

Chapter 6 – Impact Assessment, Mitigation and Monitoring



407 TRANSITWAY – WEST OF HURONTARIO STREET TO EAST OF HIGHWAY 400

MINISTRY OF TRANSPORTATION - CENTRAL REGION

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6. IMPACT ASSESSMENT, MITIGATION AND MONITORING

6.1. Introduction

The *Transit Projects and Greater Toronto Transportation Authority 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 was undertaken to identify the positive and negative footprint, construction and operation/maintenance 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 experience:

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.

TABLE 6.1: ASSESSMENT CRITERIA

ENVIRONMENTAL FACTOR	ENVIRONMENTAL VALUE/CRITERION	MEASURES
Natural Environment	Contaminated Properties and Waste	Potential for disturbance and/or disposal of contaminated waste and/or soils during construction.
		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. Impact to quality and quantity of water.
	Groundwater	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.
		Potential for groundwater contamination.
	Fish and Fish Habitat	Potential impacts to fish and fish habitat.
		Displacement of and/or disturbance to rare, threatened or endangered fish species or significant fish habitat.
	Vegetation and Vegetation Communities	Displacement of and/or disturbance to vegetation and vegetation communities.
		Displacement of and/or disturbance to rare, threatened or endangered vegetation and vegetation communities.
	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. Impacts to migratory birds during construction. Disturbance to wildlife from noise, light and visual intrusion.		
Designated Natural Areas	Potential impacts to designated natural areas in the vicinity of the study area.	
Air Quality	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. Number of businesses affected.
	Noise and Vibration	Impacts regarding noise and vibration.

TABLE 6.1: ASSESSMENT CRITERIA

ENVIRONMENTAL FACTOR	ENVIRONMENTAL VALUE/CRITERION	MEASURES
	Built Heritage Resources and Cultural Heritage Landscapes	Displacement/demolition of built heritage resources and/or cultural heritage landscapes or alteration of their settings.
	Archaeological Features	Potential loss/displacement of archaeological resources within the study area.
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 and Métis 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, TRCA, and CVC) and Indigenous and Métis Communities were consulted in the impact assessment studies listed below. Most of these reports were provided to the agencies in December 2017 for review (several were provided after December 2017), comments were received and revisions have been made in response to comments. In addition, meetings were held with agencies to discuss in detail the comments and concerns of the agencies. 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 thirty-four properties located in the vicinity of the 407 Transitway, depending on property needs. Fifteen 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. Fifteen 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. Four 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. The study area crosses three major watersheds: Etobicoke Creek, Mimico Creek, and Humber River. There are twenty-four (24) watercourses within the study limits, out of which twenty-one (21) cross the Transitway. The remaining watercourses were identified as minor conveyance features with small localized tributary areas that the proposed Transitway will not impact because of grade difference.
- **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 minor impacts to forest and wetland communities. The 407 Transitway design was refined to avoid impacts to the two designated natural areas present in the vicinity of the study area east of Martin Grove Road (including the Woodbridge Cut ESA and the Woodbridge Pleistocene Cut Earth Science ANSI). A total of 14 wildlife species at risk have been recorded within the vicinity of the study area based on secondary source data and an additional two wildlife species at risk have been identified as having the potential to be found within the study area. Two species at risk were confirmed in the study area by LGL during field investigations in 2016 including Barn Swallow and Eastern Wood Pewee. Consultation with TRCA, CVC and MNRF 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. In some cases, where channel realignment and/or retaining walls are proposed, “Serious Harm” may occur. 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 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. The analysis noted that, 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 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 TRCA, CVC 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 not only the noise and vibration impacts associated with the use of the 407 Transitway, but also the impacts of the proposed changes to the local topography required to accommodate the new infrastructure, and secondary effects such as noise-induced vibration of house structure elements. 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 (2031) assuming that the project *does not* proceed (future no-build), and future conditions (2031) 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, many have background sound levels of 65 dBA, or more. Noise barrier walls were determined to not be technically or administratively feasible. 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.
- **Air Quality Impact Assessment:** An air quality and greenhouse gas (GHG) emissions inventory was completed for the future reference year 2031, 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 (NO₂), sulphur dioxide (SO₂), 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 (PM₁₀), and particulate matter less than 2.5 microns (PM_{2.5}). 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., 2017) 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). 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 watercourses designated as ‘Urban River Valleys’ under the Greenbelt Plan (2017) are located within the study area including the Etobicoke Creek West Branch (west of Tomken Road), West Humber River (west of Highway 50) and Lower Humber River (west of Islington Avenue). 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 Resource Assessment (CHRA) was carried out to identify built heritage resources and cultural heritage landscapes located in and adjacent to the study area, and to determine any impacts to these resources. The study area has a rural land use history dating back to the early nineteenth century, and retains a number of nineteenth and twentieth-century cultural heritage resources. Thirty-eight cultural heritage resources were identified within/adjacent to the study area including 23 Built Heritage Resources (BHRs) and 15 Cultural Heritage Landscapes (CHLs). Of these resources, 18 are designated, listed or registered by a municipality or other agency. Eight of the 38 cultural heritage resources are expected to be impacted by the 407 Transitway through demolition or alteration to their setting. As a result, resource-specific Cultural Heritage Evaluation Reports (CHERs) were prepared as part of the TPAP for these eight cultural heritage resources to determine the heritage integrity of each resource. Based on the results of the eight CHERs, it was determined that no Heritage Impact Assessments were required. The CHERs were submitted to MTCS and the applicable municipalities/agencies for archival purposes. Prior to construction, where technically possible, further adjustments to the design will be explored to minimize potential impacts to the cultural heritage resources.
- **Stage 1 and Stage 2 Archaeological Assessment:** 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 (i.e. Stage 3 or Stage 4 Site Specific Archaeological Assessment). One previously registered archaeological site (AkGv-121) and one site identified during the Stage 2 assessment (AkGv-350) have been documented to retain further cultural heritage value or interest (CHVI) and will be impacted by the Transitway runningway. These two sites will require Stage 3 Site Specific Archaeological Assessment. All remaining Stage 2 work and any required Stage 3 and Stage 4 archaeological assessment work will be completed prior to construction.
- **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 seven proposed 407 Transitway Stations: Hurontario Street, Dixie Road, Airport Road, Goreway Drive, Highway 50, Highway 27 and Pine Valley Drive. 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.

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 6.5** 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.

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 thirty-four properties/areas located in the vicinity of the 407 Transitway, depending on property needs (see **Table 1** in **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 50 m of the right-of-way have been identified due to the potential petroleum hydrocarbon, pesticide, and nutrients impacts associated with these operations; however, cultivated fields have not been identified.

Fifteen of the thirty-four 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. Fifteen 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. Four 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 thirty-four 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 should 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, six of these thirty-four properties/areas located within the study area (and identified as having potential environmental impacts to soil and/or groundwater from current or historical activities) will be directly impacted by the 407 Transitway. Four of these properties are moderate risk properties that will require subsurface investigations to determine presence/absence of impacts (i.e. limited subsurface environmental investigations). These four properties/areas include two businesses on Topflight Drive in Mississauga, a property on Farmhouse Court in Brampton, a property on Bramalea Road in Brampton, and a property/industrial area on Parkhurst Square in Brampton. Two of these properties are high risk properties that will require subsurface environmental investigations (i.e. Phase II ESAs) to determine whether soil and/or groundwater impacts exist at the properties. These two properties/areas include several truck equipment/repair storage facilities and a garden centre on Codlin Crescent in Toronto, and properties in the vicinity of Highway 427 and 407 ETR on Steeles Avenue West in Vaughan. 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 should 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. A drainage and stormwater management plan has been prepared to address these potential impacts. Runoff generated by the 407 Transitway will be collected and treated using approved stormwater management practices including detention ponds (wet and dry facilities) and enhanced grassed swales, where possible.

The proposed stormwater management strategy for the 407 Transitway includes several of the BMPs discussed in *Guidance for Development Activities in Redside Dace Protected Habitat* (2016). In these areas, enhanced swales with bottom draw Hickenbottom-type inlets are provided along the Transitway alignment to provide both quantity and quality control while maintaining existing overall drainage patterns as much as possible. Furthermore, all proposed wet ponds feature bottom draw outlets. Additional mitigation measures, such as permeable pavements, will be assessed for these facilities prior to construction.

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. On the eastern slope of the Humber River Valley, west of Pine Valley Drive, relatively coarse grained glacial lake deposits of sand are mapped. As such, the effectiveness of permeable pavements and low impact development infiltration techniques in areas west of the Humber River is expected to be limited. In the area of relatively coarse grained sandy soil, in the vicinity of the proposed Pine Valley Station, there is likely an opportunity to effectively implement permeable pavements or other low impact development infiltration techniques. The actual effectiveness of any of these measures should be assessed prior to construction.

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.

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.

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 have been in use historically throughout the study area; however, given the expansion of the urban area of the Cities of Brampton, Mississauga, Toronto and Vaughan, it is anticipated that municipal water supplies are available to properties within the study area. As such, it is not expected that properties are dependent on groundwater wells for water supply.

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 Municipalities of York and Peel, there are no wellhead protection areas or municipal wells within the study area. The City of Toronto does not use groundwater for its municipal water supply. 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.

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. It is recommended that the potential impacts of the proposed construction works on groundwater resources be reassessed along with more detailed site specific hydrogeological data prior to construction of the project and that further investigation/monitoring be completed and appropriate mitigation measures be incorporated into the design.

Excavation and construction below the water table in saturated sandy and/or silty soils may present challenges, including the need for de-watering. Any pumping of water for road construction above 50,000 litres per day requires either registration on the Environmental Activity and Sector Registry ("EASR" -

under certain criteria) or a Permit to Take Water from the MECP. Based on the findings of the reassessment of the design and hydrogeological/subsurface data, 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 should be applied for as necessary.

FISH AND FISH HABITAT

There are a total of 24 watercourse crossings occurring within the project limits: eight within the Etobicoke Creek watershed, eight within the Mimico Creek Watershed and eight within the Humber River watershed. One additional watercourse (Tributary of Fletchers Creek within the Credit River watershed) is located just west of the westerly study limits. Twenty of these 24 watercourse crossing support fish and fish habitat. **Section 3.1.5** of this report provides information on the watercourse locations. This project will directly affect these watercourses. "Serious Harm to Fish" could result as a result of 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

One aquatic species at risk, Redside Dace (regulated as "Endangered" under the Ontario ESA and Canada SARA), has been identified as occurring within the vicinity of the study area. One watercourse feature (C1 - Tributary of Fletchers Creek located just west of the westerly study limits) was identified by MNRF as contributing habitat for Redside Dace, which may be regulated under the Ontario ESA, 2007. According to the Ontario 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 habitat, 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. Field investigations in 2016 determined that this feature (C1) does not provide fish habitat and is located west of the study limits so should not be impacted. However, if it is determined that C1 will be impacted as a result of the 407 Transitway, the work may affect the habitat of Redside Dace and permitting under the Ontario ESA may need to occur prior to construction in consultation with the MNRF.

It is understood at this time that a permit from DFO (under the Canada SARA) would be required in addition to a permit from MNRF only when works are to be undertaken in "occupied" habitat. Therefore, if there are any impacts to C1, it would likely be exempt from a SARA permit because the habitat is "contributing".

Summary of Proposed Work at Watercourse Crossings

The proposed new structures will result in temporary and permanent impacts at the 20 watercourses supporting fish or fish habitat. However, through proper mitigation measures and careful planning, the impacts can be minimized to prevent negative effects to fish and fish habitat.

Culvert/structure type should 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 should be considered throughout design. **Section 6.3.1** below provides 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.

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 MTO’s *Best Management Practices Manual for Fisheries Clear Span Bridges* (MTO 2015) and are therefore “not likely to result in serious harm”. Watercourses which meet this BMP include: E5, E6, E8, M7, H1, H6, H7 and H8.

For watercourses in which culvert structures are proposed (E1, E3, E4, E7, M1, M3, M4, M5, M6, M8, H2 and H5), 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 should be classified as “low”. No permanent impacts to fishes’ ability to carry out life processes will result from these works, therefore “serious harm” is not expected to occur.

For watercourses for which retaining walls in the riparian area are proposed in addition to the new crossing structures (E7, H6), the assessment of negative effects are as follows:

- extent (size) for the retaining walls 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.

The overall extent (length) of these retaining walls is relatively large. Therefore, conservatively, it is assumed that a review from DFO will be required, unless it is determined that the size and extent of these retaining walls are confirmed to result in “low” likelihood of causing serious harm. As these walls are being constructed to eliminate the need for infringement into the watercourses or the need for realignments, it is likely that their construction will result in low residual negative effects.

For the watercourse in which a channel realignment is proposed in addition to the new crossing structure (H2), 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 “high” as the altered habitat has undergone significant change (infilling).

Overall, negative residual effects at this watercourse location should be classified as “high”, “likely to result in serious harm” and will require a review from DFO prior to construction. Permanent impacts to fishes’ ability to carry out life processes will result from infilling of the channel.

An explanation of the categorization of project risk is provided in **Appendix D** (Fish and Fish Habitat Existing Conditions and Impact Assessment Report). See **Table 6.8** for additional site specific and general mitigation measures to be implemented during construction at the impacted watercourses.

Potential Enhancement/Offsetting Opportunities

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 in this report 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).

Etobicoke and Mimico Creek Watersheds

The Etobicoke and Mimico Creeks Watersheds Technical Update Report (TRCA 2010) presents some enhancement and compensation opportunities to improve the health of the watershed. The first enhancement opportunity involves expanding and enhancing natural cover and habitat connectivity. The report states that a target of 14.1% natural cover has been recommended by restoring wetlands and regenerating forest communities. The report also discusses addressing storm water management controls to incorporate “low impact development controls” which addresses quality, quantity, erosion, baseflow maintenance and water balance (TRCA 2010).

Humber River Watershed

The Humber River Watershed Plan (TRCA 2008) presents many enhancement opportunities to improve the health of the watershed. This report outlines a regeneration plan for each of the subwatersheds, and many have similar enhancement recommendations. Opportunities for enhancement within the entire watershed include creating and enhancing natural cover in the target terrestrial natural heritage system and the enhancement of storm water infiltration technologies. Other opportunities include planting trees and shrubs in riparian areas lacking natural cover, and restoring wetlands.

Some watercourse specific opportunities include the enhancement of Brook Trout (*Salvelinus fontinalis*) and Redside Dace habitat in the middle reaches of the Humber River (FMZ 5, 6, 7) encompassing the West Humber River and Rainbow Creek and the Lower Humber River north of the 407 ETR. Opportunities include increasing riparian tree cover, restoration of wetlands on marginal agricultural land, and improved development practices to avoid increases in surface water runoff. Other subwatershed specific opportunities include the creation of habitat restoration site plans along the Lower Humber River (FMZ 10) to implement stormwater retrofits, tree planting and sustainable community technologies (TRCA 2008).

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 102.47 ha of vegetation communities (including anthropogenically influenced lands such as agricultural and manicured land), which includes a loss of 52.44 ha due to the runningway, and a loss of 50.03 ha due to the stations. Collectively, this will result in impacts to both terrestrial and wetland habitats including the removal of 0.12 ha of forest communities and 0.94 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. **Table 6.3** and **Table 6.4** present a summary of the vegetation removals within the Transitway runningway and stations, respectively. The natural heritage and the preferred Transitway facility footprint are presented in **Figures 3.2 a, b and c** in **Chapter 3 of the EPR**.

TABLE 6.2: AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

WATERBODY	PATHWAY OF EFFECT (S)	STRESSOR (POTENTIAL IMPACT)	MITIGATION MEASURES	RESIDUAL EFFECTS	SERIOUS HARM Y/N
E1, E3, E4, E7, M1, M3, M4, M5, M6, M8, H2, H5 New Culvert Structures	L1- Vegetation clearing	<ul style="list-style-type: none"> Alteration of riparian vegetation Addition or removal of in stream organic structure Change in shade Change in external nutrient/energy inputs Changes to bank stability / exposed soils 	<p>Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804.</p> <ul style="list-style-type: none"> Minimize vegetation removal and disturbances on embankments and surface drainage ditches adjacent to the watercourse. Seed and mulch disturbed banks with appropriate seed mixture. Limit the duration that areas are left disturbed/exposed. 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. 	<ul style="list-style-type: none"> Change in habitat structure and cover Change in food supply Change in nutrient concentrations <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"> Addition or removal of in stream organic structure Changes to bank stability / exposed soils Changes in slope / land drainage patterns Increased erosion potential 	<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>	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.	N
	L3 – Excavation	<ul style="list-style-type: none"> Alteration of groundwater flow to surface water Creations of pond, pit or trench Dewatering of pit or trench Removal of topsoil Changes to bank stability / exposed soils Changes in slope / land drainage patterns Increased erosion potential 	The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.	No permanent residual effects are expected.	N
	B2 – Industrial equipment	<ul style="list-style-type: none"> Changes to bank stability / exposed soils Increased erosion potential Re-suspension and entrainment of sediment Oil / grease / fuel leaks 	<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>	No permanent residual effects are expected.	N
	W1 – Placement of Material or Structures in Water	<ul style="list-style-type: none"> Partial constriction of flow Change in channel morphology Change in hydraulics Change in substrate composition Change in aquatic macrophytes Complete constriction of flow 	<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"> Change in habitat structure and cover Change in food supply Change in nutrient concentrations <p>There will be minor residual effects from the change in the native substrates, however not likely to result in serious harm.</p>	N
	W3 – Water extraction	<ul style="list-style-type: none"> Reduced flow Entrainment of fish in pumps 	<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>	No permanent residual effects are expected.	N

TABLE 6.2: AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

WATERBODY	PATHWAY OF EFFECT (S)	STRESSOR (POTENTIAL IMPACT)	MITIGATION MEASURES	RESIDUAL EFFECTS	SERIOUS HARM Y/N
			Fish salvage operations shall be conducted in accordance with OPSS 182. 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.		
	W5 – Aquatic Vegetation Management	<ul style="list-style-type: none"> Change in light penetration Change in primary productivity Change in nutrient inputs Re-suspension and entrainment of sediment 	Isolate the work site. Minimize vegetation removal to the amount which is necessary to maintain proper and safe fish passage.	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"> Dewatering Bank erosion Scouring of channel beds Change in substrate composition 	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. 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.	No permanent residual effects are expected.	N
	W8 – Fish Passage	<ul style="list-style-type: none"> Channel obstructions Upstream/downstream passage of fish Alteration of migration patterns Change in water chemistry Change in temperature Flow alteration Diversions channels 	Adhere to appropriate in-water work timing windows. Temporary flow diversions shall be conducted in accordance with OPSS 517. Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517. 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.	No permanent residual effects are expected.	N
H2 Channel realignment	L1- Vegetation clearing	<ul style="list-style-type: none"> Alteration of riparian vegetation Addition or removal of in stream organic structure Change in shade Change in external nutrient/energy inputs Changes to bank stability / exposed soils 	Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804. <ul style="list-style-type: none"> Minimize vegetation removal and disturbances on embankments and surface drainage ditches adjacent to the watercourse. Seed and mulch disturbed banks with appropriate seed mixture. Limit the duration that areas are left disturbed/exposed. 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. 	<ul style="list-style-type: none"> Change in habitat structure and cover Change in food supply Change in nutrient concentrations The residual effects of vegetation clearing for the channel infilling will result in permanent alteration of x m ² of fish habitat that may limit or diminish the ability of the fish to carry out their life processes	Y
	L2 – Grading	<ul style="list-style-type: none"> Addition or removal of in stream organic structure Changes to bank stability / exposed soils Changes in slope / land drainage patterns Increased erosion potential 	Installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805. Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804. Vegetation protection and rehabilitation shall be in accordance with OPSS 182 and OPSS 804.	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.	N
	L3 – Excavation	<ul style="list-style-type: none"> Alteration of groundwater flow to surface water Creations of pond, pit or trench Dewatering of pit of trench 	The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.	No permanent residual effects are expected.	N

TABLE 6.2: AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

WATERBODY	PATHWAY OF EFFECT (S)	STRESSOR (POTENTIAL IMPACT)	MITIGATION MEASURES	RESIDUAL EFFECTS	SERIOUS HARM Y/N
		<ul style="list-style-type: none"> ▪ Removal of topsoil ▪ Changes to bank stability / exposed soils; ▪ Changes in slope / land drainage patterns ▪ Increased erosion potential 			
	B2 – Industrial equipment	<ul style="list-style-type: none"> ▪ Changes to bank stability / exposed soils ▪ Increased erosion potential ▪ Re-suspension and entrainment of sediment ▪ Oil / grease / fuel leaks 	<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>	No permanent residual effects are expected.	N
	W1 – Placement of Material	<ul style="list-style-type: none"> ▪ Partial constriction of flow ▪ Entrainment fish in pumps ▪ Change in channel morphology ▪ Change in hydraulics ▪ Change in substrate composition ▪ Change in aquatic macrophytes ▪ Complete constriction of flow 	<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"> ▪ Change in habitat structure and cover ▪ Change in food supply ▪ Change in nutrient concentrations <p>The residual effects from infilling the existing channel will result in destruction of x m² fish habitat.</p>	Y
	W3 – Water extraction	<ul style="list-style-type: none"> ▪ Reduced flow ▪ Entrainment of fish in pumps 	<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
	W7 –Change in timing, duration and frequency of flow	<ul style="list-style-type: none"> ▪ Dewatering ▪ Bank erosion ▪ Scouring of channel beds ▪ Change in substrate composition 	<p>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.</p>	No permanent residual effects are expected.	N
	W8 – Fish Passage	<ul style="list-style-type: none"> ▪ Channel obstructions ▪ Upstream/downstream passage of fish ▪ Alteration of migration patterns ▪ Change in water chemistry ▪ Change in temperature ▪ Flow alteration ▪ Diversion channels 	<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

TABLE 6.2: AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

WATERBODY	PATHWAY OF EFFECT (S)	STRESSOR (POTENTIAL IMPACT)	MITIGATION MEASURES	RESIDUAL EFFECTS	SERIOUS HARM Y/N
E7, H6 Retaining walls in riparian area of watercourse	L1- Vegetation clearing	<ul style="list-style-type: none"> ▪ Alteration of riparian vegetation ▪ Addition or removal of in stream organic structure ▪ Change in shade ▪ Change in external nutrient/energy inputs ▪ Changes to bank stability / exposed soils 	Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804. <ul style="list-style-type: none"> ▪ Minimize vegetation removal and disturbances on embankments and surface drainage ditches adjacent to the watercourse. ▪ Seed and mulch disturbed banks with appropriate seed mixture. ▪ Limit the duration that areas are left disturbed/exposed. ▪ 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. 	<ul style="list-style-type: none"> ▪ Change in habitat structure and cover ▪ Change in food supply ▪ Change in nutrient concentrations The residual effects of vegetation clearing for the proposed retaining wall 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 (depending on the proposed length).	Possible
	L2 – Grading	<ul style="list-style-type: none"> ▪ Addition or removal of in stream organic structure ▪ Changes to bank stability / exposed soils ▪ Changes in slope / land drainage patterns ▪ Increased erosion potential 	Installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805. Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804. Vegetation protection and rehabilitation shall be in accordance with OPSS 182 and OPSS 804.	There will be minor residual effects in habitat structure and cover from the removal riparian vegetation, however not likely to result in serious harm.	N
	B2 – Industrial equipment	<ul style="list-style-type: none"> ▪ Changes to bank stability / exposed soils ▪ Increased erosion potential ▪ Re-suspension and entrainment of sediment ▪ Oil / grease / fuel leaks 	Use of equipment shall be in accordance with OPSS 182. The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805. 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.	No permanent residual effects are expected.	N

Segment A: West of Hurontario Street to Kennedy Road

A total of 4.16 ha of predominately naturalized and/or planted area will be removed as a result of the proposed 407 Transitway runningway from west of Hurontario Street to East of Kennedy Road. The largest impact will be to cultural meadow communities (CUM1-1a). Overall, impacts resulting in the loss of vegetation within these cultural meadow communities is considered to be minor. Cultural meadows are widespread and common throughout Ontario. It is expected that 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.

Minor impacts will occur at the northern edge of one wetland (MAM2/MAS2a) community. This edge of the wetland is very narrow, and reed canary grass is dominant. Impacts related to the removal of this portion of the meadow marsh/shallow marsh community, communities that are widespread and common throughout Ontario, is considered to be minor.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands and manicured areas. The impact to these lands is considered to be minor.

Segment B: East of Kennedy Road to West of Tomken Road

Five ELC community types will be impacted due to the proposed Transitway runningway from east of Kennedy Road to west of Tomken Road. These communities include cultural meadow (CUM1-1a to c), cultural meadow/cultural thicket (CUM1-1/CUT1), cultural thicket/cultural woodland (CUT1/CUW1a), and meadow marsh (MAM2-2a and MAM2a), resulting in 6.34 ha of land to be impacted.

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. As a result, impacts to the cultural communities noted above are considered to be minor. Cultural vegetation communities are widespread and common throughout Ontario.

Impacts to the reed-canary grass meadow marsh (MAM2-2a) and the meadow marsh (MAM2a) will result in the removal of a small portion of these communities. The northern edge of the reed-canary grass meadow marsh will be impacted and efforts should be made to retain the remaining portion of this community, to the extent possible. Though only a smaller portion of the meadow marsh community will remain, it would persist between 407 ETR and the runningway. Runoff from these features will likely provide adequate conditions for the persistence of the remaining portion of this community. It is expected that runoff currently provides support to this meadow marsh due to its proximity to the 407 ETR. The loss of a small portion of the reed-canary grass meadow marsh, adjacent to the preferred runningway is not expected to have any negative impacts to the remaining portions of this community. Both meadow marsh communities are considered to be widespread and common in Ontario.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands. The impact to these lands is considered to be minor.

Segment C: West of Tomken Road to East of Torbam Road

Impacts to vegetation communities from west of Tomken Road to east of Torbram Road will result in the removal of approximately 9.40 ha of vegetation communities including the removal of a portion of cultural meadow (CUM1-1c, e and f), cultural thicket (CUT1b), cultural woodland (CUW1a), meadow marsh (MAM2b), agricultural lands, and manicured areas.

Impacts to the cultural meadow, the cultural thicket, and the cultural woodland are considered to be minor. 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.

Impacts to the meadow marsh (MAM2b) will result in the removal of a very small portion of the southern edge of this community. This community has established along a tributary of Etobicoke Creek West Branch which bisects a large cultural meadow. The meadow marsh community is considered to be widespread and common in Ontario.

Impacts to anthropogenically influenced lands will include the removal of agricultural lands, and a portion of manicured lands. The impact to these lands is considered to be minor.

Segment D: East of Torbram Road to East of Goreway Drive

Impacts to vegetation communities from east of Torbram Road to east of Goreway Drive will result in the removal of 6.68 ha of vegetation communities. This includes the removal of a portion of cultural meadow (CUM1-1g) and cultural thicket (CUT1d), and a portion of a reed-canary grass meadow marsh (MAM2-2b) that has developed along a tributary of Mimico Creek.

Impacts to the cultural meadow and cultural thicket communities are considered to be minor. 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.

Impacts to the reed-canary meadow marsh (MAM2-2b) will result in the removal of a very small portion of the northern edge of this community. Efforts should be made to retain the remaining portion of this community, to the extent possible. However, the loss of a small portion of the reed-canary grass meadow marsh, adjacent to the runningway, is not expected to have any negative impacts to the remaining portions of this community. The reed-canary grass meadow marsh is considered to be widespread and common in Ontario.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands, manicured areas and a SWM Pond. The impact to these lands is considered to be minor.

Segment E: East of Goreway Drive to East of Highway 427

Impacts to vegetation communities from east of Goreway Drive to east of Highway 427 will result in the removal of approximately 7.75 ha of vegetation communities including cultural meadow (CUM1-1h), cultural savannah (CUS1a), cultural thicket (CUT1e), cultural woodland (CUW1g), and shallow marsh (MAS2).

Impacts to cultural meadow, cultural savannah, cultural thicket and cultural woodland communities are considered to be minor. Cultural 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.

The shallow marsh, and open aquatic areas are associated with West Humber River. The portion of the shallow marsh community that would be impacted exists between 407 ETR and Steeles Avenue. Impacts due to the runningway may result in the temporary disturbance of these areas likely related to works associated with a bridge structure to span the creek. Such impacts are expected to be temporary, minor and are not expected to have any negative impacts to the remaining portion of these areas. The shallow marsh community is considered to be widespread and common in Ontario.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands and manicured areas. The impact to these lands is considered to be minor.

Segment F: East of Highway 427 to Just East of Martin Grove Road

Impacts to vegetation communities from east of Highway 427 to just east of Martin Grove Road will result in the removal of approximately 3.79 ha of vegetation communities consisting primarily of cultural meadow (CUM1-1h and i).

Impacts to the cultural meadows (CUM1-1h and i) 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 the cultural communities.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands and manicured areas. The impact to these lands is considered to be minor.

Segment G: Just East of Martin Grove Road to West of Islington Avenue

Impacts to vegetation communities between just east of Martin Grove Road to west of Islington Avenue will result in the removal of approximately 5.50 ha of vegetation communities. These communities include the removal of a portion of a cultural meadow (CUM1-1i to k), cultural thicket (CUT1g), cultural woodland (CUW1 c and e), meadow marsh (MAM2c), Willow Mineral Deciduous Swamp (SWD4-1a and

c), Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5b), Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3), and Fresh-Moist White Cedar-Hardwood Mixed Forest (FOM7).

Impacts to cultural meadow, cultural thicket and cultural woodland communities are considered to be minor. Cultural vegetation communities are widespread and common throughout Ontario. Cultural 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.

Construction of the runningway will result in the removal of the northern edges of the meadow marsh, the Willow Mineral Deciduous Swamp, the Sugar Maple-Hardwood Deciduous Forest, the Willow Lowland Deciduous Forest, and the White Cedar-Hardwood Mixed Forest. Though removal of the northern portion of these communities can have a negative impact, the total removals of the wetland and forest communities are approximately 0.16 ha and 0.12 ha, respectively. Only the very edges of these communities will be impacted, immediately adjacent to the highway, where edges are already in a somewhat disturbed state. The remaining wetland and forest communities are expected to persist post-construction. Forest edge management should be implemented to enhance edges. Overall, impacts to these wetland and forest community edges are considered to be minor.

Segment H: West of Islington Avenue to Immediately East of Highway 400

Impacts to vegetation communities from west of Islington Avenue to immediately east of Highway 400 will result in the removal of approximately 8.82 ha of vegetation communities including cultural meadow (CUM1-1k and l), and meadow marsh (MAM2d).

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 the cultural communities.

The meadow marsh is associated with a tributary of Lower Humber River which is a permanently flowing warmwater creek. This tributary appears to originate from 407 ETR surface drainage and a storm water pond to the north, via a concrete pipe. Flow from the creek drains towards the southwest, characterized as diffuse flow through the wetland, flowing towards an industrial development to the south, where it again appears to be piped. This wetland lies within lands between the 407 ETR, industrial development, a hydro corridor, and an area of disturbance that appears to be used inadvertently by off road vehicles. The meadow marsh consists of a high proportion of common reed, which is a highly invasive plant species. Only the western portion of the meadow marsh community is expected to be impacted due to the construction of the runningway. The remaining portion of the wetland, given the nature of the drainage, is expected to persist post-construction. Overall, impacts to this wetland are considered to be minor. The meadow marsh community is considered to be widespread and common in Ontario.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands and manicured areas. 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)
Segment A: West of Hurontario Street to East of Kennedy Road	
Cultural Communities (CUM1-1a)	1.16
Wetland Communities (MAM2/MAS2a)	0.02
Anthropogenically Influenced Lands (Agricultural and Manicured)	2.98
Subtotal West of Hurontario Street to East of Kennedy Road	4.16 ha
Segment B: East of Kennedy Road to West of Tomken Road	
Cultural Communities (CUM1-1a to c, CUM1-1/CUT1, CUT1/CUW1a)	2.86
Wetland Communities (MAM2-2a and MAM2a)	0.33
Anthropogenically Influenced Lands (Agricultural)	3.15
Subtotal East of Kennedy Road to West of Tomken Road	6.34 ha
Segment C: West of Tomken Road to East of Torbram Road	
Cultural Communities (CUM1-1c, e and f, CUT1b and CUW1a)	5.49
Wetland Communities (MAM2b)	0.04
Anthropogenically Influenced Lands (Agricultural and Manicured)	3.87
Subtotal West of Tomken Road to East of Torbram Road	9.40 ha
Segment D: East of Torbram Road to East of Goreway Drive	
Cultural Communities (CUM1-1g, CUT1d)	5.85
Wetland Communities (MAM2-2b)	0.04
Anthropogenically Influenced Lands (Agricultural, Manicured and SWM Pond)	0.79
Subtotal East of Torbram Road to East of Goreway Drive	6.68 ha
Segment E: East of Goreway Drive to East of Highway 427	
Cultural Communities (CUM1-1h, CUS1a, CUT1e and CUW1g)	4.81
Wetland Communities (MAS2)	0.05
Anthropogenically Influenced Lands (Agricultural and Manicured)	2.89
Subtotal East of Goreway Drive to East of Highway 427	7.75 ha
Segment F: East of Highway 427 to just East of Martin Grove Road	
Cultural Communities (CUM1-1h and i)	2.95
Anthropogenically Influenced Lands (Agricultural and Manicured)	0.84
Subtotal East of Highway 427 to just East of Martin Grove Road	3.79 ha
Segment G: Just East of Martin Grove Road to West of Islington Avenue	
Cultural Communities (CUM1-1i to k, CUT1g, CUW1c and e)	5.22

TABLE 6.3: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY RUNNINGWAY

TRANSITWAY SEGMENT	TOTAL AREA TO BE AFFECTED (HA)
Wetland Communities (MAM2c, SWD4-1 a and c)	0.16
Forest Communities (FOD6-5b, FOD7-3, FOM7)	0.12
Subtotal Just East of Martin Grove Road to West of Islington Avenue	5.50 ha
Segment H: West of Islington Avenue to Immediately East of Highway 400	
Cultural Communities (CUM1-1k and l)	5.78
Wetland Communities (MAM2d)	0.24
Anthropogenically Influenced Lands (Agricultural and Manicured)	2.80
Subtotal West of Islington Avenue to Immediately East of Highway 400	8.82 ha
Total Impacted Area (ha) for the Transitway Runningway	52.44 ha

Hurontario Street Station

Impacts to vegetation communities associated with the construction of the Hurontario Street Station will result in the removal of approximately 6.36 ha of cultural meadow (CUM1-1a), and agricultural lands. 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.

The impact to anthropogenically influenced lands, including the removal of a portion of agricultural lands, is considered to be minor.

Dixie Road Station

Impacts to vegetation communities associated with the construction of the Dixie Road Station will result in the removal of approximately 7.47 ha of vegetation communities, and agricultural and manicured lands. These communities include the removal of a portion of cultural meadow (CUM1-1c) and meadow marsh (MAM2b). 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 to the meadow marsh will result in the removal of a very small portion of the southern edge of this community, approximately 0.06 ha. This community has established along a tributary of Etobicoke Creek West Branch which bisects a large cultural meadow. The meadow marsh community is considered to be widespread and common in Ontario.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands and manicured areas. The impact to these lands is considered to be minor.

Airport Road Station

Impacts to vegetation communities associated with the construction of the Airport Road Station will result in the removal of approximately 6.47 ha of vegetation communities, and manicured lands. These communities include the removal of a portion of cultural meadow (CUM1-1g) and a small cultural thicket (CUT1c) that has established within the meadow community, west of Airport Road. Cultural communities typically persist in areas that are subject to regular disturbance. Consequently, impacts to the cultural communities are considered to be minor. Cultural vegetation communities are widespread and common throughout Ontario.

The impact to anthropogenically influenced lands, including the removal of a portion of manicured areas, is considered to be minor.

Goreway Drive Station

Impacts to vegetation communities associated with the construction of the Goreway Drive Station will result in the removal of approximately 6.52 ha of cultural meadow (CUM1-1g), agricultural lands 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.

The impact to anthropogenically influenced lands, including the removal of a portion of agricultural lands and manicured areas, is considered to be minor.

Highway 50 Station

Impacts to vegetation communities associated with the construction of the Highway 50 Station will result in the removal of approximately 6.60 ha of cultural meadow (CUM1-1h) 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.

The impact to anthropogenically influenced lands, including the removal of a portion of manicured areas, is considered to be minor.

Highway 27 Station

Impacts to vegetation communities associated with the construction of the Highway 27 Station will result in the removal of approximately 7.56 ha of cultural meadow (CUM1-1h), agricultural lands 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.

The impact to anthropogenically influenced lands, including the removal of a portion of agricultural lands and manicured areas, is considered to be minor.

Pine Valley Drive Station

Impacts to vegetation communities associated with the construction of the Pine Valley Drive Station will result in the removal of approximately 9.05 ha of cultural meadow (CUM1-1k). 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

TRANSITWAY SEGMENT	TOTAL AREA TO BE AFFECTED (HA)
Hurontario Street Station	
Cultural Communities (CUM1-1a)	2.93
Anthropogenically Influenced Lands (Agricultural)	3.43
Subtotal Hurontario Street Station	6.36 ha
Dixie Road Station	
Cultural Communities (CUM1-1c)	0.73
Wetland Communities (MAM2b)	0.06
Anthropogenically Influenced Lands (Agricultural and Manicured)	6.68
Subtotal Dixie Road Station	7.47 ha
Airport Road Station	
Cultural Communities (CUM1-1g and CUT1c)	5.98
Anthropogenically Influenced Lands (Manicured)	0.49
Subtotal Airport Road Station	6.47 ha
Goreway Drive Station	
Cultural Communities (CUM1-1g)	0.07
Anthropogenically Influenced Lands (Agricultural and Manicured)	6.45
Subtotal Goreway Drive Station	6.52 ha
Highway 50 Station	
Cultural Communities (CUM1-1h)	6.51
Anthropogenically Influenced Lands (Manicured)	0.09
Subtotal Highway 50 Station	6.60 ha
Highway 27 Station	
Cultural Communities (CUM1-1h)	4.64
Anthropogenically Influenced Lands (Agricultural and Manicured)	2.92
Subtotal Highway 27 Station	7.56 ha
Pine Valley Drive Station	
Cultural Communities (CUM1-1k)	9.05

TABLE 6.4: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY STATIONS

TRANSITWAY SEGMENT	TOTAL AREA TO BE AFFECTED (HA)
<i>Subtotal Pine Valley Drive Station</i>	<i>9.05 ha</i>
<i>Total Impacted Area (ha) for the Transitway Stations</i>	<i>50.03 ha</i>

Removal of Wetland and Forest Communities, Compensation and Planting Plans

Vegetation Community Offsets

The removal of wetland and forest communities should be offset/compensated through restoration, as well as through the enhancement of nearby vegetation communities, to the extent possible. A number of sites along the 407 Transitway facility will be protected for offsets/future environmental compensation (see Section 6.5 and Figures 3.2 a, b and c in Chapter 3 of the EPR for details). Restoration of suitable forest and/or wetland habitat should be undertaken in these protected sites, at a compensation ratio to be determined through further discussion with regulatory agencies (e.g., MNRF, TRCA), as part of implementing the project. As part of habitat restoration and/or enhancement, consideration for suitability should 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 to very small portions of primarily meadow marsh habitat. These wetlands are typically located along several watercourses that bisect 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 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. Additionally, edge management, which would include high-density plantings of robust, native wetland plant species, should be considered. Such 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 communities within the study area are only expected to be impacted along existing forest edges, which are already in a disturbed state. However, forest edge management should be implemented to enhance edges, and to try to mitigate the establishment of invasive species along the disturbed edges.

Where restoration on identified protected sites is undertaken 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.

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 in accordance with the TRCA *Forest Edge Management Plan Guidelines* (2004) is recommended at the forest communities, including deciduous and mixed forests and the deciduous swamp located within Segment G (see Table 6.3). 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:

- 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 should 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, should be considered.
- 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.

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

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. Forest edge, riparian and valleyland management shall take place where such 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 should include the following:

- where there are dense patches of common buckthorn, swallow-wort, common reed or garlic mustard, Russian or Autumn olive (*Elaeagnus angustifolia* and *E. umbellata*) the appropriate removal and control of these species by a qualified specialist should be undertaken. Swallow-wort is particularly invasive. This species establishes dense stands in meadow habitat but can also invade into forested sites displacing numerous native species. Common reed is also

particularly invasive, and as with swallow-wort, any emerging or established populations observed should 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 should 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 should be planted with a non-invasive annual cover crop for an interim period; and,
- no non-native and invasive ornamentals plants should 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 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 should 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 an ecological approach to restoration planting is developed, and that the planting of forest and wetland habitat is 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,
- 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.

Preliminary planting plans have not been provided for the station sites. Landscape planting plans will be considered and incorporated into the design as necessary at the station sites prior to implementation. Plantings shall be used within the station sites as part of implementation and shall include areas for canopy cover, pedestrian shading, and vegetative buffers through discussions with impacted agencies including municipalities.

Displacement of Rare, Threatened or Endangered Vegetation and Vegetation Communities

All of the vegetation communities identified within the study area are considered to be widespread and common in Ontario and secure globally. Historic records of butternut have been identified within the study area; however, neither butternut nor any other plant species at risk were identified during the plant surveys undertaken throughout the study area in 2016.

A total of 21 TRCA plant species of concern (L1 to L3) and species identified as rare in York and Peel Regions, were identified 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.

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 A West of Hurontario Street to East of Kennedy Road

Much of the habitat within this segment consists of cultural meadow or active agricultural lands. A small inclusion of meadow marsh/shallow marsh and several small seasonal watercourses are also present as well as a SWM pond. The natural heritage features potentially impacted by the 407 Transitway runningway consist entirely of disturbed wildlife habitat with low habitat capability. 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. There is also a fairly large buffer of similar habitats located between the proposed runningway and urban development.

Segment B: East of Kennedy Road to West of Tomken Road

The runningway in this segment will largely affect cultural meadow/thicket and agricultural habitat types. Industrial development and the Highway 410 interchange footprint further add to the disturbance in this segment. However, valleylands associated with Tributary of Etobicoke Creek West Branch (E3) provide higher quality natural heritage features and opportunity for wildlife movement across the local

landscape. As such, the wildlife and wildlife habitat associated with Tributary of Etobicoke Creek West Branch (E3) valleylands may be more sensitive to disturbance than the communities in other portions of this segment. 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 should be made to minimize impacts to habitats in the Tributary of Etobicoke Creek West Branch (E3) valleyland and to maintain opportunity for wildlife movement through this feature.

Segment C: West of Tomken Road to East of Torbram Road

The majority of the lands within this segment consist of cultural meadow and agricultural habitat types. Etobicoke Creek West Branch (E5) valleylands and natural features associated with Spring Creek (E8) provide higher quality natural heritage features and opportunity for wildlife movement across the local landscape. Other aquatic features include small seasonal watercourses, small marshes, and open aquatic habitats. A Barn Swallow nest colony was identified on a structure within the parkland located approximately 150 m north of the alignment east of Dixie Road. Barn Swallow is a regulated species which is afforded protection under the Ontario *Endangered Species Act, 2007*. No impacts to this structure will occur based on the current design. However, further surveys for species at risk, specifically Barn Swallow, should be conducted prior to construction to ensure that no species at risk are affected by the alignment in this segment. As with the previous sections, the wildlife assemblage encountered during field visits to this area is considered tolerant of human disturbance/anthropogenic influences. As such, limited negative effects are anticipated.

Segment D: East of Torbram Road to East of Goreway Drive

The relatively long section of runningway between these two stations consists mainly of cultural vegetation communities bordering agricultural lands. Two SWM ponds and a cultural thicket community associated with Mimico Creek (M7) are the most natural features within this segment. 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 should be made to minimize impacts to habitats in the Mimico Creek (M7) valleyland and to maintain opportunity for wildlife movement through this feature.

Segment E: East of Goreway Drive to East of Highway 427

The majority of the habitat in this segment consists largely of agricultural lands and cultural communities. The West Humber River (H1) valleyland contains a relatively diverse assemblage of wildlife. This feature 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. With the exception of the valleyland described above, 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 West Humber River (H1) valleyland, several habitat types will be impacted, but these removals will be along edges

previously disturbed by the creation of the 407 ETR corridor to the north and Steeles Avenue to the south. As such, limited negative effects are anticipated; however, efforts should be made to minimize impacts to habitats in the West Humber River (H1) valleyland and to maintain opportunity for wildlife movement through this natural heritage feature.

Segment F: East of Highway 427 to Just East of Martin Grove Road

Wildlife habitat in this segment consists almost entirely of cultural meadows, agricultural lands and manicured grass. This segment contains a very 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

Segment G: Just East of Martin Grove Road to West of Islington Avenue

Much of the land within this segment is comprised of natural area; in fact, this segment contains the largest intact natural area and is likely to be the highest quality wildlife habitat identified within the overall study area. Natural heritage features associated with the Lower Humber River (H7) and Rainbow Creek (H6) valleylands comprise a diverse assemblage of habitats for wildlife. These valleyland (H6 and H7) features are 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. Eastern Wood Pewee, a species listed 'Special Concern' under the Species at Risk in Ontario List, was identified in the vicinity of these designated natural areas during 2016 field investigations. Efforts should be made to avoid and/or minimize impacts to the natural areas described above. Implementation of mitigation measures such as forest edge management and vegetation community offset are recommended. Furthermore, opportunity for wildlife movement through these natural heritage features should be maintained.

Segment H: West of Islington Avenue to Immediately East of Highway 400

The majority of the habitat in this segment consists of agricultural/manicured lands, commercial/industrial lands, and cultural meadows. Aquatic features are restricted to small seasonal watercourses (tributary of the Lower Humber River), small marshes and open aquatic habitat, which are all generally highly disturbed and fragmented in nature. With the exception of the aquatic features, no significant effects on wildlife and wildlife habitat are expected. As such, limited negative effects are anticipated.

Hurontario Street Station

Construction of the Hurontario Street Station will result in the removal of a portion of an agricultural field and two cultural meadow communities. This station will also abut a SWM pond at its western limit. 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.

Dixie Road Station

Construction of the Dixie Road Station will result in the removal of a portion of an agricultural field, manicured grass (i.e. parkland), cultural meadow and a marsh community. The marsh community that will be impacted is small and highly disturbed. 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. As noted above, a Barn Swallow nest colony was identified on a structure within the parkland east of the station location. Barn Swallow is a regulated species which is afforded protection under the Ontario *Endangered Species Act, 2007*. No impacts to this structure will occur based on the current design. However, further surveys for species at risk should be conducted in the eastern portion of this station prior to construction to ensure that no species at risk are affected by the construction of this station.

Airport Road Station

Impacts associated with the construction of the Airport Road Station will occur to cultural meadow, cultural thicket, and manicured communities. 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.

Goreway Drive Station

The construction of the Goreway Drive Station will result in the removal of cultural meadow, agricultural lands and manicured (i.e. landscaped boulevard) areas. 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.

Highway 50 Station

The construction of the Highway 50 Station will result in the removal of cultural meadow and manicured lands. This station is situated immediately east of the West Humber River valleyland which provides important habitat for wildlife. However, the Highway 50 Station is largely fragmented from the West Humber River (H1) valleyland feature and the habitats present within the station location do not contribute to the natural heritage features found within the valleyland. 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.

Highway 27 Station

Impacts associated with the construction of the Highway 27 Station will occur to cultural meadow communities and agricultural and manicured land. 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.

Pine Valley Drive Station

Impacts associated with the construction of the Pine Valley Drive Station will occur to cultural meadow communities. 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.

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

A total of 14 wildlife species at risk have been recorded within the vicinity of the study area based on secondary source data (including Western Chorus Frog, Blanding's Turtle, Snapping Turtle, Northern Bobwhite, Common Nighthawk, Hooded Warbler, Chimney Swift, Eastern Wood Pewee, Bank Swallow, Barn Swallow, Wood Thrush, Eastern Meadowlark, Bobolink, and Monarch) and an additional two wildlife species at risk have been identified as having the potential to be found within the study area (including little brown myotis and northern myotis). Two species at risk were confirmed in the study area by LGL during 2016 field investigations including Barn Swallow and Eastern Wood Pewee. A brief review of each species' status, the results of field surveys carried out, and the potential impacts to the species at risk and their populations as a result of the 407 Transitway project is provided below.

Further correspondence shall take place with MNR 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 Barn Swallow and Eastern Wood Pewee, any potential impacts of the proposed work on these species, and any requirements for permitting under the Ontario ESA. Prior to construction, further field investigations should be undertaken as required for species at risk during the appropriate season using MNR protocols. Surveying for these species should be conducted to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.

Western Chorus Frog

The 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. Field investigations have concluded that Western Chorus Frog have the potential to be present within open aquatic habitat types across the study area including marshes, meadows (and other open-country environments) and swales. No Western Chorus Frogs were identified during field investigations; however, given the timing of amphibian surveys (May and June), Western Chorus Frog were likely to have already finished breeding and consequently were unlikely to be detected. As such, further field investigations in marshes, meadows (and other open-country environments) and swales, undertaken during the appropriate season, should 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.

Blanding's Turtle

The Blanding's Turtle is regulated as 'Threatened' under the ESA and the SARA. As previously noted, no Blanding's Turtles were identified during LGL's 2016 field investigations, and no habitat considered suitable to support this species was identified within the study area. As such, no further field investigations are required and no permitting is expected to be required to address Blanding's Turtle.

Snapping Turtle

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

Northern Bobwhite

Northern Bobwhite is listed and is regulated as 'Endangered' under the ESA and SARA. The Northern Bobwhite is now only known from a few scattered sites in extreme southwestern Ontario, namely Walpole Island (MNR 2015) and is not expected to live in or near the study area. No Northern Bobwhite were identified during LGL's 2016 field investigations. As such, no further field investigations are required and no permitting is expected to be required to address Northern Bobwhite.

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. 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. No Common Nighthawk were identified during LGL's 2016 field investigations. No permitting is anticipated as this species is not regulated under the ESA.

Hooded Warbler

Hooded Warbler is regulated as 'Threatened' under the SARA but has no designation under the ESA. The Hooded Warbler breeds in the undergrowth of forest interiors of mixed hardwoods. Field investigations in spring/early summer of 2016 identified marginally suitable habitat for this species, including several wooded areas identified across the study area; however, these wooded areas are likely too small and disturbed to support this species. No Hooded Warbler were identified during LGL's 2016 field investigations. No permitting is anticipated as this species is not regulated under the ESA.

Chimney Swift

Chimney Swift is listed and is regulated as 'Threatened' under the ESA and SARA. Field investigations have concluded that the study area provides marginally suitable habitat to support Chimney Swift, including anthropogenic areas and open habitats. However, the only suitable nesting habitat for this species would be associated with buildings (i.e. chimneys). No Chimney Swift were identified during field investigations. As such, further field investigations in anthropogenic habitat types (i.e. targeting potential chimney nesting habitat), undertaken during the appropriate season and using appropriate species-specific protocols for surveying for this species, should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.

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. Field investigations identified several Eastern Wood Pewee individuals which were restricted to wooded areas in the vicinity of the Rainbow Creek (H6) crossing. Encroachment into these areas as a result of the 407 Transitway and station construction may occur. However, it is likely that the individual birds observed are not dependent upon these specific foraging areas as many similar habitats exist in surrounding areas. As such, impacts to this species are expected to be minimal. 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. As previously noted, field investigations have concluded that marginally suitable Bank Swallow nesting habitat was identified, including eroded watercourse banks that were identified across the study area. No Bank Swallow were identified during field investigations. As such, further field investigations along eroded watercourse banks should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.

Barn Swallow

Barn Swallow is listed and is regulated as 'Threatened' under the ESA. Field investigations undertaken by LGL in late spring/early summer of 2016 identified foraging Barn Swallow at a number of sites across the study area. It is likely that the individual birds observed are not dependent upon these specific foraging areas as many similar habitats exist in surrounding areas. Two Barn Swallow nesting colonies were also identified within the study area, including nests on a structure in parkland east of Dixie Road and south of 407 ETR and an additional nesting colony under the 407 ETR bridge structure at the Lower Humber River (H7) crossing. The 407 Transitway runningway and stations do not currently encroach on either nesting structure. Further field investigations should be conducted prior to construction to confirm the breeding status of Barn Swallow, and, thus, the appropriate steps for protection and permitting.

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. Field investigations have concluded that Wood Thrush has the potential to be present within mature deciduous and mixed forest habitat communities identified within the study area. No Wood Thrush were identified during LGL's 2016 field investigations. No permitting is anticipated as this species is not regulated under the ESA.

Eastern Meadowlark and Bobolink

Eastern Meadowlark and Bobolink are listed and are regulated as 'Threatened' under the ESA. Field investigations have concluded that Eastern Meadowlark and Bobolink have the potential to be present within open-country, meadow and agricultural habitat types found across the study area. However, the aforementioned habitats identified during LGL's 2016 surveys typically did not consist of grass dominated vegetation as preferred by this species. No Eastern Meadowlark or Bobolink were identified during LGL's 2016 field investigations. As such, further field investigations in grass-dominated open-country habitat types, undertaken during the appropriate season using MNRF protocols for surveying for these species, should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.

Little Brown Myotis

Little brown myotis is listed and is regulated as 'Endangered' under the ESA and SARA. Field investigations have concluded that little brown myotis has the potential to be found across much of the study area, particularly around buildings and forest communities. However, no incidental observations of little brown myotis were recorded during LGL's 2016 field investigations; although no targeted surveys for this species were conducted. As such, further field investigations near buildings and forest communities, undertaken during the appropriate season using MNRF protocols for surveying for this species, should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.

Northern Myotis

Northern myotis is listed and is regulated as 'Endangered' under the ESA and SARA. Field investigations have concluded that northern myotis has the potential to be found within forest communities. However, no incidental observations of northern myotis were recorded during LGL's 2016 field investigations; although no targeted surveys for this species were conducted. As such, further field investigations in forest communities, undertaken during the appropriate season using MNRF protocols for surveying for this species, should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.

Monarch

Monarch is listed as 'Special Concern' under the ESA and SARA; however, this species is not a regulated species ('Endangered' or 'Threatened') under either act. Field investigations have concluded that Monarch has the potential to be present within open-country, meadow (including roadside vegetation) and agricultural habitat types identified across the study area. No incidental observations of Monarch were recorded during LGL's 2016 field investigations; although no targeted surveys for this species were conducted. No permitting is anticipated as this species is not regulated under the ESA.

Barrier Effects on Wildlife Passage

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.

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): Etobicoke Creek West Branch (E5), Mimico Creek (M7), West Humber River (H1), Rainbow Creek (H6), and the Lower Humber River (H7). 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: Fletchers Creek (C1), Etobicoke Creek (West Branch), Tributary of Spring Creek (E7), Spring Creek (E8), and Mimico Creek Albion Creek (H2). Lands in the vicinity of these structures comprise some of the highest quality natural heritage features within the vicinity of the study area and provide important north-south 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 should 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 should be 0.05 and the minimum OR for large animals should be 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 should be used to encourage wildlife to utilize crossing structures. Ground

cover should 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 animals groups can use the structures for passage. It should be noted that 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/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.

Wildlife Passage Considerations for Enhanced Functionality

The following wildlife passage considerations should 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 should 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) should occur. Shrubs should 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 identified above. Cover objects should 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 should 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 should be oriented lengthwise within the structure wall so as to not impede wildlife movement.

Substrate Materials within Wildlife Crossing Structures

Natural substrates should be used to encourage wildlife to utilize crossing structures. Ground cover should 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 should contain a mix of soil and small granular materials, matching what is found on lands surrounding the crossing structures (locally excavated soils is recommended).

DESIGNATED NATURAL AREAS

No Provincially Significant Wetlands (PSW) were identified within the study area. Two designated natural areas are present within Segment G, including the Woodbridge Cut ESA and the Woodbridge Pleistocene

Cut Earth Science ANSI. These two natural areas are located over 100 m to the south of the runningway, consequently, no impacts to these natural areas are expected.

Three watercourses located in the study area, including the Etobicoke Creek West Branch, West Humber River and Lower Humber River, are designated as 'Urban River Valleys' under the Greenbelt Plan (2017). The environmental protection/mitigation measures outlined in this chapter will help maintain/enhance the 'Urban River Valleys' and ensure that the policies of the Greenbelt Plan will be adhered to at these three 'Urban River Valleys' in order to support connections between the Natural Heritage System and the local, regional and broader natural heritage systems of southern Ontario.

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 6.5: 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	MONITORING AND RECOMMENDATION
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.	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.	Thirty-four 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, six of the thirty-four properties/areas will be directly impacted by the 407 Transitway. Four of these properties are moderate risk properties and two of these properties are high risk properties.	Fifteen of the thirty-four 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. Fifteen 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. Four 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. The four impacted moderate risk properties/areas will require subsurface investigations to determine presence/absence of impacts (i.e. limited subsurface environmental investigations). The two impacted high risk properties/areas will require subsurface environmental investigations (i.e. Phase II ESAs) 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.	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 subsequent, more detailed phases of work, additional assessment should be conducted and appropriate steps will be taken following MTO's Environmental Reference for Highway Design (2013).
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.	SWM measures include wet ponds at each station location, and enhanced swales in the form of dry ponds for transitway sub-areas. Minor creek realignment/regrading is expected within MTO property at the majority of the crossings to ensure flow is safely conveyed through the proposed structures. Wingwalls are proposed at the inlet of the culverts to improve inlet flow conditions. Additional capacity was incorporated in the drainage design to increase resiliency against potential for extreme weather events arising from climate change such as: <ul style="list-style-type: none"> ▪ Increased clearances at all crossings between the high-water level and the underside of bridges; ▪ Increased freeboard for most of the structures due to the high road elevations; and, ▪ Use of a more conservative design storm (Chicago 4-hr) model compared to TRCA's watershed criterion of 12hr AES. Incorporation of green roadways, permeable pavements, LID features and green technologies will be considered prior to construction.	N/A.

TABLE 6.5: 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	MONITORING AND RECOMMENDATION
Groundwater	<p>Potential alterations to groundwater resources (including groundwater regime and recharge/discharge) due to the construction of the Transitway facility.</p> <p>Potential for impacts to water wells.</p> <p>Potential need for de-watering.</p>	<p>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.</p> <p>The effect of the potential reduction in overall groundwater recharge is not expected to be significant.</p> <p>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.</p> <p>Properties in the study area are not expected to be dependent on groundwater wells for water supply as municipal water supplies are available to properties within the study area. The Transitway is not located in or near any well head protection areas or intake protection zones 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>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. However, the effectiveness of permeable pavements and low impact development infiltration techniques in areas west of the Humber River is expected to be limited due to local surface geology conditions. In the area of relatively coarse grained sandy soil, in the vicinity of the proposed Pine Valley Station, there is likely an opportunity to effectively implement permeable pavements or other low impact development infiltration techniques.</p> <p>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. However, 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.</p> <p>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.</p>	<p>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.</p> <p>The potential impacts to groundwater resources should be reassessed based on more detailed site specific hydrogeological data prior to construction of the project (if warranted). Further investigation/monitoring should be completed and appropriate mitigation measures should be incorporated into the design prior to construction, as required.</p> <p>The need for and effectiveness of implementing permeable pavements or other low impact development infiltration techniques (in particular in the vicinity of the Pine Valley Drive Station) will be reassessed prior to construction to reduce the groundwater recharge lost to impermeable surfaces.</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 should 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 20 watercourse crossings that support fish and fish habitat watercourses. "Serious Harm to Fish" could result as a result of the proposed works.</p> <p>Potential impacts to one watercourse feature (C1 – Tributary of Fletchers Creek located just west of the westerly study limits) identified by MNRF as</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 should be considered throughout design. See Section 6.3.1/ Table 6.8 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 Table 6.2 above for additional mitigation measures for each impacted watercourse.</p> <p>The crossings at watercourses E5, E6, E8, M7, H1, H6, H7 and H8 where clear span bridges are proposed and no works are expected to occur within the high water mark, meet MTO's <i>Best Management Practices Manual for Fisheries Clear Span Bridges</i> (MTO 2015) and are therefore "not likely to</p>	<p>Continue consultation with MNRF 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>

TABLE 6.5: 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	MONITORING AND RECOMMENDATION
		<p>contributing habitat for Redside Dace, which may be regulated under the Ontario ESA, 2007.</p>	<p>result in serious harm". Clear span bridge construction must meet all the operational constraints and protection measures in order to be in compliance with the MTO Fish Guide (MTO 2013). 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 (E1, E3, E4, E7, M1, M3, M4, M5, M6, M8, H2, H5), it was determined that there is "No Likelihood of Causing Serious Harm" provided all recommended mitigation measures are implemented. 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 for which retaining walls in the riparian area are proposed in addition to the new crossing structures (E7, H6), there is a "Likelihood of Causing Serious Harm", and a review from DFO will likely be required prior to construction. This is a conservative classification and the rationale for "Likelihood of Causing Serious Harm" includes the potential for loss of riparian vegetation, and altered flows during storm events.</p> <p>For the watercourse in which a channel realignment is proposed in addition to the new crossing structure (H2), there is a high "Likelihood of Causing Serious Harm", and a review from DFO will be required prior to construction. Regardless of realignment length, the rationale for "Likelihood of Causing Serious Harm" is due to the permanent alteration/infilling of a channel in which fish require to carry out life processes directly, or indirectly</p> <p>Field investigations in 2016 determined that C1 (Tributary of Fletchers Creek), identified by MNRF as contributing habitat for Redside Dace, does not provide fish habitat and is located west of the study limits so should not be impacted. However, if it is determined that C1 will be impacted as a result of the 407 Transitway, the work may affect the regulated habitat of Redside Dace and an Ontario ESA permit may be required prior to construction in consultation with the MNRF. A Canada SARA permit from DFO is not likely required as the habitat is "contributing" and not "occupied".</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 vegetation and vegetation communities.</p>	<p>Overall, there will be a loss of 102.47 ha of vegetation communities (including anthropogenically influenced lands such as agricultural and manicured land), which includes a loss of 52.44 ha due to the runningway, and a loss of 50.03 ha due to the stations. This will result in the removal of 0.12 ha of forest communities and 0.94 ha of wetland communities.</p> <p>Impacts to wetland communities within the study area will be to very small portions of primarily meadow marsh habitat.</p> <p>Impacts to forest communities only along already disturbed existing forest edges. Direct and indirect negative impacts along forest borders and within the forest interior associated with 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. Non-native and invasive plant species have the potential to become established.</p> <p>No impacts to plant species at risk are anticipated.</p> <p>Potential impacts to regionally rare plants.</p>	<p>The removal of wetland and forest communities should be offset/compensated through restoration, as well as through the enhancement of nearby vegetation communities, to the extent possible. A number of sites along the 407 Transitway facility will be protected for offsets/future environmental compensation.</p> <p>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. Additionally, wetland edge management should be considered to mitigate impacts related to invasive species establishment/encroachment further into wetlands, and to increase local diversity. Other mitigation measures include the removal of dumped garbage, and the treatment of invasive species such as common reed.</p> <p>Forest edge management should be implemented to enhance edges, and to mitigate the establishment of invasive species along the disturbed edges. Forest edge management in accordance with the TRCA <i>Forest Edge Management Plan Guidelines</i> (2004) is recommended at the forest communities, including deciduous and mixed forests and the deciduous swamp located within Segment G (see Table 6.3). 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"> ■ 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. ■ 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. 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. ■ Suitable tree protection fencing should be installed and regularly maintained along any newly exposed forest edges. ■ 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, should be considered. 	<p>A more detailed planting plan (including plantings at the station sites) should 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 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, TRCA), as part of implementing the</p>

TABLE 6.5: 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	MONITORING AND RECOMMENDATION
			<p>Forest edge, riparian and valleyland management shall take place where such management is recommended.</p> <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 should include the following:</p> <ul style="list-style-type: none"> ▪ 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 should be undertaken; ▪ minimize the exposure of bare soil, and where bare soil must persist over a period of time these should be planted with a non-invasive annual cover crop for an interim period; and, ▪ no non-native and invasive ornamentals plants should be used for landscaping. <p>Site-specific planting/landscape plans will be prepared prior to construction by an experienced landscape architect and will show the following:</p> <ul style="list-style-type: none"> ▪ 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; ▪ 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; and, ▪ plantings at the station sites including areas for canopy cover, pedestrian shading, and vegetative buffers through discussions with impacted agencies including municipalities. <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 protection.</p>	<p>project. Forest edge, riparian and valleyland management shall take place where such management is recommended.</p>
Wildlife and Wildlife Habitat	<p>Displacement of wildlife and wildlife habitat.</p> <p>Displacement of rare, threatened or endangered wildlife or significant wildlife habitat.</p> <p>Barrier effects on wildlife passage.</p> <p>Wildlife/vehicle conflicts.</p>	<p>Displacement of wildlife and wildlife habitat as a result of the 407 Transitway runningway and stations.</p> <p>A total of 14 wildlife species at risk have been recorded within the vicinity of the study area based on secondary source data (including Western Chorus Frog, Blanding’s Turtle, Snapping Turtle, Northern Bobwhite, Common Nighthawk, Hooded Warbler, Chimney Swift, Eastern Wood Pewee, Bank Swallow, Barn Swallow, Wood Thrush, Eastern Meadowlark, Bobolink, and Monarch) and an additional two wildlife species at risk have been identified as having the potential to be found within the study area (including little brown myotis and northern myotis). Two species at risk were confirmed in the study area by LGL during 2016 field investigations including Barn Swallow and Eastern Wood Pewee.</p> <p>The 407 Transitway has the potential to result in new barriers to wildlife passage and in wildlife/vehicle conflicts.</p>	<p>Efforts should 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> <p>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, should 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.</p> <p>Further field investigations for the Chimney Swift in anthropogenic habitat types (i.e. targeting potential chimney nesting habitat), undertaken during the appropriate season and using appropriate species-specific protocols for surveying for this species, should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</p> <p>Further field investigations for the Bank Swallow along eroded watercourse banks should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</p> <p>Further field investigations for the Barn Swallow should be conducted prior to construction to confirm the breeding status of Barn Swallow, and, thus, the appropriate steps for protection and permitting.</p> <p>Further field investigations for Eastern Meadowlark and Bobolink in grass-dominated open-country habitat types, undertaken during the appropriate season using MNRF protocols for surveying for these species, should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</p> <p>Further field investigations for Myotis/Tri-coloured Bats near buildings and forest communities, undertaken during the appropriate season using MNRF protocols for surveying for these species, should be conducted prior to construction to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</p> <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.</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 Barn Swallow and Eastern Wood Pewee, any potential impacts of the proposed work on species at risk, and any requirements for permitting under the Ontario ESA. Prior to construction, further field investigations should be undertaken as required for species at risk during the appropriate season using MNRF protocols. Surveying for these species should be conducted to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.</p> <p>As part of project implementation, once structure sizes are confirmed, the Openness Ratio should be calculated for each of the new structures to</p>

TABLE 6.5: 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	MONITORING AND RECOMMENDATION
			<p>As part of project implementation, once structure sizes are confirmed, 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 should 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 should be 0.05 and the minimum OR for large animals should be 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 should be used to encourage wildlife to utilize crossing structures. Ground cover should 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 should be implemented to enhance the functionality of crossing structures including:</p> <ul style="list-style-type: none"> ▪ plantings at wildlife crossing structures; ▪ 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; and, ▪ providing substrate materials within wildlife crossing structures. 	<p>determine whether target animals groups can use the structures for passage.</p> <p>As part of project implementation, wildlife passage considerations will be reviewed, as required.</p>
Designated Natural Areas	Impacts to designated natural areas in the vicinity of the study area.	<p>Two designated natural areas are present within Segment G (east of Martin Grove Road), including the Woodbridge Cut ESA and the Woodbridge Pleistocene Cut Earth Science ANSI.</p> <p>Three watercourses located in the study area, including the Etobicoke Creek West Branch, West Humber River and Lower Humber River, are designated as 'Urban River Valleys' under the Greenbelt Plan (2017) and will be affected by the 407 Transitway.</p>	<p>The Woodbridge Cut ESA and the Woodbridge Pleistocene Cut Earth Science ANSI are located over 100 m to the south of the runningway and, as a result, no impacts to these designated natural areas are expected.</p> <p>The environmental protection/mitigation measures outlined under Fish and Fish Habitat and Vegetation and Vegetation Communities in this table will help maintain/enhance the three 'Urban River Valleys' and ensure that the policies of the Greenbelt Plan will be adhered to at these three 'Urban River Valleys' in order 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 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.
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. Four cultural heritage landscapes and four built heritage resources will be affected by the construction of the 407 Transitway. Resource-specific Cultural Heritage Evaluation Reports (CHERs) were prepared as part of the TPAP for these eight cultural heritage resources to determine the heritage integrity of each resource. Based on the results of the eight CHERs, it was determined that no Heritage Impact Assessments were required for any of these eight cultural heritage resources as they do not retain significant heritage value. Further archaeological investigations will be needed at some locations within the footprint of the 407 Transitway prior to construction. Refer to **Table 6.6** 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 Brampton Official Plan, City of Mississauga Official Plan, City of Vaughan Official Plan, and City of Toronto 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/Ministry of 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.

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.

The existing and planned land uses and the preferred Transitway facility footprint are presented in **Figures 3.3 and 3.4 in Chapter 3 of the EPR.**

Segment A: West of Hurontario Street to East of Kennedy Road Runningway

This section of the runningway 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, which was approved under Amendment 147 'Highway 407 Inter-Urban Transitway, Mississauga to Markham' (January 2000). The runningway alignment was shifted south at Hurontario Street to accommodate the shift in the location of the Hurontario Street Station.

The runningway will cross the Tributary of Etobicoke Creek West Branch (E1) and is designated in the City of Brampton Official Plan as 'Open Space' (0.70 ha) and 'Provincial Highways' (4.11 ha). The 407 Transitway is compatible with the 'Provincial Highways' land use designation. Since the impact assessment was conducted assuming an approximately 30 m wide right-of-way, the impact to 'Open Space' may be smaller than 0.70 ha.

The City of Mississauga Official Plan designates the lands just south of the Parkway Belt West Plan area as 'Office', 'Intensification Corridor', and 'Business Employment'. The shift in the alignment of the runningway will result in the displacement of 0.40 ha of 'Intensification Corridor', and 0.24 ha of 'Office' (these land uses overlap). This area is required to provide adequate parking within the station footprint and to provide an access road to connect the station to Derrycrest Drive south of the station. The location of a Transitway station along the 407 ETR corridor and surrounded by office uses is consistent with the goals and objectives of the Growth Plan and Official Plan for the City of Mississauga, to provide transit to support movement between places of work and residence.

A golf range and mini putt facility is located at the south east quadrant of 407 ETR and Hurontario Street on Provincially owned land. The site is being leased on a temporary basis from the Province. The runningway crosses the lands that are being used for the driving range.

The runningway will be located adjacent to existing land uses/businesses to the south near Topflight Drive and Edwards Boulevard (east of Hurontario Street), and the runningway alignment will directly impact one business as well as the parking lots in this area. The runningway bisects the GO bus station and car pool lot located north of Topflight Drive, however, these facilities will be relocated to and integrated with the Hurontario Transitway Station. Also impacted is one Provincially owned property on Kennedy Road just south of 407 ETR. A maintenance facility for the Hurontario LRT Station (discussed below) is planned just west of Kennedy Road with a planned access road from the Hurontario Street. The Transitway has been designed to avoid the maintenance facility.

Hurontario Street Station

The Hurontario Street Station is proposed within the Parkway Belt West Plan area, in an area designated as 'Inter-urban Transit' and 'Electric Power Facility'. The station location is compatible with these land use designations; however, an amendment to the Parkway Belt West Plan may be required. The original station location east of Hurontario Street (Parkway Belt West Plan Amendment 147) was shifted west of Hurontario Street. The station was relocated to optimize transfer connectivity to the Hurontario LRT facility and to minimize traffic issues associated with accessing the Hurontario Street Transitway Station.

The Hurontario Street Station footprint within the City of Brampton is designated as ‘Provincial Highways’ in the City of Brampton Official Plan. The station is compatible with this land use designation.

A small area at the south end of the station, located north of Vicksburgh Drive, is located outside of the Parkway Belt West Plan area on private property and is designated as ‘Business Employment’ (0.62 ha), ‘Office’ (1.38 ha), ‘Intensification Corridor’ (1.65 ha) and ‘Utility’ (0.11 ha) in the City of Mississauga Official Plan. The portion of the Hurontario Street Station that extends beyond the Parkway Belt West Plan area is consistent with the intent of this ‘Intensification Corridor’. The location of the Transitway will offer transit service to future office facilities in this area. Also, there is a planned ‘Light Rail Transit Station and north-south ‘Higher Order Transit Corridor’ south of this station. This Light Rail Transit Station is the Hurontario LRT (HuLRT) station, which will be located on Hurontario Street at Vicksburgh Drive/Topflight Drive. A HuLRT maintenance facility is planned further east, near Kennedy Road with planned access roads from both Hurontario Street and Kennedy Road. The Hurontario Street Station location is in close proximity to the HuLRT Station and would allow for transit users to transfer between the 407 Transitway and regional and local transit services. Given the proximity of the station to the hydro corridor, the design of this station will also need to conform to required clearances from hydro towers and lines.

Segment B: East of Kennedy Road to West of Tomken Road Runningway

The runningway through this section is located within the Parkway Belt West Plan area and is designated as ‘Inter-Urban Transit’. In the City of Brampton Official Plan, this section is designated as ‘Provincial Highways’ and ‘Open Space’. The runningway will cross 1.15 ha of ‘Open Space’ and 5.67 ha of ‘Provincial Highways’. The Transitway is compatible with these land use designations.

There is one residential farm located on Farmhouse Court between Highway 410 and Tomken Road. The runningway will be located at the north side of this property, avoiding direct impacts to the heritage aspects of this property (i.e. well ruin/tower). See further information on this farmhouse under Built Heritage Resources and Cultural Heritage Landscapes (CHL 5) below.

The Etobicoke Creek West Branch (E5) is designated as an ‘Urban River Valley’ in the Greenbelt Plan. The location of the crossing along the Etobicoke Creek West Branch is close in proximity to the 407 ETR, keeping the crossing close to an already disturbed highway corridor. A three span bridge is proposed at this location to ensure no impacts within the bankfull channel and to minimize overall impacts to the watercourse at this location. The runningway generally follows the original footprint identified as part of the Corridor Protection Study (1998) and adheres to the land use designations in the Parkway Belt West Plan. Design refinements at the crossing at the Etobicoke Creek West Branch will be completed prior to construction and will address the policies of the Greenbelt Plan (see **Section 3.2.1**). The following will be 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 Etobicoke Creek West Branch valley as a corridor for wildlife habitat and movement.

A potential 407 Transitway station at Tomken Road was originally identified/protected as part of the Corridor Protection Study (1998); however, it was determined that this station would not be included in the 407 Transitway because it does not provide an adequate transit or road network connection. To

provide transit connectivity from the redevelopment of the Powerade Centre site to the 407 Transitway, a potential interlining concept connecting the 407 Transitway with Kennedy Road is being proposed. The City of Brampton designates these lands as “Provincial Highways”.

Segment C: West of Tomken Road to East of Torbram Road Runningway

The runningway within this section is located within the Parkway Belt West Plan area and is part of the ‘Public Use Area’ which includes ‘Inter-Urban Transit’, ‘Electric Power Facility’, ‘Road’ and ‘Utility’ designations. The majority of the runningway follows the ‘Inter-urban Transit’ designation, which was approved under Amendment 147 ‘Highway 407 Inter-Urban Transitway, Mississauga to Markham’ (January 2000).

The City of Brampton Official Plan designates the study area as ‘Provincial Highways’ and ‘Open Space’. The runningway will cross 2.99 ha of ‘Open Space’ and 9.45 ha of ‘Provincial Highways’. The Transitway is compatible with these land use designations.

Existing land uses along the runningway include one property/business and a Hydro One transformer station located east of Tomken Road, Dixie Highway 407 Park and Soccer and Cricket Fields (just east of Dixie Road), a waste facility and Bramalea transformer station (just west of Bramalea Road), an industrial business facility just east of Bramalea Road, and CN/GO railway lines (west of Torbram Road). This section also contains the hydro corridor, utility corridor and six watercourses.

East of Tomken Road

The runningway alignment shifts northward close to the 407 ETR to minimize impacts to the Etobicoke Creek West Branch and associated terrestrial habitat, and then continues south to the Dixie Road Station. As the runningway continues south, it bisects the one business located east of Tomken Road which includes outside storage of trailers, landscaping supplies, machinery, trucks and parking. This property is leased from the Province on a temporary basis. This alignment is the same as the originally approved Transitway under Amendment 147 ‘Highway 407 Inter-Urban Transitway, Mississauga to Markham’ (January 2000) to the Parkway Belt West Plan. This alignment is the only feasible option to allow adequate services to the Dixie Road Station facility.

East of Dixie Road

The runningway crosses Dixie Road at the southern end of the Dixie Highway 407 Park. The Dixie Road Station displaces a portion of the sports fields at this site, which is discussed further below. The runningway alignment connects to the new station location.

West of Bramalea Road

The runningway shifts south to avoid an energy from waste facility and is located north of a transformer station. The location of the runningway is compatible with the Parkway Belt West Plan.

East of Bramalea Road

There is an industrial building facility located east of Bramalea Road used by a number of businesses. The lands for this facility were removed from the Parkway Belt West Plan area, through Amendment 112. The runningway and the interlining connection at Bramalea Road that will connect to the GO Station north of 407 ETR will impact some land that is used for temporary parking/storage at the back of this industrial facility. Further assessment of the impacts to this existing land use will be conducted prior to construction. Efforts will be made to minimize impacts to this land use to the extent feasible. The runningway will create a new crossing of the CN/GO rail line, just south of 407 ETR. An agreement will be required with the Canadian National Railway and/or GO Transit to plan and build a grade separated crossing at the railway crossing. CN Railway confirmed, during a project meeting, that there can be no impact to CN operations during construction.

A potential 407 Transitway station at Torbram Road was originally identified/protected as part of the Corridor Protection Study (1998); however, it was determined that this station would not be included in the 407 Transitway due to isolation from nearby major roads, poor pedestrian access, and limited development.

Dixie Road Station

The Dixie Road Station is located within the Parkway Belt West Plan area, and is designated as 'Inter-Urban Transit', 'Electric Power Facility' and 'Utility'. The City of Brampton Official Plan designates the study area as 'Provincial Highways' and 'Open Space'. The station footprint impacts 2.06 ha of 'Provincial Highways' and 6.02 ha of 'Open Space'. The station is compatible with these land use designations.

The Dixie Road Station was originally proposed on the north side of the runningway at Dixie Road on Provincially owned property. However, based on consultation with the City of Brampton, it was determined that this option would remove a significant portion of the soccer and cricket fields located on Provincial lands currently leased by the City for the Dixie Highway 407 Park. The recommended Dixie Road Station includes lands on both the north and south sides of the runningway, with a footprint of 5.8 ha within the Dixie Highway 407 Park. This design will avoid significant impacts to the recreational facilities. Impacts to one large soccer field and two smaller soccer fields will be avoided. Given the proximity of the station to the hydro corridor south of the sports field park, the design of this station will also need to conform to required clearances from hydro towers and lines.

Interlining Connection – Major Transit Node/GO Rail Station

An interlining configuration is proposed at Bramalea Road to provide an additional access point for transit to connect to the Bramalea GO Station north of 407 ETR. The interlining configuration connects the runningway to Bramalea Road, for traffic to continue further north of Bramalea Road to the GO Station. The City of Brampton designates these lands as 'Provincial Highways' and the Parkway Belt West Plan designates these lands as 'Inter-Urban Transit' and 'Road'. The roadway required for the interlining configuration would require some lands abutting the industrial building located just east of Bramalea Road, which will impact the existing temporary parking/storage area.

Segment D: East of Torbram Road to East of Goreway Drive Runningway

The runningway within this section is located within the Parkway Belt West Plan and is designated as 'Inter-Urban Transit'. The runningway is consistent with the land use designations for this area.

The City of Brampton designates these lands as 'Provincial Highways', 'Open Space', and 'Business Corridor'. The runningway impacts 5.83 ha of 'Provincial Highways', 1.36 ha of 'Open Space', and 0.44 ha of 'Business Corridor' (part of the Pearson Convention Centre site). The Transitway is compatible with these land uses, subject to the results of the assessment of impacts on the natural heritage system (including impacts to three Tributaries of Mimico Creek (M4, M5 and M6) and Mimico Creek (M7)) (see **Section 6.2.1**).

The runningway crosses four watercourses (including Mimico Creek), one CN/GO rail line (between Airport Road and Goreway Drive), crosses through open fields (associated with some private property) and agricultural fields, and does not impact any other existing land uses. The runningway lies just north of and avoids an industrial facility with a number of businesses located east of Airport Road, although the open fields associated with these private properties will be impacted. Efforts will be made to minimize impacts to these properties to the extent feasible. An agreement will be required with the Canadian National Railway and/or GO Transit to plan and build a grade separated crossing at the railway corridor. CN Railway confirmed, during a project meeting, that there can be no impact to CN operations during construction. Since the runningway crosses the hydro corridor west of Goreway Drive, the design of the runningway will need to conform to required clearances from hydro towers and lines.

Airport Road Station

The Airport Road Station will be located on the west side of Airport Road on lands designated as 'Inter-Urban Transit' and 'lands removed from the plan area' under Amendment 101 including the Pearson Convention Centre west of Airport Road. In the City of Brampton Official Plan, it is designated as 'Provincial Highways'. It is located on Steeles Avenue, which is identified as an 'Other Rapid Transit Corridor'. The footprint of the station consists of approximately 6.71 ha of 'Provincial Highways'. The station is compatible with the 'Provincial Highways' designation. No impacts to the Pearson Convention Centre located just west of the proposed station are expected.

The station footprint extends across the utility corridor and into the hydro corridor south of Steeles Avenue. Given the proximity of the station to the hydro corridor, the design of this station will need to conform to required clearances from hydro towers and lines. The station is located directly adjacent to (and east of) the Pearson Convention Centre and Hilton Garden Inn. A shared site access agreement is in place for the Transitway and convention centre.

Goreway Drive Station

The Goreway Drive Station will be located on the west side of Goreway Drive on the north side of Steeles Avenue and is approximately 6.52 ha. It is designated as 'Inter-Urban Transit' in the Parkway Belt West Plan and 'Provincial Highways' (6.52 ha) in the City of Brampton Official Plan. Steeles Avenue is identified

as an 'Other Rapid Transit Corridor'. There are no existing land uses that would be impacted on the site. However, Provincially owned property will be impacted on the site. There is a hydro corridor adjacent to the station location, and there are existing land uses south of Steeles Avenue. The existing land uses include industrial facilities located west of Goreway Drive, south of Steeles Avenue, and businesses located east of Goreway Drive. However, these land uses will not be directly impacted by the 407 Transitway.

Segment E: East of Goreway Drive to East of Highway 427 Runningway

The runningway within this section is located within the Parkway Belt West Plan and is designated as 'Inter-Urban Transit'. The City of Brampton designates these lands as 'Provincial Highways' (6.09 ha) and 'Open Space' (1.11 ha). The City of Vaughan designates these lands as 'Parkway Belt West Plan' (1.36 ha). The Transitway is compatible with these land use designations. The runningway follows the same alignment as approved under Amendment 147 'Highway 407 Inter-Urban Transitway, Mississauga to Markham' (January 2000).

East of Goreway Drive the runningway crosses Provincially owned land and a vacant private property adjacent to the rear lot line.

The runningway crosses two watercourses (including the West Humber River west of Highway 50) and crosses through open fields and agricultural fields and some private properties west of Gorewood Drive.

The West Humber River is designated as an 'Urban River Valley' in the Greenbelt Plan 2017. The location of the West Humber River crossing is in close proximity to the 407 ETR, keeping the crossing close to an already disturbed highway corridor. The location of the runningway avoids impacting land uses to the south, and ensures that the runningway connects the Goreway Drive and Highway 50 Stations efficiently. A two span bridge is proposed at this location to ensure no impacts within the bankfull channel and to minimize overall impacts to the watercourse at this location. In addition, the runningway generally follows the original footprint identified as part of the Corridor Protection Study (1998) and adheres to the designations in the Parkway Belt West Plan. Design refinements at the crossing at the West Humber River will be completed prior to construction and will address the policies of the Greenbelt Plan. The following will be 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 West Humber River valley as a corridor for wildlife habitat and movement.

Highway 50 Station

The Highway 50 Station will be located on the east side of Highway 50 and on both sides of Steeles Avenue. It is designated as 'Inter-Urban Transit', and 'lands removed from the Parkway Belt West Plan', Amendment 71 in the Parkway Belt West Plan. The City of Vaughan designates the Station as 'Parkway Belt West Plan' (3.87 ha) and the City of Toronto designates the Station as 'Employment Areas' (3.15 ha).

The general footprint of the Highway 50 Station site was identified/protected as part of the 427 Transitway Environmental Assessment. In the 427 Transitway Transportation Environmental Study Report (2015), the Highway 50 Station was referred to as the 427/407 Transitway station site. The updates made to the footprint and station layout as part of the TPAP are included in **Chapter 5**.

There are no existing land uses that would be impacted on the north side of Steeles Avenue. The existing land uses south of Steeles Avenue, in the City of Toronto, include residential dwellings, industrial, and business buildings and two religious facilities. The project team has reviewed alternative designs for this station; however, this area in the City of Toronto is needed for the station given the site constraints and parking requirements. As noted above, the Highway 50 Station will connect with the future 427 Transitway (extending to the north) and potential transit service on Highway 427, as well as local transit. However, this station design will result in the requirement for private properties south of Steeles Avenue. There are contamination issues and potential cultural and built heritage resources within the lands south of Steeles Avenue, which are presented below under Built Heritage Resources and Cultural Heritage Landscapes and in **Section 6.2.1** (Contaminated Property and Waste).

Segment F: East of Highway 427 to East of Martin Grove Road Runningway

The runningway within this section is located within the Parkway Belt West Plan area, and is designated as 'Inter-Urban Transit', 'General Complementary Use Area', and 'Road'. The majority of the runningway follows the 'Inter-urban Transit' designation, which was approved under Amendment 147 'Highway 407 Inter-Urban Transitway, Mississauga to Markham' (January 2000). There is a slight northerly shift in alignment of the runningway as it crosses Highway 427 to connect the Highway 50 Station and Highway 27 Station in an efficient way. The City of Vaughan Official Plan designates the runningway as 'Parkway Belt West Plan' (2.31 ha). One business is located just east of Highway 427 on Provincial land. The parking/storage lot of this facility will be impacted by the runningway. The runningway also impacts vacant land associated with one private property located just east of Highway 27. The runningway lies just north of and avoids one business located further east of Highway 27.

A potential 407 Transitway station at Martin Grove Road was originally identified/protected as part of the Corridor Protection Study (1998); however, it was determined that this station would not be included in the 407 Transitway due to significant accessibility issues to the local road network.

Highway 27 Station

The Highway 27 Station will be located on the west side of Highway 27 on the north side of Steeles Avenue. The Highway 27 Station is designated as 'Inter-Urban Transit' in the Parkway Belt West Plan and 'Parkway Belt West Plan' (6.79 ha) in the City of Vaughan Official Plan. There are Provincial lands west of Highway 27 that are leased for agricultural and other temporary uses that will be displaced by the station. The leases will need to be terminated when the station is constructed. The easterly limits of the parking area of the business located east of Highway 427 will be avoided by the station. There are existing businesses south of Steeles Avenue, and on the south-east quadrant of the intersection, as well as a worship centre. A new development is under construction in the northeast quadrant. Any indirect

impacts to these land uses will be assessed prior to construction based on the current conditions at that time.

Segment G: East of Martin Grove Road to West of Islington Avenue Runningway

The runningway within this section is located within the Parkway Belt West Plan area, and is designated as 'Inter-Urban Transit' and 'Road'. The City of Vaughan designates the runningway as 'Parkway Belt West Plan' (6.44 ha) and 'Parks' (0.02 ha). The impacts to the 'Parks' land use designations are edge impacts and are not considered significant. The runningway is located adjacent to the 407 ETR to minimize impacts to natural heritage features to the extent possible (including two Tributaries of Rainbow Creek (H4 and H5), Rainbow Creek (H6), and the Lower Humber River (H7)) and to avoid the Woodbridge Pleistocene Cut Area of Natural and Scientific Interest (ANSI) and Woodbridge Cut Environmentally Significant Area (ESA).

The Lower Humber River is designated as an 'Urban River Valley' in the Greenbelt Plan 2017. The location of the crossing along the Lower Humber River is close in proximity to the 407 ETR, keeping the crossing close to an already disturbed highway corridor. The location of the runningway was shifted north (from the original footprint identified as part of the Corridor Protection Study (1998)) in order to avoid impacting the ANSI and ESA to the south and to minimize impacts to the high quality forest and wetland communities at this location. The runningway connects the Highway 27 and Pine Valley Drive Stations efficiently. A three span bridge is proposed at this location to ensure no impacts within the bankfull channel and to minimize overall impacts to the watercourse at this location. Design refinements at the crossing at the Lower Humber River will be completed prior to construction and will address the policies of the Greenbelt Plan. The following will be 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 Lower Humber River valley as a corridor for wildlife habitat and movement.

A crossing of the Canadian Pacific Railway/GO Transit line will be required just west of Islington Avenue. A future GO Station is planned at this location. An agreement will be required with the Canadian Pacific Railway and GO Transit to plan and build a grade separated crossing at the railway crossing.

Segment H: West of Islington Avenue to immediately East of Highway 400 Runningway

The runningway within this section is located within the Parkway Belt West Plan area, and is designated as 'Inter-Urban Transit', 'Electric Power Facility' and 'Utility'. The majority of the runningway follows the 'Inter-urban Transit' designation, which was approved under Amendment 147 'Highway 407 Inter-Urban Transitway, Mississauga to Markham' (January 2000). The alignment of the runningway continues along the north edge of the hydro corridor east of Pine Valley Drive for approximately 400 m, and then continues south along the south edge of the hydro corridor until immediately east of Highway 400, where it continues in a northeast direction. The runningway is designated as 'Infrastructure and Utilities' (3.37 ha) 'Parkway Belt West Plan' (8.33 ha), 'General Employment' (0.18 ha), and 'Prestige Employment'

(0.12 ha) in the City of Vaughan Official Plan. The 407 Transitway is compatible with these land use designations.

The runningway crosses a private driveway (Galcat Drive) and lies at the south limits of a business located east of Pine Valley Drive. The runningway then runs just south of and avoids another business located west of Highway 400, but will require conveyance of vacant private property. Any impacts to these land uses will be assessed prior to construction based on the current conditions at that time. Given that the runningway crosses the hydro corridor, the design of the runningway will need to conform to required clearances from hydro towers and lines.

A potential 407 Transitway station at Weston Road was originally identified/protected as part of the Corridor Protection Study (1998); however, it was determined that this station would not be included in the 407 Transitway due to limited demand (due to Spadina Subway at Jane Street and VIVA service on Highway 7), poor access to and from 407 ETR, limited space for platforms due to site constraints, and no off-street bus loop opportunity.

Pine Valley Drive Station

The Pine Valley Drive Station will be located between Islington Avenue and Pine Valley Drive (excluding the hydro corridor and utility corridor lands). It is designated as 'Inter-Urban Transit' in the Parkway Belt West Plan. In the City of Vaughan Official Plan, the majority of the station lands are designated as 'Parkway Belt West Plan' (8.76 ha), with the remaining lands designated as 'Infrastructure and Utilities' (0.09 ha) and 'Natural Areas' (0.21 ha). The 407 Transitway is compatible with these land use designations.

The Pine Valley Drive Station site contains vacant fields classified as cultural meadow and is bordered by the Canadian National Railway on the south side. There are existing businesses located directly south of the station site and the railway. Any indirect impacts to these land uses will be assessed prior to construction based on the current conditions at that time.

Greenbelt Plan

Three watercourses designated as 'Urban River Valleys' under the Greenbelt Plan (2017) are located within the study area including the Etobicoke Creek West Branch, West Humber River and Lower Humber River. Appropriate environmental protection/mitigation measures have been included to ensure that the policies of the Greenbelt Plan (2017) will be met (see **Section 6.2.1**).

NOISE AND VIBRATION

Footprint impacts regarding noise and vibration do not apply.

BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES

A Cultural Heritage Resource Assessment (CHRA) was carried out as part of the TPAP to identify built heritage resources and cultural heritage landscapes located in and adjacent to the study area, and to determine any impacts to these resources. The study area has a rural land use history dating back to the

early nineteenth century, with major roadways, railways, and important natural watercourses connecting various settlements in the area, and retains a number of nineteenth and twentieth-century cultural heritage resources. Thirty-eight cultural heritage resources were identified within/adjacent to the study area including 23 Built Heritage Resources (BHRs) and 15 Cultural Heritage Landscapes (CHLs). These resources include four farmscapes, 15 residences, one remnant farmscape, one historic settlement area, four cemeteries, four bridges, one watercourse, one church, one commercial building, two industrial buildings, three recreational properties and one railscape (see **Appendix G** for further details). Of these resources, 18 are designated, listed or registered by a municipality or other agency. The remnant farmscape (CHL 2) is a formerly-listed property, however it has been confirmed as demolished. One of the residences (BHR 1) is listed on the municipal register but has been approved for demolition.

To assess the potential impacts of the 407 Transitway on cultural heritage resources, the identified cultural heritage resources were considered against a range of possible impacts as outlined in the document entitled *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* (MTC November 2010). These impacts may include displacement through removal or demolition and/or disruption by the introduction of physical, visual, audible or atmospheric elements that are not in keeping with the character of the cultural heritage resources and/or their setting. A number of other factors are also considered when evaluating potential impacts on identified cultural heritage resources, all outlined in the *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (MTCS and MECP October 1992). In total, eight of the 38 cultural heritage resources are expected to be impacted by the 407 Transitway through demolition or alteration to their setting. As a result of the proposed impacts to these eight BHRs/CHLs, resource-specific Cultural Heritage Evaluation Reports (CHERs) were prepared as part of the TPAP for these eight cultural heritage resources to determine the heritage integrity of each resource (see **Appendix H**). Based on the results of the eight CHERs, it was determined that no Heritage Impact Assessments were required for any of these eight cultural heritage resources as they do not retain significant heritage value. The CHERs were submitted to the Ministry of Tourism, Culture and Sport and the applicable municipalities (City of Brampton, City of Vaughan, and City of Toronto)/agencies (Infrastructure Ontario) for archival purposes.

The eight impacted cultural heritage resources as well as the footprint impacts and proposed mitigation measures are as follows. See **Appendix H** for further details regarding the CHERs completed for each of the eight impacted cultural heritage resources. See **Section 6.3.2** for construction impacts and proposed mitigation measures.

BHR 15, 17, 19 and 21

BHR 15 (2158 Codlin Crescent), BHR 17 (2150 Codlin Crescent), BHR 19 (2140 Codlin Crescent), and BHR 21 (2128 Codlin Crescent) (all residential properties on Codlin Crescent, Toronto - identified during field review): alterations to these BHRs as a result of the Highway 50 station include the removal of the residences and the excavation, grading and removal of landscape features. In addition, these BHRs are located within CHL 15, the Historic Settlement of Claireville (identified for demolition and alteration). The

CHERs determined that none of these four BHRs retain any cultural heritage significance from a local or provincial perspective.

CHL 1

CHL 1 (Waterscape, Humber River – designated a Canadian Heritage River as part of the Canadian Heritage Rivers System): the runningway will cross over this watercourse and may impact the natural and cultural heritage elements of the watercourse at the crossing west of Islington Avenue. The CHER determined that CHL 1 does not retain any cultural heritage significance from a local or provincial perspective. For mitigation measures during construction see **Section 6.3.2**.

CHL 5

CHL 5 (Farmscape, 7385 Farmhouse Court/Tomken Road, Brampton - Listed, City of Brampton): the runningway will impact the farmhouse on Farmhouse Court directly due to the close proximity of the residence to the proposed infrastructure and by introducing noise and construction related disturbance not in keeping with the historical context of the resource. The CHER determined that the property at 7385 Farmhouse Court met the criteria under Ontario Regulation 9/06 of the *Ontario Heritage Act*. However, the property did not meet the criteria contained in Ontario Regulation 10/06 of the *Ontario Heritage Act*. The well and tower on the property were determined to be a representative example of an early-1900s wind-driven brick well. The structure helps interpret early agricultural technologies and practices. The site is a cultural landscape documenting the agricultural heritage of Brampton and the interactions of early settlers with their environment. The heritage attributes of the structure include the well with courses of bricks laid in stretchers, mortared above the water line, and the metal tower and its shaft mechanism. Although the property/farmhouse will be directly impacted by the runningway, the identified heritage attributes of the property (i.e. the well and tower) are not expected to be impacted. For mitigation measures during construction see **Section 6.3.2**.

CHL 7

CHL 7 (Farmscape, 7324 Kennedy Road, Brampton – identified during field review): the runningway will impact the structures at 7324 Kennedy Road due to the close proximity of the structures to the proposed infrastructure and by introducing noise and construction related disturbance not in keeping with the historical context of the resource. The CHER determined that CHL 7 does not retain any cultural heritage significance from a local or provincial perspective. For mitigation measures during construction see **Section 6.3.2**.

CHL 15

CHL 15 (Historical Settlement Area of Claireville on Codlin Crescent, Toronto (formerly Albion Road and Steeles Avenue) – identified during field review): the proposed Highway 50 Station will result in direct and indirect impacts to the historical settlement of Claireville. The complete demolition of a large portion of the historic settlement centre of the Hamlet of Claireville will be required. Impacts relate to alteration of the historical setting of the community of Claireville, and introduction of structures and landscape

elements not in keeping with the historical setting of the resource. Although none of the identified buildings within the Highway 50 station are listed or designated under the *Ontario Heritage Act*, this historic settlement area may be considered a significant cultural heritage landscape by the City of Toronto, local history groups, or the local community. The CHL is located at the intersection of 407 ETR and Highway 427. The historical settlement of Claireville has undergone considerable change since it was established in 1850 at the intersection of the old Albion plank road and Steeles Avenue. What remains of the historical settlement along Codlin Crescent is now enveloped in highway and industrial park and is bounded by Highway 427 to the east and by the intersection of modern-day Albion Road and Steeles Avenue West to the west. The CHER determined that Codlin Crescent and the historical settlement of Claireville retain local cultural heritage value following application of Ontario Regulation 9/06 of the *Ontario Heritage Act*. Application of Ontario Regulation 10/06 confirmed that the subject resource was not determined to be of provincial significance. Its local heritage significance revolves around its historical and contextual value. While the area no longer retains the character of a nineteenth-century village, Codlin Crescent and the few remaining structures dating to the late nineteenth and early twentieth century, while not individually significant, as a whole contribute to the heritage significance of this historical settlement. Character defining attributes include the original alignment of Codlin Crescent (originally Albion Road), and the remaining structures dating to the late nineteenth and early twentieth century, including 2095 Codlin Crescent known as the former toll house (not impacted by the 407 Transitway). Based on the determined heritage values of the resource the following recommendations are provided for CHL 15:

- The development of a public commemoration or interpretation strategy should be considered as part of the new station design, prior to construction, for this location to commemorate the former settlement of Claireville.
- Cultural heritage resources should be fully documented prior to removal. The CHERs completed for CHL 15 as well as for BHRs 15, 17, 19, and 21 (residences on Codlin Crescent) as part of the TPAP provide sufficient documentation to serve this purpose.

During preparation of the CHERs for CHL 15 (and BHRs 15, 17, 19 and 21), and during the 407 Transitway TPAP, consultation took place with the City of Toronto regarding the cultural heritage resources within the Highway 50 station, including a meeting with the project team and City of Toronto staff on March 21, 2017. No comments were received from the City of Toronto regarding the CHRA or the CHERs completed for CHL 15 or for BHRs 15, 17, 19 and 21.

In addition, given the location of the BHRs (residences) on the south side of Codlin Crescent within the historical settlement centre of Claireville directly adjacent to the proposed limits of the Highway 50 Station, four residences (BHR 16, BHR 18, BHR 20, and BHR 22) may experience indirect impacts related to alteration of the historical setting of the community of Claireville, and introduction of landscape elements not in keeping with the historical setting of these resources. Impacts are also possible due to the proximity of construction related activities directly adjacent to these BHRs and associated landscape features (see **Section 6.3.2**).

General

Heritage attributes typically associated with the rail corridors include the runningway, width of the ROW and the arrangement of the tracks. The rail lines within the study area, however, have all been altered by the construction of the 407 ETR and, as a result, no mitigation is proposed.

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

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

ARCHAEOLOGICAL FEATURES

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), administered by the Ministry of Tourism, Culture and Sport. The Stage 1 Archaeological Assessment Report was submitted to the Ministry of Tourism, Culture and Sport in January and March 2017. On April 19, 2017, the study team received a letter from the Ministry of Tourism, Culture and Sport noting that the Stage 1 Archaeological Assessment Report had been reviewed and deemed compliant with the Ministry requirements for archaeological fieldwork and reporting. This Report was entered into the *Ontario Public Register of Archaeological Reports*.

The Stage 1 Archaeological Assessment Report identified 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 within 300 m of watercourses/waterbodies (where permission to enter was secured) that will be impacted by the 407 Transitway to identify any sites/lands requiring further assessment (i.e. Stage 3 or Stage 4 Site Specific Archaeological Assessment). A summary of the Stage 2 archaeological assessment is provided below and further details (including details/mapping of the location of the lands recommended for further archaeological study prior to construction) are found in **Appendix P** of this report. The Stage 2 Archaeological Assessment Report was submitted to the Ministry of Tourism, Culture and Sport in August 2018. There are no previously registered burial sites located within 1 km of the study limits.

The Stage 2 archaeological assessment was conducted intermittently between October 5, 2017 and June 15, 2018. The total area surveyed comprises 128.08 ha of both open and closed lands that encompasses the current Transitway footprint (118.15 ha). The Stage 2 assessment determined that 42.8 % (54.82 ha) of the area surveyed had been subject to previous archaeological assessment, and that 9.3% (11.88 ha) did not retain archaeological potential due to previous deep and extensive ground disturbance, severe slope (>20°), and permanently low and wet conditions. Approximately 32.89 ha of the lands that were identified as requiring Stage 2 assessment are within the current 407 Transitway footprint and will require Stage 2 survey prior to construction. The remaining 22.2 % (28.49 ha) of land surveyed was subject to Stage 2 pedestrian and test pit surveys as part of the TPAP.

As a result of the Stage 2 archaeological assessment, three pre-contact Indigenous findspots (P2, P5, and P6) and two pre-contact Indigenous sites (P3 and P4) were identified. Due to their non-diagnostic nature and overall paucity of artifacts, findspots P2, P5, and P6 do not have further cultural heritage value or interest (CHVI) and do not meet the requirements for Stage 3 assessment. Site P3 (AkGv-349) is a non-diagnostic precontact Indigenous lithic site that does not meet the artifact density requirements for Stage 3 assessment and can be considered free of archaeological concern. Site P4 (AkGv-350) is an Early Archaic precontact Indigenous site that consists of two Nettling projectile points (ca. 9500-8900 BP). As site P4 dates to the Early Archaic period, it meets the requirements for Stage 3 assessment and therefore requires further work prior to any soil disturbing activities. In addition to the archaeological finds identified during the Stage 2 assessment, the previously registered ROW Site (AkGv-121) also lies within the current footprint of the 407 Transitway. It represents a small Archaic lithic scatter that has been previously recommended for Stage 3 assessment. The ROW Site should therefore be subject to Stage 3 assessment prior to any soil disturbing activities. Stage 3 assessment is recommended 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. Further details of the specific requirements of the Stage 3 work for these two sites are provided in **Appendix P** of this report.

Any Stage 2 work required for land retaining archaeological potential not completed during the TPAP will be completed by a licensed archaeologist prior to construction and before any soil disturbing activities (including Stage 2 assessment for all land located beyond 300 m of watercourses/waterbodies and for any areas not surveyed as part of this assessment due to permission to enter restrictions or final alignment changes) to identify any sites/lands requiring further assessment. Any Stage 3 or Stage 4 Site Specific Archaeological Assessment required will be completed prior to construction.

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.

TABLE 6.6: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES	ENVIRONMENTAL VALUE / CRITERION
Land Use and Property Requirements	<p>Potential impacts on designated land uses within the study area.</p> <p>Potential impacts on existing, planned, and future land uses within the study area.</p> <p>Additional property requirements/displacements</p>	<p>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, City of Vaughan Official Plan, and City of Toronto Official Plan may be required to reflect changes in the footprint of the Transitway.</p> <p>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.</p> <p>Potential impacts to the Toronto Pearson International Airport Operating Area which is located within the study area.</p> <p>Potential impacts to three watercourses designated as 'Urban River Valleys' in the Greenbelt Plan (2017) including Etobicoke Creek West Branch, West Humber River and Lower Humber River.</p> <p><u>Segment A: West of Hurontario Street to Kennedy Road Runningway Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 0.70 ha of 'Open Space' and 4.11 ha of 'Provincial Highways' (City of Brampton Official Plan); ▪ 0.40 ha of 'Intensification Corridor', and 0.24 ha of 'Office' (City of Mississauga Official Plan); ▪ direct impacts to driving range of a golf range/mini putt facility located at the south-east quadrant of 407 ETR and Hurontario Street on Provincially owned land, one business and parking lots located near Topflight Drive and Edwards Boulevard, GO Bus Station and car pool lot located north of Topflight Drive (facilities to be relocated to and integrated with the Hurontario Transitway Station), and one Provincially owned property on Kennedy Road just south of 407 ETR; and, ▪ indirect impacts to existing land uses/businesses to the south near Topflight Drive and Edwards Boulevard. <p><u>Hurontario Street Station Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 'Provincial Highways' (City of Brampton Official Plan); ▪ 'Business Employment' (0.62 ha), 'Office' (1.38 ha), 'Intensification Corridor' (1.65 ha) and 'Utility' (0.11 ha) (City of Mississauga Official Plan); and, ▪ impacts to private land. <p><u>Segment B: East of Kennedy Road to West of Tomken Road Runningway Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 1.15 ha of 'Open Space' and 5.67 ha of 'Provincial Highways' (City of Brampton Official Plan); ▪ impacts to north side of property on Farmhouse Court (avoids direct impacts to the heritage aspects of this property (i.e. well ruin/tower); and, ▪ a potential interlining concept connecting the 407 Transitway with Kennedy Road to provide transit connectivity from the redevelopment of the Powerade Centre site to the 407 Transitway. <p><u>Segment C: West of Tomken Road to East of Torbram Road Runningway and Interlining Connection Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 2.99 ha of 'Open Space' and 9.45 ha of 'Provincial Highways' (City of Brampton Official Plan); and, ▪ impacts to one property/business located east of Tomken Road, Dixie Highway 407 Park and Soccer and Cricket Fields (just east of Dixie Road), an industrial business facility just east of Bramalea Road, and CN/GO railway lines (west of Torbram Road). <p><u>Dixie Road Station Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 2.06 ha of 'Provincial Highways' and 6.02 ha of 'Open Space' (City of Brampton Official Plan); and, ▪ impacts to 5.8 ha of the Dixie Highway 407 Park and Soccer and Cricket Fields. <p><u>Segment D: East of Torbram Road to East of Goreway Drive Runningway Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 5.83 ha of 'Provincial Highways', 1.36 ha of 'Open Space', and 0.44 ha of 'Business Corridor' (part of the Pearson Convention Centre site) (City of Brampton Official Plan); and, 	<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. No major concerns have been identified to date from the agencies.</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 Toronto Pearson International Airport Operating Area have been minimized to the extent possible. No noise sensitive receptors are planned as part of the 407 Transitway. The design of the 407 Transitway will ensure that it is compatible with the requirements for: height limitations, protection of navigational aids, surveillance equipment and communications, visibility and protection from wildlife hazards as outlined in the Special Purpose Area policies of the City of Mississauga Official Plan.</p> <p>Impacts to the three watercourses 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 Hurontario Street Station has been located in close proximity to the HuLRT Station, and will allow for transit users to transfer between the 407 Transitway and regional and local transit services.</p> <p>The Dixie Road Station was shifted south to minimize impacts to the Dixie Highway 407 Park and Soccer and Cricket Fields.</p> <p>An interlining connection is proposed at Bramalea Road to provide an additional access point for transit to connect to the Bramalea GO Station further north of 407 ETR. The interlining configuration connects the runningway to Bramalea Road, for traffic to continue further north of Bramalea Road to the GO Station.</p> <p>A shared site access agreement is in place for the Airport Road Station and the Pearson Convention Centre.</p> <p>The project team reviewed alternative designs for the Highway 50 Station; however, this additional area in the City of Toronto (south of Steeles Avenue) is needed for the station given the site constraints and parking requirements. The Highway 50 Station will connect with the future 427 Transitway (located further north) and potential transit service on Highway 427, as well as local transit. The Province will acquire the necessary private property on a willing seller/willing buyer basis at fair market value, where possible. Where an agreement cannot be reached with the property owner, the Province will commence an application under the Expropriations Act.</p> <p>Agreements will be required with the Canadian National Railway, Canadian Pacific Railway and GO Transit to plan and build grade separated crossings at all proposed</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).</p> <p>The study team will continue to work with utility and infrastructure stakeholders (Hydro One, Enbridge, GO Transit, Canadian National Railway,</p>

TABLE 6.6: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES	ENVIRONMENTAL VALUE / CRITERION
		<ul style="list-style-type: none"> ▪ impacts to one CN/GO rail line (between Airport Road and Goreway Drive) and open fields (associated with some private property), agricultural fields and the hydro corridor west of Goreway Drive. <p><u>Airport Road Station Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 6.71 ha of 'Provincial Highways' (City of Brampton Official Plan); ▪ impacts to the utility corridor and hydro corridor; and, ▪ a shared site access agreement is in place for the Transitway station and Pearson Convention Centre/Hilton Garden Inn located just west of station site. <p><u>Goreway Drive Station Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 6.52 ha of 'Provincial Highways' (City of Brampton Official Plan); ▪ impacts to Provincially owned property; and, ▪ potential indirect impacts to adjacent land uses including hydro corridor, industrial facilities (west of Goreway Drive, south of Steeles Avenue) and businesses (east of Goreway Drive). <p><u>Segment E: East of Goreway Drive to East of Highway 427 Runningway Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 6.09 ha of 'Provincial Highways' and 1.11 ha of 'Open Space' (City of Brampton Official Plan); ▪ 1.36 ha of 'Parkway Belt West Plan' (City of Vaughan Official Plan); and, ▪ impacts to Provincially owned land and a vacant private property adjacent to the rear lot line east of Goreway Drive, as well as open fields, agricultural fields and some private properties west of Gorewood Drive. <p><u>Highway 50 Station Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 3.87 ha of 'Parkway Belt West Plan' (City of Vaughan Official Plan); ▪ 3.15 ha of 'Employment Areas' (City of Toronto Official Plan); and, ▪ impacts to existing land uses south of Steeles Avenue, in the City of Toronto, including residential dwellings, industrial, and business buildings and two religious facilities. <p><u>Segment F: East of Highway 427 to East of Martin Grove Road Runningway Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 2.31 ha of 'Parkway Belt West Plan' (City of Vaughan Official Plan); and, ▪ impacts to the parking/storage lot of one business located just east of Highway 427 on Provincial land, and impacts to vacant land associated with one private property located just east of Highway 27. <p><u>Highway 27 Station Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 6.79 ha of 'Parkway Belt West Plan' (City of Vaughan Official Plan); ▪ impacts to Provincial lands west of Highway 27 that are leased for agricultural and other temporary uses; and, ▪ potential indirect impacts to the existing businesses south of Steeles Avenue and on the southeast quadrant of Highway 27 and Steeles Avenue (including a worship centre), and a new development (under construction in the northeast quadrant of the intersection). <p><u>Segment G: East of Martin Grove Road to West of Islington Avenue Runningway Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 6.44 ha of 'Parkway Belt West Plan' and 0.02 ha of 'Parks' (City of Vaughan Official Plan); and, ▪ a crossing of the CPR/GO Transit line is required just west of Islington Avenue and a future GO Station is planned at this location. <p><u>Segment H: West of Islington Avenue to immediately East of Highway 400 Runningway Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> ▪ 3.37 ha of 'Infrastructure and Utilities', 8.33 ha of "Parkway Belt West Plan", 0.18 ha of "General Employment" and 0.12 ha of 'Prestige Employment' (City of Vaughan Official Plan); and, ▪ impacts to a private driveway (Galcat Drive) and lies at the south limits of a business located east of Pine Valley 	<p>railway crossings. CN Railway has indicated during a project meeting that there can be no impact to CN operations during construction.</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 Table 6.5). A number of sites along the 407 Transitway facility have been protected for future environmental compensation (see Section 6.5).</p> <p>Impacts to the high quality wetland and forest vegetation communities located between Martin Grove Road and Islington Avenue were minimized to the extent possible by design of the runningway directly adjacent to/south of the 407 ETR. Impacts to the ANSI/ESA in this area were avoided.</p>	<p>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 6.6: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES	ENVIRONMENTAL VALUE / CRITERION
		<p>Drive, impacts to the hydro corridor, and will require conveyance of vacant private property located west of Highway 400.</p> <p><u>Pine Valley Drive Station Land Use/Property Impacts</u></p> <ul style="list-style-type: none"> 8.76 ha of 'Parkway Belt West Plan', 0.09 ha of 'Infrastructure and Utilities' and 0.21 ha of 'Natural Areas' (City of Vaughan Official Plan); and, impacts to vacant fields. 		
Noise and Vibration	Footprint impacts regarding noise and vibration do not apply.			
Built Heritage Resources and Cultural Heritage Landscapes	Displacement/ demolition of built heritage resources and/or cultural heritage landscapes or alteration of their settings.	<p>Eight of the 38 identified cultural heritage resources are expected to be impacted by the 407 Transitway through demolition or alteration to their setting:</p> <p>BHR 15, BHR 17, BHR 19, and BHR 21 (all residential properties on Codlin Crescent, Toronto - identified during field review): alterations to these BHRs as a result of the Highway 50 station include the removal of the residences and the excavation, grading and removal of landscape features. In addition, these BHRs are located within CHL 15, the Historic Settlement of Claireville (identified for demolition and alteration). The CHERs determined that none of these four BHRs retain any cultural heritage significance from a local or provincial perspective.</p> <p>CHL 1 (Waterscape, Humber River – designated a Canadian Heritage River as part of the Canadian Heritage Rivers System): the runningway will cross over this watercourse and may impact the natural and cultural heritage elements of the watercourse at the crossing west of Islington Avenue. The CHER determined that CHL 1 does not retain any cultural heritage significance from a local or provincial perspective. See Section 6.3.2 for mitigation measures during construction.</p> <p>CHL 5 (Farmscape, 7385 Farmhouse Court/Tomken Road, Brampton - Listed, City of Brampton): the runningway will impact the farmhouse on Farmhouse Court directly due to the close proximity of the residence to the proposed infrastructure and by introducing noise and construction related disturbance not in keeping with the historical context of the resource. The CHER determined that the property at 7385 Farmhouse Court met the criteria under Ontario Regulation 9/06 of the Ontario Heritage Act. However, the property did not meet the criteria contained in Ontario Regulation 10/06 of the Ontario Heritage Act. The well and tower on the property were determined to be a representative example of an early-1900s wind-driven brick well. Although the property/farmhouse will be directly impacted by the runningway, the identified heritage attributes of the property (i.e. the well and tower) are not expected to be impacted. Section 6.3.2 for mitigation measures during construction.</p> <p>CHL 7 (Farmscape, 7324 Kennedy Road, Brampton – identified during field review): the runningway will impact the structures at 7324 Kennedy Road due to the close proximity of the structures to the proposed infrastructure and by introducing noise and construction related disturbance not in keeping with the historical context of the resource. The CHER determined that CHL 7 does not retain any cultural heritage significance from a local or provincial perspective. See Section 6.3.2 for mitigation measures during construction.</p> <p>CHL 15 (Historical Settlement Area of Claireville on Codlin Crescent (formerly Albion Road and Steeles Avenue) – identified during field review): the proposed Highway 50 Station will result in direct and indirect impacts to the historical settlement of Claireville. The complete demolition of a large portion of the historic settlement centre of the Hamlet of Claireville will be required. Impacts relate to alteration of the historical setting of the community of Claireville, and introduction of structures and landscape elements not in keeping with the historical setting of the resource. None of the identified buildings within the Highway 50 station are listed or designated under the Ontario Heritage Act. The CHER determined that Codlin Crescent and the historical settlement of Claireville retain local cultural heritage value following application of Ontario Regulation 9/06 of the Ontario Heritage Act. Application of Ontario Regulation 10/06 confirmed that the subject resource was not determined to be of provincial significance. Its local heritage significance revolves around its historical and contextual value.</p> <p>In addition, given the location of the residences on the south side of Codlin Crescent within the historical settlement</p>	<p>As a result of the proposed impacts to the eight BHRs/CHLs, resource-specific Cultural Heritage Evaluation Reports (CHERs) were prepared as part of the TPAP for the eight impacted cultural heritage resources to determine the heritage integrity of each resource. Based on the results of the eight CHERs, it was determined that no Heritage Impact Assessments were required for any of these eight cultural heritage resources as they do not retain significant heritage value. The CHERs were submitted to the Ministry of Tourism, Culture and Sport and the applicable municipalities (City of Brampton, City of Vaughan, and City of Toronto)/agencies (Infrastructure Ontario) for archival purposes.</p> <p>CHL 15 - based on the determined heritage values of the resource the following recommendations are provided for CHL 15:</p> <ul style="list-style-type: none"> The development of a public commemoration or interpretation strategy should be considered as part of the new station design, prior to construction, for this location to commemorate the former settlement of Claireville. Cultural heritage resources should be fully documented prior to removal. The CHERs completed for CHL 15 as well as for BHRs 15, 17, 19, and 21 (residences on Codlin Crescent) as part of the TPAP provide sufficient documentation to serve this purpose. 	<p>Should future work require an expansion of the study area, a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential cultural heritage resources.</p> <p>Prior to construction, where technically possible, further adjustments to the design will be explored to minimize potential impacts to the cultural heritage resources.</p> <p>Prior to construction, consider the development of a public commemoration or interpretation strategy as part of the new Highway 50 station design for CHL 15 to commemorate the former settlement of Claireville.</p>

TABLE 6.6: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES	ENVIRONMENTAL VALUE / CRITERION
		<p>centre of Claireville directly adjacent to the proposed limits of Highway 50 Station, four residences (BHR 16, BHR 18, BHR 20, and BHR 22) may experience indirect impacts related to alteration of the historical setting of the community of Claireville, and introduction of landscape elements not in keeping with the historical setting of these resources. Impacts are also possible due to the proximity of construction related activities directly adjacent to these BHRs and associated landscape features (See Section 6.3.2).</p> <p>Heritage attributes typically associated with the rail corridors include the runningway, width of the ROW and the arrangement of the tracks. The rail lines within the study area, however, have all been altered by the construction of the 407 ETR and, as a result, no mitigation is proposed.</p>		
Archaeological Features	Potential loss/displacement of archaeological resources within the study area.	<p>The Stage 1 Archaeological Assessment identified lands retaining archaeological potential as well as one previously registered archaeological site (AkGv-121) that will be impacted by the runningway.</p> <ul style="list-style-type: none"> ▪ There are no previously registered burial sites located within 1 km of the study limits. ▪ As part of the TPAP, a Stage 2 Archaeological Assessment, including test pit and pedestrian surveys, was conducted on lands retaining archaeological potential within 300 m of watercourses/waterbodies (where permission to enter was secured) that will be impacted by the Transitway to identify any sites/lands requiring further assessment (i.e. Stage 3 or Stage 4 Site Specific Archaeological Assessment). As a result of the Stage 2 archaeological assessment, three pre-contact Indigenous findspots (P2, P5, and P6) and two pre-contact Indigenous sites (P3 and P4) were identified. 	<p>Findspots P2, P5, and P6 do not have further cultural heritage value or interest (CHVI) and do not meet the requirements for Stage 3 assessment. Site P3 (AkGv-349) does not meet the artifact density requirements for Stage 3 assessment and can be considered free of archaeological concern.</p> <p>Site P4 (AkGv-350) meets the requirements for Stage 3 assessment and therefore requires further work prior to any soil disturbing activities. The previously registered ROW Site (AkGv-121) lies within the runningway and should be subject to Stage 3 assessment prior to any soil disturbing activities. Stage 3 assessment is recommended 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. Further details of the specific requirements of the Stage 3 work for these two sites are provided in Appendix P of this report.</p>	<p>Any Stage 2 work required for land retaining archaeological potential not completed during the TPAP will be completed by a licensed archaeologist prior to construction and before any soil disturbing activities (including Stage 2 assessment for all land located beyond 300 m of watercourses/waterbodies and for any areas not surveyed as part of this assessment) to identify any sites/lands requiring further assessment. Any Stage 3 or Stage 4 Site Specific Archaeological Assessment required will be completed prior to construction. This includes Stage 3 archaeological assessment required for one previously registered archaeological site (AkGv-121) and one site identified during the Stage 2 assessment (AkGv-350) which have been documented to retain further CHVI and will be impacted by the runningway.</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>

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.

During the Pre-TPAP stage of the project, Metrolinx informed MTO in a meeting transpired in February 7, 2018, that it will be preparing a future environmental assessment for the separation of passenger and

freight rail services on the GO Transit Kitchener rail corridor. The Metrolinx EA will review alternatives, including those identified in previous Metrolinx feasibility studies. These alternatives include alignments running parallel to and within the Highway 407 Parkway Belt West Plan corridor. Metrolinx and MTO 407 Transitway project teams will coordinate efforts and continue dialogue as both projects progress.

There will be no negative footprint effects to transportation as described in **Table 6.7**.

TABLE 6.7: 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	MONITORING AND RECOMMENDATION
Segment A – West of Hurontario Street to East of Kennedy Road				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under Hurontario Street. Transitway crosses under Kennedy Road. Transitway crosses under Highway 410 Interchange. Transitway crosses under Tomken Road.	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 intersection between west end of Derrycrest Drive and Hurontario Station access road. New right in/right out T intersection for secondary southbound access to Hurontario Station off Hurontario Street.	Need of signal to be assessed and discussed with Municipality at the time of construction.	N/A
Impact on 407 ETR infrastructure	No impact to ramps	No impact.	No action required.	N/A
Segment B – East of Kennedy Road to West of Tomken Road				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under Highway 410 Interchange. Transitway crosses under Tomken 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.	No impact .	No action required.	N/A
Segment C – West of Tomken Road to East of Torbram Road				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses over Dixie Road. Transitway crosses over Bramalea Road. Transitway crosses under CN Halton track. Transitway crosses under Torbram Road.	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 Dixie Road and the proposed access road to Dixie Station will be installed at approximately 280 m south of EB 407 ETR ramp intersection.	No action required.	N/A
Impact on 407 infrastructure	Impact to ramps	No impact.	No action required.	N/A
Segment D – East of Torbram Road to East of Goreway Drive				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses over Steeles Avenue. Transitway crosses over Airport Road. Transitway crosses under CN track. Transitway crosses under Goreway Drive.	No action required. No action required. No action required. No action required.	N/A N/A N/A N/A

TABLE 6.7: 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	MONITORING AND RECOMMENDATION
Impact to existing road network	New roads, new intersections.	New signalized intersection located in the intersection of Steeles Avenue and the proposed access road to Goreway Drive Station will be installed at approximately 300 m west of the Goreway Drive/Steeles Avenue signalized intersection.	No action required.	N/A
		New right in/right out T intersection for secondary southbound access to Goreway Drive Station off Goreway Drive.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	Transitway crosses over S-E ramp at Airport Road Interchange. Transitway crosses under S-E ramp at Goreway Interchange.	No action required. No action required.	N/A N/A
Segment E – East of Goreway Drive to East of Highway 427				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses over Gorewood Drive. Transitway crosses under Highway 50.	No action required. No action required.	N/A N/A
Impact to existing road network	New roads, new intersections.	New signal and revised intersection layout at existing Steeles Avenue and Alcide Street intersection due to addition of Highway 50 Station access road.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	No impact to 407 ETR ramps as Transitway crosses under Highway 427 Interchange.	No action required.	N/A
Segment F – East of Highway 427 to East of Martin Grove Road				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under Highway 27. Transitway crosses under Martin Grove Road.	No action required. No action required.	N/A N/A
Impact to existing road network	New roads, new intersections.	New signalized intersection located in the intersection of Steeles Avenue and the proposed access road to Highway 27 Station will be installed at approximately 260 m west of the Highway 27/Steeles Avenue signalized intersection. New right in/right out T intersection for secondary westbound access to Highway 27 Station off Steeles Avenue West.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	No impact to 407 ETR ramps as Transitway crosses under S-E ramp from Highway 27.	No action required.	N/A
Segment G – East of Martin Grove to West of Islington Avenue				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under CP Mactier Subdivision track.	No action required.	N/A
Impact to existing road network	New roads, new intersections.	No impact.	No action required.	N/A

TABLE 6.7: 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	MONITORING AND RECOMMENDATION
Impact on 407 ETR infrastructure	Impact to ramps.	No impact.	No action required.	N/A
Segment H – West of Islington Avenue to East of Highway 400				
Impact of structures crossing arterials roads and railway tracks	Underpass or overpass crossing.	Transitway crosses under Islington Avenue. Transitway crosses under Weston Road.	No action required. No action required.	N/A N/A
Impact to existing road network	New roads, new intersections.	New signalized intersection located in the intersection of Pine Valley Drive and the proposed access road to Pine Valley Road Station will be installed at approximately 230 m south of existing signal at intersection of W-N/S ramp and Pine Valley Drive. New right in/right out T intersection for secondary northbound access to Pine Valley Station off Islington Avenue.	No action required.	N/A
Impact on 407 ETR infrastructure	Impact to ramps.	Transitway crosses under south ramps and core lanes of Highway 400.	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 6.9** 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 Fox sandy loam soils, which are 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 OPSS 805 (Construction Specification for Temporary Erosion and Sediment Control Measures) 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 *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* (2014)) will be used when developing an Excess Materials Management Plan.

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.

As previously noted, 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 should 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 should 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 should 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;
- 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.

GROUNDWATER

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), 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. 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 should 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;

- 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 negligible post-construction once water table conditions equilibrate around the new structures; and,
- 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 measured impacts and effective radius of influence from any dewatering will be dependent on specific local hydrogeologic conditions and should 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 should be re-assessed prior to construction based on additional site specific hydrogeologic data.

Impacts of High Water Table During Construction

Areas of high water table (i.e., less than 3 metres 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 west of the Humber River, the presence of the high water table should not represent a significant constraint for construction. For areas of relatively coarse silt and sand such as those thought to exist to the east of the Humber River, the presence of a high water table could impact on construction techniques and progress. As noted under **Section 6.2.1**, excavation and construction below the water table in saturated sandy and/or silty soils may present challenges, including the need for de-watering. Further assessment of the Transitway selected design and future subsurface investigation data should be reviewed prior to construction to further assess the impact of the suspected areas of high water table, and to confirm whether registration on the EASA or a Permit to Take Water from MECP will be required.

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.

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. Redside Dace). **Table 6.8** 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.

TABLE 6.8: SUMMARY OF PROPOSED IN STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS

NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
C1: Tributary of Fletchers Creek	<ul style="list-style-type: none"> No structure proposed (C1 is located west of study limits) 	<ul style="list-style-type: none"> Possible disturbance to Redside Dace Contributing Habitat (MNRF 2016). LGL field investigations indicated this feature does not support fish habitat (directly or indirectly). 	<ul style="list-style-type: none"> Any in-water works to be conducted within the Redside Dace timing window (July 1 to September 15). Follow standard mitigation and best management practices for surface water quality. Works may be subject to the best management practices (BMPs) outlined in the <i>Draft Guidance for Development Activities in Redside Dace Protected Habitat</i> (MNR 2011).
E1: Tributary of Etobicoke Creek West Branch	<ul style="list-style-type: none"> Structural Box Culvert Length 20 m Span 3.5 m 	<ul style="list-style-type: none"> Permanent enclosure of ~70 m² of seasonal, warmwater fish habitat. 	<ul style="list-style-type: none"> 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.
E3: Tributary of Etobicoke Creek West Branch	<ul style="list-style-type: none"> Structural Box Culvert Length 15 m Span 3.0 m 	<ul style="list-style-type: none"> Permanent enclosure of ~22.5 m² of seasonal, warmwater fish habitat. 	<ul style="list-style-type: none"> 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.
E4: Tributary of Etobicoke Creek West Branch	<ul style="list-style-type: none"> Pipe Length 15 m Diameter 1.0 m 	<ul style="list-style-type: none"> Permanent enclosure of ~15 m² of indirect, warmwater fish habitat. 	<ul style="list-style-type: none"> In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done “in the dry”.
E5: Etobicoke Creek West Branch	<ul style="list-style-type: none"> Three Span Bridge Span 160 m Width 15 m 	<ul style="list-style-type: none"> No impacts within bankfull channel 	<ul style="list-style-type: none"> All works must adhere to conditions outlined in the MTO Best Management Practices Manual for Fisheries - Draft for Pilot, 2016 (Clear Span Bridges).
E6: Tributary of Etobicoke Creek West Branch	<ul style="list-style-type: none"> Bridge Span 100 m Width 15 m 	<ul style="list-style-type: none"> No impacts within bankfull channel 	<ul style="list-style-type: none"> All works must adhere to conditions outlined in the MTO Best Management Practices Manual for Fisheries - Draft for Pilot, 2016 (Clear Span Bridges).

TABLE 6.8: SUMMARY OF PROPOSED IN STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS

NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
E7: Tributary of Spring Creek	<ul style="list-style-type: none"> Structural Twin Box Culvert Length 19 m Span 9.2 m Retaining wall (285 m long) proposed to preserve the bank of watercourse at a meander to the west of the main crossing structure 	<ul style="list-style-type: none"> Permanent enclosure of ~57 m² of direct, warmwater fish habitat. Permanent removal of riparian vegetation at the retaining wall (285 linear m). 	<ul style="list-style-type: none"> 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. Retaining wall should be set back from the high water mark of the watercourse.
E8: Spring Creek	<ul style="list-style-type: none"> Single Span Bridge Span 120 m Width 15 m 	<ul style="list-style-type: none"> No impacts within bankfull channel. 	<ul style="list-style-type: none"> All works must adhere to conditions outlined in the MTO Best Management Practices Manual for Fisheries - Draft for Pilot, 2016 (Clear Span Bridges).
M1: Tributary of Mimico Creek	<ul style="list-style-type: none"> Twin Box Culvert Length 20 m Width 14.4 m 	<ul style="list-style-type: none"> Permanent enclosure of ~120 m² of direct, warmwater fish habitat. 	<ul style="list-style-type: none"> 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.
M3: Tributary of Mimico Creek	<ul style="list-style-type: none"> Box Culvert Length 15 m Width 4.7 m 	<ul style="list-style-type: none"> Permanent enclosure of ~45 m² of indirect, warmwater fish habitat. 	<ul style="list-style-type: none"> 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.
M4: Tributary of Mimico Creek	<ul style="list-style-type: none"> Twin Box Culvert Length 20 m Width 8 m 	<ul style="list-style-type: none"> Permanent enclosure of ~120 m² of direct, warmwater fish habitat. 	<ul style="list-style-type: none"> 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.
M5: Tributary of Mimico Creek	<ul style="list-style-type: none"> Twin Box Culvert Length 15 m Width 12 m 	<ul style="list-style-type: none"> Permanent enclosure of ~60 m² of direct, warmwater fish habitat. 	<ul style="list-style-type: none"> 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.
M6: Tributary of Mimico Creek	<ul style="list-style-type: none"> Box Culvert Length 15 m Width 6.3 m 	<ul style="list-style-type: none"> Permanent enclosure of ~45 m² of direct, warmwater fish habitat. 	<ul style="list-style-type: none"> 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.

TABLE 6.8: SUMMARY OF PROPOSED IN STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS

NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
M7: Mimico Creek	<ul style="list-style-type: none"> Three Span Bridge Span 60 m Width 15.8 m 	<ul style="list-style-type: none"> No impacts within bankfull channel. 	<ul style="list-style-type: none"> All works must adhere to conditions outlined in the MTO Best Management Practices Manual for Fisheries - Draft for Pilot, 2016 (Clear Span Bridges).
M8: Tributary of Mimico Creek	<ul style="list-style-type: none"> Box Culvert Length 15 m Span 6 m 	<ul style="list-style-type: none"> Permanent enclosure of ~100 m² of seasonal, warmwater fish habitat. 	<ul style="list-style-type: none"> 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.
H1: West Humber River	<ul style="list-style-type: none"> Two Span Bridge Length 120 m Width 15.8 m 	<ul style="list-style-type: none"> No impacts within bankfull channel. 	<ul style="list-style-type: none"> All works must adhere to conditions outlined in the MTO Best Management Practices Manual for Fisheries - Draft for Pilot, 2016 (Clear Span Bridges).
H2: Albion Creek	<ul style="list-style-type: none"> Box Culvert Length 20 m Width 5 m Channel realignment around proposed station 	<ul style="list-style-type: none"> Permanent enclosure of ~100 m² of indirect, warmwater fish habitat. Channel realignment proposed for existing 411 m linear channel. Realignment length will measure 435 m. Net gain of 24 m of indirect, warmwater fish habitat due to realignment. 	<ul style="list-style-type: none"> In-water works to be conducted within the warmwater timing window (July 1 to March 31). Work will be done "in the dry". Implement natural channel design into realignment channel to maintain, or enhance natural fluvial processes. An open footed structure, or box structure with embedded natural substrates should be considered.
H5: Tributary of Rainbow Creek	<ul style="list-style-type: none"> Pipe Length 10 m Diameter 1 m 	<ul style="list-style-type: none"> Permanent enclosure of ~15 m² of direct, coldwater fish habitat. 	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater timing window (July 1 to September 15). Work will be done "in the dry". An open footed structure, or box structure with embedded natural substrates should be considered (open footed preferred due to observed groundwater contributions).
H6: Rainbow Creek	<ul style="list-style-type: none"> Single Span Bridge Span 55 m Width 15 m Retaining walls proposed along the edge of the Transitway footprint. 	<ul style="list-style-type: none"> Flow characteristics of large storm events may be impacted through potential restriction of flows to north of the watercourse. Permanent removal of riparian vegetation at the retaining wall (760 m to the east and 1,100 m to the west). 	<ul style="list-style-type: none"> All works must adhere to conditions outlined in the MTO Best Management Practices Manual for Fisheries - Draft for Pilot, 2016 (Clear Span Bridges). Retaining wall should be set back from the high water mark of the watercourse.

TABLE 6.8: SUMMARY OF PROPOSED IN STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS

NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
H7: Lower Humber River	<ul style="list-style-type: none"> Three Span Bridge Each Span 52 m Width 15 m 	<ul style="list-style-type: none"> No impacts within bankfull channel. 	<ul style="list-style-type: none"> All works must adhere to conditions outlined in the MTO Best Management Practices Manual for Fisheries - Draft for Pilot, 2016 (Clear Span Bridges).
H8: Tributary of the Lower Humber River	<ul style="list-style-type: none"> Bridge Span 45 m Width 15 m 	<ul style="list-style-type: none"> No impacts within bankfull channel. 	<ul style="list-style-type: none"> All works must adhere to conditions outlined in the MTO Best Management Practices Manual for Fisheries - Draft for Pilot, 2016 (Clear Span Bridges).

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 2010) 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 should be implemented during construction:

- vegetation cover will be used 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;

- old field seed mix and mulching or erosion control blanket (in accordance with NSSP-Erosion Control Blanket) will be placed in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization; and,
- tree protection to be in accordance with OPSS 801 (Construction Specification for the Protection of Trees) (i.e. tree protection fencing placed 1 m outside of the dripline of trees to minimize impacts and ensure no construction activity can occur within the tree protection zone).

Riparian Habitat and Valley Management

Riparian habitat should 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 should be installed and regularly maintained. Restoration/enhancement of riparian habitat should 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, should 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 should be limited, and staging areas should be well outside of forested valleys. Suitable tree protection fencing and erosion control fencing should be installed and regularly maintained. Restoration of newly impacted edges should be undertaken, and methods for the enhancement of these areas should be carried out as outlined in **Section 6.2.1** under Forest Edge Management. Plant species selected will be native and/or non-invasive.

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 should 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.

A total of 14 wildlife species at risk have been recorded within the vicinity of the study area based on secondary source data and an additional two wildlife species at risk have been identified as having the potential to be found within the study area (including little brown myotis and northern myotis). Two species at risk were confirmed in the study area by LGL during 2016 field investigations including Barn Swallow and Eastern Wood Pewee. Impacts to wildlife species at risk/species at risk habitat during construction will be minimized to the extent possible. **Section 6.2.1** provides more details on species at risk.

Construction duration and disturbance in the vicinity of existing culverts and bridges should 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.

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 (as per NSSP Operational Constraint – Migratory Bird Protection – General), disturbance, clearing or disruption of vegetation where birds may be nesting should 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.

DESIGNATED NATURAL AREAS

No Provincially Significant Wetlands (PSW) were identified within the study area. Two designated natural areas are present within Segment G (east of Martin Grove Road), including the Woodbridge Cut ESA and the Woodbridge Pleistocene Cut Earth Science ANSI. These two natural areas are located over 100 m to the south of the runningway, consequently, no impacts to these natural areas are expected during construction.

Three watercourses located in the study area, including the Etobicoke Creek West Branch, West Humber River and Lower Humber River, are designated as 'Urban River Valleys' under the Greenbelt Plan (2017). The environmental protection/mitigation measures outlined in this chapter will help maintain/enhance the 'Urban River Valleys' during construction and ensure that the policies of the Greenbelt Plan will be adhered to at these three 'Urban River Valleys' in order to support connections between the Natural Heritage System and the local, regional and broader natural heritage systems of southern Ontario.

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 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 6.9: 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	MONITORING AND RECOMMENDATION
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"> ■ 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. 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.	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, 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 should 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 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	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	Erosion will be monitored and a sediment removal program will be followed. Cleaning of sediments in the temporary SWM ponds will be undertaken as needed.

TABLE 6.9: 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	MONITORING AND RECOMMENDATION
		<p>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>	<p>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"> ■ 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 features 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. <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>	<p>Monitoring of potential spills will be carried out during construction.</p>
Groundwater	<p>Potential alteration of the existing groundwater regime during construction. Impacts to high water table during construction. Potential for groundwater contamination during construction.</p>	<p>Potential alterations to the groundwater regime during construction include:</p> <ul style="list-style-type: none"> ■ Construction excavation below 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 (although this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures); and, ■ 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. <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. For areas of relatively coarse silt and sand such as those thought to exist to the east of the Humber River, the presence of a</p>	<p>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.</p> <p>The impacts associated with the construction dewatering activities are expected to be temporary.</p> <p>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).</p> <p>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.</p>	<p>Potential impacts of the proposed construction works on groundwater resources should be re-assessed along with more detailed site specific hydrogeological data prior to construction. Further investigation/monitoring should be completed and appropriate mitigation measures should 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 should be applied for as necessary.</p>

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		<p>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 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>		
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 Section 6.2.1, Table 6.2 and Table 6.8.</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> <ul style="list-style-type: none"> ▪ 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). <p><u>Best Management Practices</u></p> <p>See Surface Water, Drainage and Stormwater above in Table 6.9 for the BMPs to be implemented during construction.</p> <p><u>Erosion and Sedimentation Control</u></p> <p>See Physiography and Soils above in Table 6.9 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"> ▪ 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; 	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.

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			<ul style="list-style-type: none"> ▪ 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. <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></p> <p>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> <ul style="list-style-type: none"> ▪ 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 matures 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. <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"> ▪ 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. 	
Vegetation and Vegetation Communities	Displacement of and/or disturbance to vegetation and vegetation communities during construction.	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	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 associated with salvaging impacted regionally rare species through transplanting will be further developed prior to construction. The <i>Construction</i>

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	Inadvertent spread of non-native invasive plants during construction.	equipment operating in areas identified for protection. Siltation of natural vegetation arising from soil erosion of exposed soils can arise if appropriate sediment control is not undertaken. Non-native invasive plants can establish in natural areas during construction displacing native plant species over time.	<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 should be implemented during construction:</p> <ul style="list-style-type: none"> ■ vegetation cover will be used 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; ■ old field seed mix and mulching or erosion control blanket (in accordance with NSSP-Erosion Control Blanket) will be placed in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization; and ■ tree protection to be in accordance with OPSS 801 (Construction Specification for the Protection of Trees) (i.e. tree protection fencing placed 1 m outside of the dripline of trees to minimize impacts and ensure no construction activity can occur within the tree protection zone). <p><u>Riparian Habitat and Valley Management</u></p> <p>Riparian habitat should 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 should be installed and regularly maintained.</p> <p>Restoration/enhancement of riparian habitat should 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, should 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 should be limited, and staging areas should be well outside of forested valleys. Suitable tree protection fencing and erosion control fencing should be installed and regularly maintained.</p> <p>Restoration of newly impacted edges should be undertaken, and methods for the enhancement of these areas should be carried out as outlined in Table 6.5 for forest edge management. Plant species selected will be native and/or non-invasive.</p>	<p><i>Administration and Inspection Task Manual</i> (MTO 2010) 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>
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 14 wildlife species at risk have been recorded within the vicinity of the study area based on secondary source data and an additional two wildlife species at risk have been identified as having the potential to be found within the study area (including little brown myotis and northern myotis). Two species at risk were confirmed in the study area by LGL during 2016 field investigations including Barn Swallow and Eastern Wood Pewee.</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 should 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 Table 6.5 (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 should 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 Section 6.2.1 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 Section 6.2.1.</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 should 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 Barn Swallow and Eastern Wood Pewee, 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 should be undertaken as required for species at risk during the appropriate season using MNRF protocols. Surveying for these species should 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>

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				<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 identify and locate active nests of species covered by the MBCA.</p>
Designated Natural Areas	Impacts to designated natural areas in the vicinity of the study area during construction.	<p>Two designated natural areas are present within Segment G (east of Martin Grove Road), including the Woodbridge Cut ESA and the Woodbridge Pleistocene Cut Earth Science ANSI.</p> <p>Three watercourses located in the study area, including the Etobicoke Creek West Branch, West Humber River and Lower Humber River, are designated as 'Urban River Valleys' under the Greenbelt Plan (2017) and will be affected by the construction of the 407 Transitway.</p>	<p>These two designated natural areas are located over 100 m to the south of the runningway and, as a result, no impacts to these natural areas are expected.</p> <p>The environmental protection/mitigation measures outlined under Fish and Fish Habitat and Vegetation and Vegetation Communities in this table will help maintain/enhance the three 'Urban River Valleys' and ensure that the policies of the Greenbelt Plan will be adhered to during construction at these three 'Urban River Valleys'.</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.
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.	<p>If possible, construction activities that are likely to cause the release of particulates should 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.</p> <p>BMPs outlined in the "<i>Best Practices for the Reduction of air Emissions from Construction and Demolition Activities</i>" should be followed during construction to reduce emissions during construction activities as well as any adverse air quality impacts that may occur.</p> <p>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.</p>	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 6.10** 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 should be mitigated with the following measures:

- access and egress for emergency vehicles and school buses should be maintained at all times during construction;
- to prevent the emission of pollutants, including dust, to the atmosphere, provisions should be made to ensure there is no unnecessary idling of vehicles. Dust suppressants should be used to combat dust, where appropriate. Emissions during construction should not result in health effects on motorists and local residents and employees;
- construction activities should adhere to local noise by-law regulations. Noise by-law exemptions should be obtained prior to construction from the municipality where construction activities will occur within the prohibited times, as required;
- construction activities should 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, including: maintaining use of recreational and community facilities such as the Dixie Highway 407 Park (soccer and cricket fields), and access to the Wet 'n' Wild Toronto recreational facility accessed near the runningway west of Highway 427;
- access to the 407 ETR, regional roads and local municipal roads should be maintained at all times, or detours should be identified; and,
- the local public should be kept informed of the progress of the Transitway construction and notified of any disruptions such as road closings.

The mitigation measures listed above should 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, or an exemption/permit will be sought directly from the applicable jurisdiction in advance of any work performed outside of the allowable time periods (prior to construction). 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.

BUILT HERITAGE AND CULTURAL HERITAGE LANDSCAPES

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

CHL 1 (Waterscape, Humber River – designated a Canadian Heritage River as part of the Canadian Heritage Rivers System): the runningway will cross over this watercourse and may impact the natural and cultural heritage elements of the watercourse at the crossing west of Islington Avenue. The destruction of mature trees should be avoided, and post-construction rehabilitation should include plantings sympathetic to the historical context of the resource. For footprint impact mitigation measures see **Section 6.2.2**.

CHL 5 (Farmscape, 7385 Farmhouse Court/Tomken Road, Brampton - Listed, City of Brampton): the runningway will impact the farmhouse on Farmhouse Court directly due to the close proximity of the residence to the proposed infrastructure and by introducing noise and construction related disturbance not in keeping with the historical context of the resource. However, the identified heritage attributes of the property (i.e. the well and tower) are not expected to be impacted. Construction and staging areas should be suitably planned in order to avoid the residence and mature trees directly south of the proposed impact area. For footprint impact mitigation measures see **Section 6.2.2**.

CHL 7 (Farmscape, 7324 Kennedy Road, Brampton – identified during field review): the runningway will impact the structures at 7324 Kennedy Road due to the close proximity of the structures to the proposed infrastructure and by introducing noise and construction related disturbance not in keeping with the historical context of the resource. For footprint impact mitigation measures see **Section 6.2.2**.

As noted in **Section 6.2.2**, given the location of the BHRs (residences) on the south side of Codlin Crescent within the historical settlement centre of Claireville directly adjacent to the proposed limits of the Highway 50 Station, these four residences (BHR 16, BHR 18, BHR 20, and BHR 22) may experience indirect impacts related to alteration of the historical setting of the community of Claireville, and introduction of landscape elements not in keeping with the historical setting of these resources. Impacts are also possible due to the proximity of construction related activities directly adjacent to these BHRs

and associated landscape features. Construction activities and staging will be suitably planned and undertaken to avoid impacts to these BHRs. Steps must be taken to ensure that the structures, landscape elements, and surrounding vegetation are retained and protected during construction-related activities.

For CHL 5, CHL 7 and BHRs 16, 18, 20 and 22, instructions should be issued to construction crews, and fenced no-go zones should be established in order to prevent impacts to the existing structures. Where impacts to existing vegetation cannot be avoided, post-construction rehabilitation should include plantings sympathetic to the historical context of the resources. The destruction of mature trees should be avoided.

All staging and construction activities should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources.

ARCHAEOLOGICAL FEATURES

As noted in **Section 6.2.2**, any Stage 2 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 prior to construction and before any soil disturbing activities (including Stage 2 assessment for all land located beyond 300 m of watercourses/waterbodies and for any areas not surveyed as part of this assessment) to identify any sites/lands requiring further assessment. Any Stage 3 or Stage 4 Site Specific Archaeological Assessment required will be completed prior to construction. This includes Stage 3 archaeological assessment required for one previously registered archaeological site (AkGv-121) and one site identified during the Stage 2 assessment (AkGv-350) which have been documented to retain further CHVI and will be impacted by the runningway.

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.

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 6.10: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	ENVIRONMENTAL IMPACT AND PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
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 should be mitigated with the following measures:</p> <ul style="list-style-type: none"> ▪ access and egress for emergency vehicles and school buses should be maintained at all times during construction; ▪ to prevent the emission of pollutants, including dust, to the atmosphere, provisions should be made to ensure there is no unnecessary idling of vehicles. Dust suppressants should be used to combat dust, where appropriate. Emissions during construction should not result in health effects on motorists and local residents and employees; ▪ construction activities should adhere to local noise by-law regulations. Noise by-law exemptions should be obtained prior to construction from the municipality where construction activities will occur within the prohibited times, as required; ▪ construction activities should 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, including: maintaining use of recreational and community facilities such as the Dixie Highway 407 Park (soccer and cricket fields), and access to the Wet 'n' Wild Toronto recreational facility accessed near the runningway west of Highway 427; ▪ access to the 407 ETR, regional roads and local municipal roads should be maintained at all times, or detours should be identified; and, ▪ the local public should be kept informed of the progress of the Transitway construction and notified of any disruptions such as road closings. 	Temporary construction impacts to existing and planned land uses should 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"> ▪ Limit construction to the time periods allowed by the City of Brampton, City of Mississauga, City of Vaughan and City of Toronto'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 seek any required exemptions and permits directly from the applicable jurisdiction, in advance of any work performed outside of the allowable time periods. If an exemption cannot be obtained, then construction will proceed in accordance with the requirements of the noise by-laws; ▪ The Contractor is expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work; ▪ 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. Note that demonstrated compliance with NPC-115 is a requirement of the City of Vaughan noise by-law; ▪ The separation distance between construction 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. <p>The implementation of the following measures will help to mitigate potential vibration impacts during construction:</p>	<p>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.</p> <p>Any required noise by-law exemptions/permits will be secured prior to construction by the Contractor.</p>

TABLE 6.10: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	ENVIRONMENTAL IMPACT AND PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			<ul style="list-style-type: none"> ▪ For work that is to occur outside of regular hours, the Contractor will be responsible for identifying the implications of the vibration generated, and to make construction work plans available for review; ▪ For work that has a high potential for vibration impacts (e.g., pile driving), the Contractor will be responsible for identifying the implications of the vibration generated, and to make construction work plans available for review; ▪ Construction equipment with potential to cause off-site vibrations should be operated as far away from vibration-sensitive sites as possible; ▪ Where possible, activities that have potential to cause off-site vibrations should 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 should 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	Potential impacts to built heritage resources and cultural heritage landscapes during construction.	<p>Construction activities associated with the 407 Transitway will result in soil disturbance, alterations in topography, and tree removal. The cultural heritage resources that will be affected by construction activities and the proposed mitigation measures are listed below. See Section 6.2.2 for footprint impacts and proposed mitigation measures.</p> <p>CHL 1 (Waterscape, Humber River – designated a Canadian Heritage River as part of the Canadian Heritage Rivers System): the runningway will cross over this watercourse and may impact the natural and cultural heritage elements of the watercourse at the crossing west of Islington Avenue.</p> <p>CHL 5 (Farmscape, 7385 Farmhouse Court/Tomken Road, Brampton - Listed, City of Brampton): the runningway will impact the farmhouse on Farmhouse Court directly due to the close proximity of the residence to the proposed infrastructure and by introducing noise and construction related disturbance not in keeping with the historical context of the resource. However, the identified heritage attributes of the property (i.e. the well and tower) are not expected to be impacted.</p> <p>CHL 7 (Farmscape, 7324 Kennedy Road, Brampton – identified during field review): the runningway will impact the structures at 7324 Kennedy Road due to the close proximity of the structures to the proposed infrastructure and by introducing noise and construction related disturbance not in keeping with the historical context of the resource.</p> <p>Given the location of the BHRs (residences) on the south side of Codlin Crescent within the historical settlement centre of Claireville directly adjacent to the proposed limits of the Highway 50 Station, these four residences (BHR 16, BHR 18, BHR 20, and BHR 22) may experience indirect impacts related to alteration of the historical setting of the community of Claireville, and introduction of landscape elements not in keeping with the historical setting</p>	<p>All staging and construction activities should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources.</p> <p>CHL 1: the destruction of mature trees should be avoided, and post-construction rehabilitation should include plantings sympathetic to the historical context of the resource.</p> <p>CHL 5: construction and staging areas should be suitably planned in order to avoid the residence and mature trees directly south of the proposed impact area.</p> <p>BHRs 16, 18, 20, and 22: construction activities and staging will be suitably planned and undertaken to avoid impacts to these BHRs. Steps must be taken to ensure that the structures, landscape elements, and surrounding vegetation are retained and protected during construction-related activities.</p> <p>For CHL 5, CHL 7 and BHRs 16, 18, 20 and 22: instructions should be issued to construction crews, and fenced no-go zones should be established in order to prevent impacts to the existing structures. Where impacts to existing vegetation cannot be avoided, post-construction rehabilitation should include plantings sympathetic to the historical context of the resources. The destruction of mature trees should be avoided.</p> <p>Construction activities will be undertaken in a manner that limits impacts on cultural heritage resources.</p>	

TABLE 6.10: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	ENVIRONMENTAL IMPACT AND PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
		of these resources. Impacts are also possible due to the proximity of construction related activities directly adjacent to these BHRs and associated landscape features.		
Archaeological Features	Potential loss/displacement of archaeological resources within the study area during construction.	<p>The Stage 1 Archaeological Assessment identified lands retaining archaeological potential as well as one previously registered archaeological site (AkGv-121) that will be impacted by construction of the runningway.</p> <p>The Stage 2 Archaeological Assessment identified lands requiring further archaeological assessment prior to construction. As a result of the Stage 2 archaeological assessment, three pre-contact Indigenous findspots (P2, P5, and P6) and two pre-contact Indigenous sites (P3 and P4) were identified.</p> <p>There are no previously registered burial sites located within 1 km of the study limits.</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 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>	See Archaeological Features under Table 6.6 .

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 6.11** 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 (York Region, City of Vaughan, Peel Region, City of Brampton, City of Mississauga, City of Toronto 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 6.11: CONSTRUCTION IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
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"> ▪ Hurontario Street ▪ Kennedy Road ▪ Tomken Road ▪ Torbram Road ▪ Goreway Drive ▪ Martin Grove Road ▪ Islington Avenue ▪ Pine Valley Drive ▪ Weston Road <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.
<p>Crossings of 407 ETR ramps to/from arterial roads by the Transitway</p> <p>Crossings of 407 ETR major Interchanges</p> <p>Utility Relocates</p>	<p>Ability to maintain 407 ETR traffic during crossing construction.</p> <p>Ability to maintain 407 ETR traffic during crossing construction.</p> <p>Ability to maintain existing utilities functioning during Transitway construction</p>	<p>Potential delays to 407 ETR traffic resulting in increased safety problems and potential accidents caused by construction of the Transitway.</p> <p>The Transitway will be tunneled under all major Highway to Highway Interchanges, avoiding impacts to Highway traffic</p> <p>Existing utilities could be affected by construction of Transitway Grade Separations</p>	<p>Temporary detour ramps will be built in coordination with MTO Corridor Management, and 407 ETR prior to initiation of construction of the Transitway.</p> <p>No action required</p> <p>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 Pre-Construction 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. 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."</p>	<p>N/A</p> <p>N/A</p> <p>N/A</p>

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 6.12** 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.

Although groundwater is not expected to be a source of water for human use within the study area, the development of the Transitway has the potential to impact groundwater with corresponding risk to 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 should 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, a new area of salt application will result from the construction of the project.

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.

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.

DESIGNATED NATURAL AREAS

The operation and maintenance activities of the 407 Transitway will not affect the designated natural areas located in the vicinity of the study area.

AIR QUALITY

An air quality and greenhouse gas (GHG) emissions inventory was completed for the future reference year 2031, 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, NO₂ and PM_{2.5} which have background concentrations already above or approaching their respective criteria and standards.

Exceedances of the annual benzene and 24-hour and annual benzo[a]pyrene Ambient Air Quality Criteria (AAQC) are predicted at many receptor locations for existing conditions and future scenarios assessed. Similarly, exceedances of the annual NO₂ Canadian Ambient Air Quality Standards (CAAQS) are predicted at many receptor locations for future conditions. These contaminants in particular have background concentrations that exceed their respective AAQC and CAAQS. Annual PM_{2.5} exceedances are predicted at select sensitive receptor locations and is largely attributable to background concentrations accounting for 93% of the AAQC which suggests that model predicted exceedances of annual PM_{2.5} criteria are attributable to elevated background concentrations within the study area.

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

nitrogen dioxide (NO₂), carbon monoxide (CO), sulphur dioxide (SO₂), acetaldehyde, acrolein, 1,3-butadiene and formaldehyde concentrations are well within applicable criteria whereas benzene, benzo[a]pyrene and PM_{2.5} concentrations periodically exceed applicable criteria.

The assessment identified that compared to existing conditions, concentrations of gaseous contaminants 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. Predicted concentrations at sensitive receptor locations will generally remain unchanged in both future scenarios for particulate matter-based compounds. Carbon dioxide equivalent (CO₂e) emissions are shown to decrease in the future scenarios relative to Existing Conditions.

The assessment also identified that the Future Build scenario will generally result in less than a 1% 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%). Emissions of CO₂e are also shown to decrease in the Future Build scenario relative to Future No-Build, however, the percent change is also insignificant at less than 1%.

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 6-12: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
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"> 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 features 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. 	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 should 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 should be implemented (see Table 6.5).	
Wildlife and Wildlife Habitat	Barrier effects on wildlife passage. 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.	

TABLE 6-12: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			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.	
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.		
Air Quality	Air quality impacts due to the operation of a 23.7 kilometre busway, fuelled by diesel.	<p>Particulate emissions during the operations/maintenance phase have the potential to impact air quality.</p> <p>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, NO₂ and PM_{2.5} which have background concentrations already above or approaching their respective criteria and standards.</p> <p>Exceedances of the annual benzene and 24-hour and annual benzo[a]pyrene Ambient Air Quality Criteria (AAQC) are predicted at many receptor locations for existing conditions and future scenarios assessed. Similarly, exceedances of the annual NO₂ Canadian Ambient Air Quality Standards (CAAQS) are predicted at many receptor locations for future conditions. These contaminants in particular have background concentrations that exceed their respective AAQC and CAAQS. Annual PM_{2.5} exceedances are predicted at select sensitive receptor locations and is largely attributable to background concentrations accounting for 93% of the AAQC which suggests that model predicted exceedances of annual PM_{2.5} criteria are attributable to elevated background concentrations within the study area.</p> <p>The results of the assessment show 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 nitrogen dioxide (NO₂), carbon monoxide (CO), sulphur dioxide (SO₂), acetaldehyde, acrolein, 1,3-butadiene and formaldehyde concentrations are well within applicable criteria whereas benzene, benzo[a]pyrene and PM_{2.5} concentrations periodically exceed applicable criteria.</p> <p>The assessment identified that compared to existing conditions, concentrations of gaseous contaminants 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. Predicted concentrations at sensitive receptor locations will generally remain unchanged in both future scenarios for particulate matter-based compounds. Carbon dioxide equivalent (CO_{2e}) emissions are shown to decrease in the future scenarios relative to Existing Conditions.</p> <p>The assessment also identified that the Future Build scenario will generally result in less than a 1% 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%). Emissions of CO_{2e} are also shown to decrease in the Future Build scenario relative to Future No-Build, however, the percent change is also insignificant at less than 1%.</p>	<p>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.</p>	<p>If, in the future, any plans are considered for bus garages, an addendum to the EPR may be required.</p>

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 and cultural heritage resources are anticipated by the operation and maintenance of the 407 Transitway. Refer to **Table 6.13** 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 (2031) assuming that the project *does not* proceed (future no-build), and future conditions (2031) 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).

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;

- ground-borne vibration impacts associated with buses operating on the 407 Transitway; and,
- airborne vibration of house structure elements induced by sound levels from bus engines.

The conclusions of the assessment were as follows:

- no significant increases of 5 dBA, or more, were predicted for any of the NSAs, however, many have background sound levels of 65 dBA, or more;
- noise barrier walls were concluded to not be technically feasible when constructed on MTO ROW as they do not provide sufficient noise reduction. Noise barrier walls are also not administratively feasible as they would need to be constructed on private residential properties, or 407 ETR right-of-way, which is not MTO's property, to provide sufficient noise reduction;
- no ground-borne vibration impacts were predicted for operations on the 407 Transitway; and,
- no airborne vibration effects (i.e., rattling of house structure elements) due to bus engine pass-by noise were predicted.

The 407 Transitway does not include bus garages. If, in the future, any plans are considered for bus garages, an addendum to the EPR may be required.

BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES

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

ARCHAEOLOGICAL FEATURES

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

TABLE 6.13: 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 AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
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.	Potential impacts at existing and proposed sensitive locations from buses operating on the proposed 407 Transitway, inclusive of changes to local topography. Potential ground-borne vibration impacts associated with buses operating on the 407 Transitway. Potential airborne vibration of house structure elements induced by sound levels from bus engines.	No significant increases of 5 dBA, or more, were predicted for any of the NSAs, however, many have background sound levels of 65 dBA, or more. Noise barrier walls were concluded to not be technically or administratively feasible. No ground-borne vibration impacts were predicted for operations on the 407 Transitway. No airborne vibration effects (i.e., rattling of house structure elements) due to bus engine pass-by noise were predicted.	If, in the future, any plans are considered for bus garages, an addendum to the EPR may be required.
Built Heritage Resources and Cultural Heritage Landscapes	Potential impacts to built heritage resources and/or cultural heritage landscapes from operations and maintenance activities.	The operations and maintenance activities of the 407 Transitway present no impacts.		
Archaeological Features	Potential loss/displacement of archaeological resources within the study area from operations and maintenance activities.	The operations and maintenance activities of the 407 Transitway present no impacts.		

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 6.14**, 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 itself, this environmental issue/concern illustrates the potential impacts that may arise in providing connectivity among the different transportation modes. Connectivity to other transit systems (TTC, Viva, YRT, Brampton Zum, MiWay and GO Transit) 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 vehicle access to a station in mixed traffic is an environmental issue/concern.
4. Travel time and service reliability for on-street-stop transit services: this environmental issue/concern speaks to the effect of bus operations when in mixed traffic. The potential for adverse effects to occur is present.
5. Reduction in level of service for vehicular traffic: service in the station area could be reduced due to changes in signal timing.
6. Station access by walking distance: as part of the integration of various transportation modes as part of the 407 Transitway's transit system, the provision of station access by means of walking is noted. If such convenient walking access to stations is not available, the potential to discourage use of the Transitway is possible.
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.
8. Reduction in main street intersection capacities due to rapid transit operations: This will be re-assessed at time of implementation, in coordination with the corresponding Municipalities.

TABLE 6.14: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	ENVIRONMENTAL IMPACT AND MITIGATION MEASURES	MONITORING AND RECOMMENDATION
Hurontario Street Station	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> Direct and efficient connection to future Hurontario LRT. No mitigation required. 	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"> Planned off street bus loop and on street stops provide direct connection between Transitway service and local services. No mitigation required. 	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"> Convenient station access off a secondary local street (Derrycrest Drive). No mitigation required. Provide priority egress for buses leaving bus loop. 	<p>N/A</p> <p>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.</p>
	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"> Bus bays inside the facility as well as on street bus stops are only 15 and 30m from Transitway platforms respectively. No mitigation required. 	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Hurontario Street.	<ul style="list-style-type: none"> Station will add vehicular traffic volume to Hurontario Street; however, implementation of future Hurontario LRT is anticipated to reduce important volume of vehicular traffic on this arterial road. 	Monitor reduction of traffic volume when LRT is in service, and if necessary, adjust traffic signals in adjacent intersections.
	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"> Short and convenient walkway access from Hurontario Street. No mitigation required. 	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> Direct access to station is provided by station access roads. No mitigation required. 	N/A
Dixie Road Station	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> No current or planned regional services in the vicinity of the station. No mitigation required. 	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"> Planned off street bus loop and on street stops provide direct connection between Transitway service and local services. No mitigation required. 	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"> Convenient station access off Dixie Road. No mitigation required. Provide priority egress for buses leaving bus loop. 	<p>N/A</p> <p>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.</p>
	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"> Bus bays inside the facility as well are only 15 m from Transitway platforms. No mitigation required. 	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Dixie Road.	<ul style="list-style-type: none"> Station will add vehicular traffic volume to Hurontario Street. Signal on new signalized intersection will regulate traffic on Dixie Road. 	On-going monitoring of traffic flow and adjustments of signal timing accordingly as necessary.

TABLE 6.14: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	ENVIRONMENTAL IMPACT AND MITIGATION MEASURES	MONITORING AND RECOMMENDATION
	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"> Convenient walkway access from Dixie Road. No mitigation required. 	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> Direct access to station is provided by station access roads. No mitigation required. 	N/A
Airport Road Station	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> No current or planned regional services in the vicinity of the station. No mitigation required. 	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"> Planned off street bus loop and on street stops provide direct connection between Transitway service and local services. No mitigation required. 	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"> Accesses from both Airport Road and Steeles Avenue. No mitigation required. Provide priority egress for buses leaving bus loop. 	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"> Bus bays inside the facility as well are only 15 m from Transitway platforms. No mitigation required. 	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Airport Road and Steeles Avenue.	<ul style="list-style-type: none"> Station will add vehicular traffic volume to arterial roads. Signal on new signalized intersection at main station access will regulate traffic on Steeles Avenue. 	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"> Convenient walkway access from Airport Road. No mitigation required. 	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> Direct access to station is provided by station access roads. No mitigation required. 	N/A
Goreway Drive Station	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> No current or planned regional services in the vicinity of the station. No mitigation required. 	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"> Planned off street bus loop and on street stops provide direct connection between Transitway service and local services. No mitigation required. 	N/A

TABLE 6.14: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	ENVIRONMENTAL IMPACT AND MITIGATION MEASURES	MONITORING AND RECOMMENDATION
	Location of station and transit access	Convenience of station accesses to current transportation network in the area. Potential for buses to be delayed by traffic entering/leaving station area.	<ul style="list-style-type: none"> Accesses from both Goreway Drive and Steeles Avenue. No mitigation required. Provide priority egress for buses leaving bus loop. 	N/A 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"> Bus bays inside the facility as well are only 15 m from Transitway platforms. No mitigation required. 	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Airport Road and Steeles Avenue.	<ul style="list-style-type: none"> Station will add vehicular traffic volume to arterial roads. Signal on new signalized intersection at main station access will regulate traffic on Steeles Avenue. 	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"> Convenient walkway access from Goreway Drive. No mitigation required. 	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> Direct access to station is provided by station access roads. No mitigation required. 	N/A
Highway 50 Station	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> Highway 50 Station will provide direct connection between the East-West 407 Transitway with the North-South 427 Transitway. No mitigation required. 	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"> Planned off street bus loop and on street stops provide direct connection between Transitway service and local services. No mitigation required. 	N/A
	Location of station and transit access	Convenience of station accesses to current transportation network in the area. Potential for buses to be delayed by traffic entering/leaving station area.	<ul style="list-style-type: none"> Access off Steeles Avenue. No mitigation required. Provide priority egress for buses leaving bus loop. 	N/A 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"> Bus bays inside the facility as well are only 20 m from Transitway platforms. No mitigation required. 	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Airport Road and Steeles Avenue.	<ul style="list-style-type: none"> Station will add vehicular traffic volume to arterial roads. Signal on new signalized intersection at main station access will regulate traffic on Steeles Avenue. 	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"> Convenient walkway access from Steeles Avenue. No mitigation required. 	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> Direct access to station is provided by station access roads. No mitigation required. 	N/A

TABLE 6.14: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	ENVIRONMENTAL IMPACT AND MITIGATION MEASURES	MONITORING AND RECOMMENDATION
Highway 27 Station	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> No current or planned regional services in the vicinity of the station. No mitigation required. 	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"> Planned off street bus loop and on street stops provide direct connection between Transitway service and local services. No mitigation required. 	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"> Access off Steeles Avenue. No mitigation required. Provide priority egress for buses leaving bus loop. 	<p>N/A</p> <p>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.</p>
	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"> Bus bays inside the facility as well are only 20 m from Transitway platforms. No mitigation required. 	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Airport Road and Steeles Avenue.	<ul style="list-style-type: none"> Station will add vehicular traffic volume to arterial roads. Signal on new signalized intersection at main station access will regulate traffic on Steeles Avenue. 	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"> Walkway access from Steeles Avenue and Highway 27. No mitigation required. 	N/A
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> Direct access to station is provided by station access roads. No mitigation required. 	N/A
Pine Valley Drive Station	Connections to regional transit services	Connection to regional services enhances the overall attractiveness of the system.	<ul style="list-style-type: none"> No current or planned regional services in the vicinity of the station. No mitigation required. 	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"> Planned off street bus loop and on street stops provide direct connection between Transitway service and local services. No mitigation required. 	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"> Access off Pine Valley Drive. No mitigation required. Provide priority egress for buses leaving bus loop. 	<p>N/A</p> <p>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.</p>
	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"> Bus bays inside the facility as well are only 20 m from Transitway platforms. No mitigation required. 	N/A
	Reduce level of services for vehicular traffic	Traffic volume and level of service on Airport Road and Steeles Avenue.	<ul style="list-style-type: none"> Station will add vehicular traffic volume to arterial roads. Signal on new signalized intersection at main station access will regulate traffic on Steeles Avenue. 	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"> Walkway access from Pine Valley Drive. No mitigation required. 	N/A

TABLE 6.14: OPERATIONS AND MAINTENANCE IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION

STATION	ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	ENVIRONMENTAL IMPACT AND MITIGATION MEASURES	MONITORING AND RECOMMENDATION
	Emergency/maintenance vehicles access	Emergency vehicles require direct unimpeded access to station area.	<ul style="list-style-type: none"> ▪ Direct access to station is provided by station access roads. No mitigation required. 	N/A

6.5. MTO Protected Sites

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, TRCA), as part of implementing the project.

6.6. Conversion/Decommissioning

As described in **Chapter 7 (Implementation) 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 road bed 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 EA 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

Given that the preferred Transitway alignment is mostly confined to a well-established urban transportation and utility corridor, footprint impacts are limited to removal of primarily cultural vegetation communities and anthropogenically influenced land (i.e. agricultural and manicured lands) with only a minor amount of removal of wetland and forest communities, minor land acquisition, and minor conflict with utilities. Built-in design attributes to be adopted will be typically those for bridge 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 planning effort has been applied to minimize intrusion of Transitway facilities onto 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.