assessment identified that, with the exception of TSP and PM <sub>10</sub> concentrations, the Future Build scenario will generally result in a 2% increase in pollutant concentrations at sensitive receptor locations compared to the Future No-Build scenario. As a result, the increase in gaseous and particulate air pollutants attributable to the Project is deemed to be insignificant (i.e. <10%). The increase in predicted 24-hour maximum PM <sub>10</sub> and annual TSP concentrations from Future No Build to Future Build is not significant (i.e. less <10%). Predicted 24-hour maximum TSP concentrations show a significant increase from Future No Build to Future Build at sensitive receptors in close vicinity of the proposed Transitway attributable to road dust from the 407 Transitway. Despite this increase, predicted 24-hour TSP concentrations are still below its	During the operations/maintenance phase, there are many fuel and technology pathways available to reduce tailpipe emissions of the Transitway buses. Switching from diesel to alternative fuels such as natural gas or dimethyl ether can reduce tailpipe emissions. Another option is blending biological-based fuels such as biodiesel or hydrogenation-derived renewable diesel with conventional petroleum-based diesel. Moreover, upgrading transit buses from conventional internal combustion engine technology to hybrid or electric technology can improve fuel economy or eliminate tailpipe emissions altogether. These pathways would simultaneously reduce air pollution and GHG emissions.  To reduce particulate impacts at nearby sensitive receptors, areas will be vegetated with evergreen trees, particularly in areas with the highest predicted levels of TSP, PM <sub>10</sub> and PM <sub>2.5</sub> (e.g. between the ETR 407 intersection with Winston Churchill Boulevard and with Ninth Line).	

**TABLE 6.15: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
		respective criteria. Emissions of CO2e are also shown to increase in the Future Build scenario relative to Future No-Build, however, the percent change is insignificant at less than 2%.		

## 6.4.2 Socio-Economic and Cultural Environment

Adverse impacts to the land uses within the study area are not anticipated from the operational and maintenance activities of the 407 Transitway. No impacts to archaeological resources and built heritage resources and cultural heritage landscapes are anticipated by the operation and maintenance of the 407 Transitway. Refer to **Table 6.14** which shows the operations and maintenance impacts, proposed mitigation measures and recommended monitoring for the Socio-Economic and Cultural Environment.

### LAND USE AND PROPERTY REQUIREMENTS

The operation and maintenance of the 407 Transitway conforms to the adjacent land uses. Provincial planning documents and municipal Official Plans support the implementation of the 407 Transitway. Consultation with the municipalities will continue prior to construction regarding the integration of the 407 Transitway with municipal services.

### NOISE AND VIBRATION

The potential noise and vibration impacts associated with the project were assessed by predicting noise and vibration conditions at the nearest NSAs under two operating scenarios: future conditions (2041) assuming that the project *does not* proceed (future no-build), and future conditions (2041) assuming that the project *does* proceed (future build). Further details on the noise modelling can be found in **Appendix K** (Noise and Vibration Impact Assessment). There is a Non-Disclosure Agreement between MTO and 407 ETR which states that traffic volume data on Highway 407 ETR is confidential, and as a result, although Highway 407 traffic volumes were used in the modelling to calculate the sound levels, the 407 ETR traffic volume data was not included in this Noise Report. A similar approach was used in the previous approved Transitway TPAPs east of Hurontario Street.

The noise and vibration assessment for the 407 Transitway included an assessment of the following potential impacts at existing and proposed future sensitive locations related to operation/maintenance activities:

- noise impacts at existing and proposed sensitive locations from buses operating on the proposed 407 Transitway, inclusive of changes to local topography;

- air-borne vibration of house structure elements induced by sound levels from bus engines; and
- noise and vibration considerations during construction of the 407 Transitway.

The conclusions of the assessment were as follows:

- no significant increases of 5 dBA, or more, were predicted for any of the NSAs;
- two receptors (NSA 12\_R20 and NSA 12\_R21) have overall impacts greater than 65dBA at the most exposed side, but mitigation is not warranted because the Transitway is below ground at this location and there is no clear ground-level OLA.
- two NSAs have overall impacts greater than 65 dBA as background sound levels. Mitigation is not technically feasible because the 407 Transitway is below ground at these locations.
- no ground-borne vibration impacts were predicted for operations on the 407 Transitway; and
- no airborne vibration effects due to bus engine pass-by noise were predicted.

### BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES

The operations and maintenance activities of the 407 Transitway present no impacts.

### ARCHAEOLOGICAL RESOURCES

The operations and maintenance activities of the 407 Transitway present no impacts.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site/all activities impacting these resources immediately, notify MHSTCI, and engage a licensed consultant archaeologist to carry out archaeological fieldwork/an archaeological assessment, in compliance with sec. 48 (1) of the *Ontario Heritage Act* and the *Standards and Guidelines for Consultant Archaeologists*.

The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must notify the police or coroner. Should a cemetery be discovered, appropriate mitigation measures will be discussed with the Municipalities and corresponding authorities and implemented to the satisfaction of applicable provincial agencies and the Commissioner, Planning and Development Services.

**TABLE 6.16: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

ENVIRONMENTAL VALUE/ CRITERION	ENVIRONMENTAL MEASURE	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
Land Use and Property Requirements	Potential impacts to land uses within the study area by the operation and maintenance activities.	The operation and maintenance of the 407 Transitway conforms to the adjacent land uses. Provincial planning documents and municipal Official Plans support the implementation of the 407 Transitway.	Consultation with the municipalities will continue prior to construction regarding the integration of the 407 Transitway with municipal services.	
Noise and Vibration	Potential noise and vibration impacts from operation and maintenance of the 407 Transitway.	<p>Potential impacts at existing and proposed sensitive locations from buses operating on the proposed 407 Transitway, inclusive of changes to local topography.</p> <p>Potential ground-borne vibration impacts associated with buses operating on the 407 Transitway.</p> <p>Potential airborne vibration of house structure elements induced by sound levels from bus engines.</p>	<p>No significant increases of 5 dBA, or more, were predicted for any of the NSAs; Two receptors (NSA 12_R20 and NSA 12_R21) have overall impacts greater than 65dBA at the most exposed side, but mitigation is not warranted because the Transitway is below ground at this location and there is no clear ground-level OLA.</p> <p>No ground-borne vibration impacts were predicted for operations on the 407 Transitway; and</p> <p>No airborne vibration effects due to bus engine pass-by noise were predicted.</p>	<p>Ventilation was not assessed as method of construction of deep underground sections will be evaluated and defined during Detail Design.</p> <p>For bored tunnels, ventilation shafts will be included at regulated spacing; however, a total sound power level of 96 dBA at the façade of each ventilation opening will result in an insignificant sound level at the receptors closest to the proposed tunnel locations.</p>
Built Heritage Resources and Cultural Heritage Landscapes	Potential impacts to built heritage resources and cultural heritage landscapes from operations and maintenance activities.	The operations and maintenance activities of the 407 Transitway present no impacts.		
Archaeological Resources • Cemeteries	Potential loss/displacement of archaeological resources and/or cemeteries within the study area from operations and maintenance activities.	The operations and maintenance activities of the 407 Transitway present no impacts.	<p>Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the <i>Ontario Heritage Act</i>. The proponent or person discovering the archaeological resources must cease alteration of the site/all activities impacting these resources immediately, notify MHSTCI, and engage a licensed consultant archaeologist to carry out archaeological fieldwork/an archaeological assessment, in compliance with sec. 48 (1) of the <i>Ontario Heritage Act</i> and the <i>Standards and Guidelines for Consultant Archaeologists</i>.</p> <p>The <i>Funeral, Burial and Cremation Services Act</i>, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner.</p> <p>Should a cemetery be discovered, appropriate mitigation measures will be discussed with the Municipalities and corresponding authorities and implemented to the satisfaction of applicable provincial agencies and the Commissioner, Planning and Development Services.</p>	

### 6.4.3 Transportation

In general, the proposed 407 Transitway will have an overall positive effect on the transportation system by increasing transit ridership in the corridor and reducing auto dependence. As the 407 Transitway will be fully grade-separated when the construction is complete, the BRT operations on the Transitway will have no interference with general traffic on arterial roads. However, there is potential for impacts to traffic at the 407 Transitway stations.

The analysis of environmental effects and mitigation for each Transitway station is presented in **Table 6.15**, while the detailed traffic analysis reports are included in **Appendix B**. The transportation systems effects and mitigation table illustrates the operations and maintenance impacts per station. The environmental issues and/or concerns are provided for all the stations with a station specific environmental issues/concerns focus. The following describes the eight environmental issues/concerns:

1. Connections to inter-regional transit services: addressing one of the objectives of the 407 Transit System. Connectivity to other transit systems may be either hindered or facilitated at the station. The ultimate effect of this environmental issue/concern is the ability to aid or inhibit the movement of people rapidly and conveniently.
2. Compatibility with local transit services: this compatibility is related to how the transfers between the Transitway and other transit systems are facilitated. The level of convenience achieved will either positively or negatively affect ridership on the Transitway.
3. Location of station and transit access: the potential effect of transit vehicles accessing the station in mixed traffic is being addressed.
4. Travel time and service reliability for on-street-stop transit services: this is a concern when buses operate in mixed traffic.
5. Reduction in level of service for vehicular traffic: Traffic generated by a new station facility will affect general traffic operations in the area of influence. This will be re-assessed at time of implementation, in coordination with the corresponding Municipalities.
6. Station access by walking distance: as part of the integration of various transportation modes the provision of station access by means of walking is noted.
7. Emergency/maintenance vehicles access: To respond to emergency situations that may occur at stations, potential may exist where emergency access to the station may be hindered and time to reach the station may be lengthened.

**TABLE 6.17: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION**

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
<b>Dundas Street Station</b>	Connections to-regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> <li>▪ No current regional services in the vicinity of the station. No mitigation required.</li> </ul>	N/A
	Compatibility with local transit services	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> <li>▪ Planned off street bus loop will provide direct connection between Transitway service and local services. No mitigation required.</li> </ul>	N/A
	Location of station and transit access	<p>Convenience of station accesses to current transportation network in the area.</p> <p>Potential for buses to be be delayed by traffic entering/leaving station area.</p>	<ul style="list-style-type: none"> <li>▪ Station access off a secondary local street (Palladium Way). No mitigation required.</li> <li>▪ Two lane per direction Station access road will minimize delays. Provide priority egress for buses leaving bus loop when and if local bus volumes reach significant levels</li> </ul>	Options of prioritization treatment for buses will be investigated by the Transitway Operator prior to initiation of service, based on volumes of local transit buses at the time.
	Travel time and service reliability for on-street-stop transit services	Location and walking distance from local on-street stops.	<ul style="list-style-type: none"> <li>▪ Access far away from Dundas Street. Current local bus service on Dundas Street. Future local bus service expansion uncertain.</li> </ul>	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Dundas Street and Palladium Way.	<ul style="list-style-type: none"> <li>▪ To be assessed based on Transitway parking demand at time of implementation. Signal on new intersection at station access will regulate traffic on Palladium Way.</li> </ul>	On-going monitoring of traffic flow and adjustments to signal timing accordingly as necessary.

**TABLE 6.17: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION**

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
	Station access by walking distance	Direct and convenient sidewalk access can attract local area passengers to walk to station.	<ul style="list-style-type: none"> <li>Long walkway access to the Station. Additionally, need to cross 407 ETR on pedestrian bridge, to access 407 Transitway service.</li> </ul>	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> <li>Direct access to station is provided by station access road. No mitigation required.</li> </ul>	N/A
<b>Appleby Line Station</b>	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> <li>No current or planned regional transit services in the vicinity of the station. No mitigation required.</li> </ul>	N/A
	Compatibility with local transit services	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> <li>No current local transit services in the vicinity of the station. No mitigation required.</li> </ul>	N/A
	Location of station and transit access	Convenience of station accesses to current transportation network in the area.	<ul style="list-style-type: none"> <li>Convenient station access off Appleby Line. No mitigation required.</li> </ul>	N/A
		Potential for buses to be be delayed by traffic entering/leaving station area.	<ul style="list-style-type: none"> <li>Potential minimum bus demand when and if local service on Appleby Line is implemented.</li> </ul>	N/A.
	Travel time and service reliability for on-street-stop transit services	Location and walking distance from local on-street stops.	<ul style="list-style-type: none"> <li>No current local transit services in the vicinity of the station. No mitigation required</li> </ul>	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Appleby Line	<ul style="list-style-type: none"> <li>To be assessed based on Transitway parking demand at time of implementation Signal at intersection with station access will regulate traffic on Appleby Line.</li> </ul>	On-going monitoring of traffic flow and adjustments to signal timing accordingly as necessary.
	Station access by walking distance	Direct and convenient sidewalk access can attract local area passengers to walk to station.	<ul style="list-style-type: none"> <li>Station far away from developments.</li> </ul>	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> <li>Direct access to station is provided by station access road. No mitigation required.</li> </ul>	N/A
<b>Bronte Road Station</b>	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> <li>No current or planned regional services in the vicinity of the station. No mitigation required.</li> </ul>	N/A
	Compatibility with local transit services	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> <li>Planned off street bus loop will provide direct connection between Transitway service and local services. No mitigation required.</li> </ul>	N/A
	Location of station and transit access	Convenience of station accesses to current transportation network in the area.	<ul style="list-style-type: none"> <li>Only access road off Bronte Road. No mitigation required.</li> </ul>	N/A
Potential for buses to be be delayed by traffic entering/leaving station area.		<ul style="list-style-type: none"> <li>Low frequency of local buses expected. Provide priority egress for buses leaving bus loop when and if local bus volumes reach significant levels</li> </ul>	Options of prioritization treatment for buses will be investigated by the Transitway Operator prior to initiation of service, based on volumes of local transit buses at the time.	



**TABLE 6.17: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION**

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
	Travel time and service reliability for on-street- and off street stop transit services	Location and walking distance from local transit buses.	<ul style="list-style-type: none"> <li>Bus bays inside the facility as well are only 15 m average from Transitway platforms. No mitigation required.</li> </ul>	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Bronte Road	<ul style="list-style-type: none"> <li>To be assessed based on Transitway parking demand at time of implementation. Signal on intersection with station access will regulate traffic on Bronte Road.</li> </ul>	On-going monitoring of traffic flow and adjustments to signal timing accordingly as necessary.
	Station access by walking distance	Direct and convenient sidewalk access can attract local area passengers to walk to station.	<ul style="list-style-type: none"> <li>Long walkway access to the Station.</li> </ul>	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> <li>Direct access to station is provided by station access road. No mitigation required.</li> </ul>	N/A
<b>Trafalgar Road Station</b>	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> <li>No current or planned regional services in the vicinity of the station. No mitigation required.</li> </ul>	N/A
	Compatibility with local transit services	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> <li>Planned off street bus loop will provide direct connection between Transitway service and local services. No mitigation required.</li> </ul>	N/A
	Location of station and transit access	<p>Convenience of station accesses to current transportation network in the area.</p> <p>Potential for buses to be be delayed by traffic entering/leaving station area.</p>	<ul style="list-style-type: none"> <li>Main access and secondary right in/out access. off Trafalgar Road. No mitigation required.</li> <li>Provide priority egress for buses leaving bus loop when local bus volumes reach significant levels.</li> </ul>	Options of prioritization treatment for buses will be investigated by the Transitway Operator prior to initiation of service, based on volumes of local transit buses at the time.
	Travel time and service reliability for on-street-stop transit services	Location and walking distance from local transit buses.	<ul style="list-style-type: none"> <li>Bus bays inside the facility as well on the street are only 15 m from Transitway platforms. No mitigation required.</li> </ul>	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Trafalgar Road	<ul style="list-style-type: none"> <li>To be assessed based on Transitway parking demand at time of implementation. Signal on intersection with main station access will regulate traffic on Trafalgar Road.</li> </ul>	On-going monitoring of traffic flow and adjustments to signal timing accordingly as necessary.
	Station access by walking distance	Direct and convenient sidewalk access can attract local area passengers to walk to station.	<ul style="list-style-type: none"> <li>Convenient walkway access from Trafalgar Road. No mitigation required.</li> </ul>	N/A
Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> <li>Direct access to station is provided by station access roads. No mitigation required.</li> </ul>	N/A	
<b>Britannia Road Station</b>	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> <li>No current or planned regional services in the vicinity of the station. No mitigation required.</li> </ul>	N/A
	Compatibility with local transit services	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> <li>Planned off street bus loop will provide direct connection between Transitway service and local services. No mitigation required.</li> </ul>	N/A
	Location of station and transit access	Convenience of station accesses to current transportation network in the area.	<ul style="list-style-type: none"> <li>Access off Ninth Line. No mitigation required.</li> </ul>	N/A

**TABLE 6.17: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION**

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
		Potential for buses to be be delayed by traffic entering/leaving station area.	<ul style="list-style-type: none"> <li>Provide priority egress for buses leaving bus loop when local bus volumes reach significant levels.</li> </ul>	Options of prioritization treatment for buses will be investigated by the Transitway Operator prior to initiation of service, based on volumes of local transit buses at the time.
	Travel time and service reliability for on-street-stop transit services	Location and walking distance from local transit buses.	<ul style="list-style-type: none"> <li>Bus bays inside the facility as well are only 20m. average from Transitway platforms. No mitigation required.</li> </ul>	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Britannia Road and Ninth Line	<ul style="list-style-type: none"> <li>To be assessed based on Transitway parking demand at time of implementation. Signal on reconfigured intersection at main station access will regulate traffic on Ninth Line.</li> </ul>	On-going monitoring of traffic flow and adjustments to signal timing accordingly as necessary.
	Station access by walking distance	Direct and convenient sidewalk access can attract local area passengers to walk to station.	<ul style="list-style-type: none"> <li>Convenient walkway access Ninth Line developments. No mitigation required.</li> </ul>	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> <li>Direct access to station is provided by station access road. No mitigation required.</li> </ul>	N/A
<b>Derry Road Station</b>	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> <li>No current or planned regional services in the vicinity of the station. No mitigation required.</li> </ul>	N/A
	Compatibility with local transit services	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> <li>Planned off street bus loop will provide direct connection between Transitway service and local services. No mitigation required.</li> </ul>	N/A
	Location of station and transit access	<p>Convenience of station accesses to current transportation network in the area.</p> <p>Potential for buses to be be delayed by traffic entering/leaving station area.</p>	<ul style="list-style-type: none"> <li>Access off Derry Road. No mitigation required.</li> <li>Provide priority egress for buses leaving bus loop when local bus volumes reach significant levels.</li> </ul>	Options of prioritization treatment for buses will be investigated by the Transitway Operator prior to initiation of service, based on volumes of local transit buses at the time.
	Travel time and service reliability for on-street-stop transit services	Location and walking distance from local transit buses.	<ul style="list-style-type: none"> <li>Bus bays inside the facility as well are only 15m. average from Transitway platforms. No mitigation required.</li> </ul>	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Derry Road and Ninth Line	<ul style="list-style-type: none"> <li>To be assessed based on Transitway parking demand at time of implementation Signal on new intersection at main station access will regulate traffic on Ninth Line.</li> </ul>	On-going monitoring of traffic flow and adjustments to signal timing accordingly as necessary.
	Station access by walking distance	Direct and convenient sidewalk access can attract local area passengers to walk to station.	<ul style="list-style-type: none"> <li>Walkway access from Ninth Line. No mitigation required.</li> </ul>	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> <li>Direct access to station is provided by station access roads. No mitigation required.</li> </ul>	N/A

**TABLE 6.17: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION**

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
<b>Lisgar GO Station</b>	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> <li>This station provides the connection opportunity of travelers using the GO Milton Line and the 407 Transitway. No mitigation required.</li> </ul>	N/A
	Compatibility with local transit services	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> <li>Off street bus loop of the existing GO station will provide connection between Transitway service and local services. No mitigation required.</li> </ul>	N/A
	Location of station and transit access	<p>Convenience of station accesses to current transportation network in the area.</p> <p>otential for buses to be be delayed by traffic entering/leaving station area.</p>	<ul style="list-style-type: none"> <li>Using existing access to GO station off Tenth Line. No mitigation required.</li> <li>Being an existing GO station, the bus operation entering the facility will remain.</li> </ul>	Options of prioritization treatment for buses will be investigated by the Transitway Operator prior to initiation of service, based on volumes of local transit buses at the time.
	Travel time and service reliability for on-street-stop transit services	Location and walking distance from local transit buses.	<ul style="list-style-type: none"> <li>Existing bus bays inside the facility as well are only 20 m from Transitway platforms. No mitigation required.</li> </ul>	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Tenth Line.	<ul style="list-style-type: none"> <li>To be assessed based on Transitway parking demand at time of implementation.</li> </ul>	On-going monitoring of traffic flow and adjustments accordingly as necessary.
	Station access by walking distance	Direct and convenient sidewalk access can attract local area passengers to walk to station.	<ul style="list-style-type: none"> <li>Walkway access from Tenth Line. No mitigation required.</li> </ul>	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> <li>Direct access to station is provided by station access road. No mitigation required.</li> </ul>	N/A
<b>Mississauga Road Station</b>	<b>Connections to regional transit services</b>	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> <li>No current regional services in the vicinity of the station. No mitigation required.</li> </ul>	N/A
	<b>Compatibility with local transit services</b>	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> <li>Planned off street bus loop will provide direct connection between Transitway service and local services. No mitigation required.</li> </ul>	N/A
	<b>Location of station and transit access</b>	<p>Convenience of station accesses to current transportation network in the area.</p> <p>Potential for buses to be be delayed by traffic entering/leaving station area.</p>	<ul style="list-style-type: none"> <li>Direct connection to station site from Hereford Street. No mitigation required.</li> <li>Provide priority egress for buses leaving bus loop</li> </ul>	Options of prioritization treatment for buses will be investigated by the Transitway Operator prior to initiation of service, based on volumes of local transit buses at the time.
	<b>Travel time and service reliability for on-street-stop transit services</b>	Location and walking distance from local transit buses.	<ul style="list-style-type: none"> <li>Existing bus bays inside the facility as well are only 15m. average from Transitway platforms. No mitigation required.</li> </ul>	N/A
	<b>Reduce level of services for vehicular traffic</b>	Traffic volume and level of service on Mississauga Road and Hereford Street.	<ul style="list-style-type: none"> <li>To be assessed based on Transitway parking demand at time of implementation..</li> </ul>	On-going monitoring of traffic flow and adjustments accordingly as necessary.

**TABLE 6.17: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION**

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	COMMITMENTS TO FUTURE WORK AND MONITORING
	<b>Station access by walking distance</b>	Direct and convenient sidewalk access can attract local area passengers to walk to station.	<ul style="list-style-type: none"> <li>▪ Walkway access from Hereford Street. No mitigation required.</li> </ul>	N/A
	<b>Emergency/maintenance vehicles access</b>	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> <li>▪ Direct access to station is provided by station access road. No mitigation required.</li> </ul>	N/A

## 6.5 MTO Protected Sites

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Environmental compensation has been included as a key component of this project. A number of sites along the 407 Transitway facility will be protected for future environmental compensation. Please see **Chapter 5** of this EPR for further details and the location of these protected sites. As noted in **Section 6.2.1**, compensation/offsets will be provided at a compensation ratio to be determined through further discussion with regulatory agencies (e.g., MNRF), as part of implementing the project.

## 6.6 Conversion/Decommissioning

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As described in **Chapter 7** of this EPR, it is anticipated that the 407 Transitway will initially be built as an exclusive, all grade separated two lane road and operated with buses. However, the current design of the runningway and stations has been developed to accommodate conversion to LRT technology, if warranted in the future due to an increase in passenger demand and/or other reasons.

In case of conversion to LRT, the roadbed will need to be replaced by track bed, and special track works (e.g. track crossovers; pocket tracks) will have to be installed, on the busway alignment. This conversion would be subject to a further Environmental Assessment study.

If for any reason in the future, it is decided to decommission the Transitway, the corridor would be returned to its original state.

## 6.7 Summary

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Given that the preferred Transitway alignment is mostly confined to a well-established urban transportation and utility corridor, and minor conflict with utilities. Built-in design attributes to be adopted will be typically those for watercourse crossing works adjacent to, or in, flood plains and mitigation of impacts on sensitive vegetation in valleylands by configuring facilities to preserve natural features. Considerable effort has been applied to minimize intrusion of Transitway facilities onto designated natural heritage areas (ANSIs, PSWs), built heritage resources and cultural heritage landscapes, known

archaeological resources, removal of vegetation, agricultural lands, developable parcels based on currently available land use plans. In the limited cases, where an easement across private land is required, air-rights development is a feasible mitigation measure if necessary.

Construction impacts are temporary and are limited within the zone of construction due to the availability of undeveloped provincial lands between and alongside the 407 ETR. Accommodation of traffic during underpass construction at arterial roads is to be considered. Built-in design methods and construction staging will mitigate the effects by maintaining peak direction capacity and minimizing delays to traffic. Other typical construction impacts such as noise, dust, erosion, water quality and surplus material disposal effects will be mitigated by adopting regulatory requirements and industry best practices in contract specifications and conditions.

Generally, operations and maintenance impacts are minimized by the remoteness of a large portion of the Transitway from sensitive neighbourhoods. While modelling of noise impacts indicates that increases to ambient levels will be generally imperceptible, local mitigation will be considered if warranted by the proximity of operations. The only other potentially significant impact will be on traffic circulation in the vicinity of Transitway stations. This will be mitigated by built-in design and control features at station entrances. The minor effects of operations on surface water quantity and quality will also be mitigated by SWM system design attributes.

Appropriate environmental protection measures were identified to address potential environmental effects resulting from this project. Proposed mitigation measures are based on the current design and further assessment of the impacts and detailed mitigation measures will be conducted prior to construction. The monitoring and contingency plans are also considered preliminary, dynamic and subject to refinements prior to construction in consultation with regulatory agencies. The specific monitoring requirements of any environmental permits/approvals/exemptions secured prior to construction will be incorporated into the monitoring and contingency plan at that time. The details of the monitoring and contingency plan will be incorporated into provisions included in the construction contracts package.

Please see **Chapter 10** of this EPR for commitments to future work.