

Chapter 6 – Impact Assessment, Mitigation and Monitoring



407 TRANSITWAY - KENNEDY ROAD TO BROCK ROAD
MINISTRY OF TRANSPORTATION - CENTRAL REGION

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 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 operations 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 construction and operations of the project.
3. Identify the residual environmental effects and their significance, if any.
4. Recommend monitoring activities during the construction and operations 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
	Contaminated Property and Waste	Potential for disturbance and/or disposal of contaminated waste and/or soils during construction
		Potential footprint impacts to contaminated property and waste
		Potential construction impacts to unknown contaminated property and waste

TABLE 6.1: ASSESSMENT CRITERIA		
ENVIRONMENTAL FACTOR	ENVIRONMENTAL VALUE/CRITERION	MEASURES
Natural Environment	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 regime and recharge
		Potential for groundwater contamination
	Fish and Aquatic Habitat	Potential impacts to fish habitat and fisheries resources
		Displacement of rare, threatened or endangered fish species or significant fish habitat
	Vegetation and Vegetation Communities	Loss of and disturbance to vegetation and vegetation communities
		Displacement of rare, threatened or endangered plant species
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	
Designated Natural Areas	Impacts to designated natural areas in and adjacent to the study area	
	Air Quality	Potential for air quality impacts
Social Environment	Land Use	Potential impacts on the existing, planned, and future land uses within the study area
		Private property requirements/ displacements
		Number of sensitive land uses affected
	Noise and Vibration	Impacts regarding noise and vibration
	Built Heritage and Cultural Heritage Landscapes	Displacement of built heritage and/or cultural heritage landscapes
Archaeological Features	Potential loss/displacement of archaeological resources within the study area	
Economic Environment	Impact on businesses	Number of businesses affected
Transportation - Alignment	Structures crossing arterials	Underpass or overpass crossing

TABLE 6.1: ASSESSMENT CRITERIA

ENVIRONMENTAL FACTOR	ENVIRONMENTAL VALUE/CRITERION	MEASURES
	Local 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 crossing construction
	Impact on 407 ETR infrastructure	Impact to ramps Number of 407 crossings
Transportation - Stations	Connections to-regional transit services	Connection to regional services enhances the overall attractiveness of the system
	Compatibility with local transit services	Potential for fast convenient connection with local transit services to discourage ridership.
	Location of station and transit access	Convenient station integrated into local development will attract greater ridership
	Travel time and service reliability for on-street-stop transit services	Potential for buses to be delayed by traffic entering/leaving station area.
	Reduce level of services for vehicular traffic	Location and walking distance from local on-street stops
	Station access by walking distance	Revised signal timing at local intersections could reduce level of service
	Emergency/maintenance vehicles access	Direct and convenient sidewalk access can attract local area passengers to walk to station
	Reduction in main street intersection capacities due to rapid transit operations	Emergency vehicles require direct unimpeded access to station area.
Utilities	Impact on existing utilities	Number and significance of utility impacts

that will potentially be displaced or lost through the introduction of the Transitway;

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

Environmental factors that may be affected by the project facilities or activities were identified using an interactions matrix (**Table 6.2**). The interactions matrix is designed to scope the types and levels of significance of environmental effects that may be encountered for this project and the level of detail that may be necessary to address those environmental effects. The interactions matrix considered environmental conditions and project-specific activities and components for the three impact categories of footprint, construction and the operations and maintenance. Each interaction between a project activity and an environmental factor was rated based on professional judgement and the experience of the Study Team, as follows:

0 = No interaction. The environmental effects are not considered significant and therefore are not considered further in this report.

1 = Interaction occurs; however, based on past experience and professional judgement the interaction would not result in a significant environmental effect, even without mitigation; or interaction would not be significant due to application of legislated environmental protection practices that are known to effectively mitigate the predicted environmental effects.

2 = Interaction could result in an environmental effect or concern even with mitigation.

Where no interaction (rating of 0) is expected, no discussion is provided. Where an interaction occurs between the project activity or component and an environmental factor and the interaction is considered not to be significant (rating of 1), impacts, mitigation and monitoring measures are identified to explain why the interaction is deemed not to be significant. Where a potentially significant interaction is likely between the project activity or component and an environmental factor (rating of 2), further discussion is provided and recommendation suggested to evaluate the environmental effects more thoroughly.

The impact assessment considered:

- All federal and provincial regulatory requirements for the assessment of environmental effects;
- Issues raised by the agencies, public, Aboriginal 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

TABLE 6.2: INTERACTIONS MATRIX

ACTIVITY/ COMPONENT	PHYSIOGRAPHY AND SOILS	CONTAMINATED PROPERTY AND WASTE	SURFACE WATER, DRAINAGE AND STORMWATER	GROUNDWATER	FISH AND AQUATIC HABITAT	VEGETATION AND VEGETATION COMMUNITIES	WILDLIFE AND WILDLIFE HABITAT	DESIGNATED NATURAL AREAS	AIR QUALITY	LAND USE	NOISE AND VIBRATION	BUILT HERITAGE AND CULTURAL HERITAGE LANDSCAPES	ARCHAEOLOGICAL FEATURES	STRUCTURES CROSSING ARTERIALS	LOCAL TRAFFIC	407 ETR INFRASTRUCTURE	LOCAL TRANSIT SERVICES	TRAVEL TIME AND SERVICE RELIABILITY FOR STREET-STOP
Footprint Impacts																		
Runningway	1	2	2	2	1	2	1	1	0	1	0	2	2	1	0	1	1	0
Bridges and Culverts	1	1	2	1	2	1	1	1	0	1	0	0	0	1	0	1	0	0
Stations (including platform, PPU DO, parking, etc.)	1	2	2	1	1	2	2	0	0	1	0	0	2	0	1	0	1	0
Stormwater Management Facilities	2	2	2	2	2	2	1	0	0	1	0	0	0	0	0	1	0	0
Construction Impacts																		
Clearing, excavation, erosion and sedimentation control	2	2	2	2	2	1	1	1	1	0	1	1	1	1	1	0	1	1
Utility relocation	0	1	0	1	0	0	0	0	0	0	1	0	0	1	1	0	1	1
Paving	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	0	0	0
Dewatering	1	1	2	2	1	0	0	0	0	0	0	0	0	1	0	1	0	0
Heavy equipment operations i.e. spills	1	0	0	1	1	0	0	1	1	0	1	0	0	0	0	0	0	0
Traffic management	1	1	1	1	1	0	0	0	1	0	1	0	0	1	1	2	1	1
Material import/stockpiling	2	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0
Operations and Maintenance Impacts																		
Rapid transit operation	0	0	1	1	0	0	1	0	1	0	1	0	0	0	0	0	1	1
Runningway maintenance	0	1	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Stormwater management	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Station maintenance	0	1	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Snow removal	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0

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 studies prepared based on the Preliminary Design of the 407 Transitway. Members of the Technical Resource Group (TRG) including TRCA, MNRF, Parks Canada, MOECC, City of Markham, City of Pickering, York Region, Durham Region, Ministry of Tourism, Culture and Sport were consulted in the impact assessment studies listed below. These reports were provided to the agencies in April 2016 for review, 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, in a preliminary fashion, the potential subsurface chemical contamination issues within the study area based on available sources of information. Nine properties were identified requiring further assessment for potential contamination and/or waste materials. Four of the properties require further assessment to determine whether subsurface investigations would be warranted (e.g. Phase 1 ESA) and five of the properties require subsurface environmental investigation to determine whether soil and/or groundwater impacts exist on the properties (Phase 2 ESA). Four properties identified for potential property contamination and/or waste materials could interfere with the construction of the 407 Transitway within the study area. Fill placement was also noted at interchanges along the 407 ETR corridor. It concluded that if any of the properties are affected, further studies will be carried out during Detail Design. Preliminary Site Screening forms were prepared 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: Rouge River, Petticoat Creek and Duffins Creek. The remaining watercourses were identified as minor conveyance features with small localized tributary areas that the proposed Transitway will not affect because of grade difference. Therefore, a hydraulic analysis was undertaken for 23 crossings. A drainage and stormwater management strategy was developed for the Transitway and five stations and parking lots at Markham Road, Ninth Line, Donald Cousens Parkway, Whites Road and Brock Road that minimizes impact on the existing watercourses and drainage system. Refer to Appendix C for details.
- **Secondary Source Groundwater Investigation:** Existing groundwater resources and hydrogeology in the study area were investigated to identify potential constraints to the implementation of the 407 Transitway. It provided an overview of the geology and hydrogeology within and adjacent to the study area and identified areas where dewatering may be required. It identified areas where the groundwater table is likely to be high. It concluded that further investigation and monitoring is necessary to assess the impacts to the groundwater regime during Detail Design.
- **Terrestrial Ecosystems:** An assessment of the potential effects of the Transitway on the existing natural heritage conditions was carried out for vegetation, wildlife, and designated natural areas within the study area. It concluded that the 407 Transitway will displace previously disturbed vegetation communities and wildlife habitat mostly characterized as urban. The 407 Transitway will encroach on the West Duffin's Creek

ESA and Cedar Grove Wetland Complex PSW. Eastern Meadowlark and Bobolink have potential to be present within the study area based on field investigations that confirmed the presence of suitable habitat. Consultation with TRCA, MNRF and Parks Canada have 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 Transitway on the fish and fish habitats located within the study area was undertaken. It concluded that the 407 Transitway will result in a temporary alteration and disruption of fish habitat. The mitigation measures proposed will minimize negative impacts to fish and fish habitat. The proposed works will take place between July 1 and September 15 in accordance with the coldwater/Redside Dace fisheries timing window, and July 1 and March 31 in accordance with the warmwater timing window. Works are also to be conducted during a period of low flow and precipitation to further reduce the potential impacts. Negative residual effects range from low to moderate, with a detailed self-assessment to be carried out during Detail Design. Consultation with MNRF have occurred regarding the potential impacts of this project to fish and fish habitat resources. Future consultation is committed during the Detail Design phase of this project.
- **Aesthetics, Landscape Planting:** This study provided an inventory and general evaluation of the existing tree communities and the aesthetic/visual conditions associated with the proposed 407 Transitway corridor and station sites. It noted that most of area of the 407 Transitway corridor is on vacant lands where evidence of natural regeneration of pioneer tree species is starting to occur. The most significant wooded areas along the corridor are located in valleyland areas associated with the major watercourses. It recommended a landscape planning design that will mitigate the visual impacts and impacts to the existing vegetation communities. A preliminary landscape concept was developed as part of this study. During Detail Design, consultation with agencies including Parks Canada, TRCA and MNRF will be conducted in the preparation of planting plans and landscape plans.
- **Noise and Vibration Impact Assessment:** A project-specific noise and vibration impact assessment was conducted. The assessment covered three scenarios: Existing Conditions (2015), Future without the 407 Transitway (2031) and Future with the 407 Transitway (2031). The assessment concluded that the future with the 407 Transitway will be under the MTO absolute sound level limit of 65dBA at all representative receptor locations for operations of both bus and LRT systems. The incremental impacts are less than the MTO criteria of +5dBA at all but two locations.
- **Air Quality Impact Assessment:** An air quality and 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 with detailed air dispersion modelling. Estimated concentrations of all pollutants of concern were shown to be below their corresponding ambient air quality criteria and standards, except benzo[a]pyrene and annual benzene which have background concentrations already above their respective AAQC limits. The project's contribution to the cumulative concentration of benzene for the annual averaging period is insignificant. Conversely, the project's contribution to the cumulative concentration of benzo[a]pyrene for the 24-hr and annual averaging periods is more substantial. However, since benzo[a]pyrene is assessed in significantly small quantities, model-predicted concentrations are very sensitive to even a minor increase in emissions. Compared to existing conditions (2015), NO₂, CO and SO₂ show a significant decrease in both Future Build and Future No-Build scenarios. All VOCs (i.e. acrolein,

acetaldehyde, benzene, 1,3-butadiene, formaldehyde and benzo[a]pyrene) stay relatively constant in both Future Build and Future No-Build scenarios. Significant changes at two receptors are shown for 24-hour benzo[a]pyrene, which are in close proximity to the proposed nearby stations. However, it should be restated that benzo[a]pyrene is assessed in significantly small quantities and therefore model-predicted concentrations are very sensitive to even a minor increase in emissions. Moreover, despite future increases in traffic volumes within the study area, these gaseous tailpipe emissions decrease due to improved engine technologies and better fuel standards. As a result, the increase in gaseous air pollutants attributable to the Project is deemed to be insignificant. Unlike gaseous air pollutants, TSP and PM₁₀ concentrations are predicted to increase in the “Future with the 407 Transitway” scenario relative to existing conditions. Although, the estimated increase in emissions of TSP and PM₁₀ are attributable to the Project, this increase is considered to be insignificant and the predicted concentrations are well below the applicable ambient air quality criteria, indicating no public health risk. The change in PM_{2.5} concentrations in the Future Build scenario relative to the Existing Conditions and Future No-Build scenarios is insignificant. Emissions of CO_{2e} are also shown to increase in the “Future with the 407 Transitway” scenario relative to future conditions without the Project as well as existing conditions. However, the percent change is less than 10% in both cases, therefore, the increase is considered to be insignificant.

- **Land Use Factors:** A secondary source information review was undertaken to identify existing land uses, designated land uses by municipality and future planned land uses in the study area. In general, land uses within the study area are compatible with the proposed Transitway, which will improve transit options in the general area. A number of small changes to existing land use designations will be required to reflect changes in the footprint of the Transitway. During Detail Design, further assessment will be required to refine impacts and determine appropriate mitigation measures.
- **Cultural Heritage Assessment:** Built heritage resources and cultural heritage landscapes located in and adjacent to the study area were identified. Ten cultural heritage resources were identified within or immediately adjacent to the study area. Out of the ten, one cultural heritage resource is listed by the City of Markham, two (Reesor Road properties) are designated under Part IV of the Ontario Heritage Act, and one (Old Brock Road property) cultural heritage resource was identified requiring a Cultural Heritage Evaluation and Heritage Impact Assessment (HIA). Of the ten, four are farmscapes, one is a historically surveyed road, three are watercourses noted on nineteenth century mapping, one is an early nineteenth century railway and one is a twentieth century recreational hiking trail. Cultural Heritage Evaluation and HIA was conducted for the three resources (Reesor Road properties and Old Brock Road property) identified to be potentially impacted by the Transitway. Copies of these reports were submitted to Infrastructure Ontario, City of Markham and City of Pickering. During Detail Design, where technically possible, further adjustments to the design will be explored to reduce potential impacts to the cultural heritage resources.
- **Stage 1 Archaeological Assessment:** A Stage 1 Archaeological Assessment was carried out in accordance with the *Ontario Heritage Act* (2005) and the *Standards and Guidelines for Consulting Archaeologists* (2011). Stage 2 Archaeological Assessment was recommended for all lands considered to have archaeological site potential and that may be disturbed by the proposed Transitway construction. Two identified archaeological sites were identified as requiring Stage 3 Site-Specific Assessment and another two archaeological sites were identified as requiring Stage 4 Mitigation of Development Impacts by

Protection and Avoidance. Stages 2, 3 and 4 Archaeological Assessments will be carried out during Detail Design.

- **Traffic Impact Assessment:** Project-specific Traffic Impact Assessments were conducted to determine future traffic impacts that may occur due to the construction and operation of the 407 Transitway. The assessment of 407 Transitway construction staging traffic impacts examined various construction stages and their impacts to arterial roadway traffic operations. The assessment covered three scenarios: without construction; with construction; and, with construction and a reversible traffic lane over two time periods - a.m. peak hour and p.m. peak hour. It concluded that most arterial roadways are projected to operate with reduced traffic capacities and worsening levels of service, particularly in the p.m. peak hour during construction. Where possible, the primary mitigation measure would consist of providing a reversible traffic lane during most construction stages, which is projected to help increase traffic capacity and improve levels of service at most arterial roadways. The assessment of 407 Transitway operations traffic impacts focused on the proposed location of 407 Transitway Stations and a study of area traffic operations. Station area traffic impacts were assessed for five proposed 407 Transitway Stations: Markham Road, Ninth Line, Donald Cousens Parkway, Whites Road and Brock Road. The assessment covered three analysis scenarios: (2010) Existing Condition, (2031) Background Condition and (2031) Future Total 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 during Detail Design to determine detailed impacts, and develop any necessary mitigation measures, monitoring and contingency plans.

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 will be built mostly within the Parkway Belt West Plan area, a previously approved 60 m Transitway ROW and Seaton Development Lands. 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 the removal of vegetation and disturbance to fish and wildlife habitat. The construction of Transitway

and associated facilities (i.e. stations, bridges, culverts, and stormwater management facilities) have the potential to affect surface water quality and quantity and groundwater recharge.

The socio-economic and cultural environment subsection identifies footprint-related impacts to built heritage features found within the study area and need for further archaeological investigations. 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/concern 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. Potential project effects on the utilities are identified and categorized as: conflict anticipated, potential conflict, and no conflict anticipated. Where conflicts are anticipated, mitigation measures are recommended and include utility relocation, taking test pits for further analysis, burying cables, safeguarding utilities during the construction stage, and extension of concrete culverts.

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 407 Transitway facilities result in minimum impacts to the terrain located within the study area as it will be located primarily where 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. Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (i.e. Ontario Provincial Standard Specification 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.

The management of excess soils will be further developed during Detail Design in consultation with MOECC.

Contaminated Property and Waste

Four properties located within the study area were identified as having environmental impacts to soil and/or groundwater from current or historical activities. Two properties (Hydro Distribution Station and Unknown Fill east of York Durham Line) require further assessment to determine whether subsurface investigations would be warranted (i.e. Phase I ESA is recommended). The Cresthaven Golf Course and the Markham Green Golf Course require subsurface environmental investigation to determine whether soil and/or groundwater impacts exist at the properties. Further assessment of these properties will be conducted during Detail Design

once the design of the Transitway is further refined. 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 impervious areas within the ROW, 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 Transitway facilities make up a total of approximately 42 ha of impervious surface.

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, and SWMF-7 at Brock Road Station will discharge to a cooling trench before flows enter Brougham Creek. This facility also provides 120 hour detention of the 25 mm quality design storm for erosion control. SWMF-6, which also discharges to Brougham Creek, will have a 3 m deep permanent pool to provide thermal mitigation. Additional mitigation measures, such as floating islands and permeable pavements, will be assessed for these facilities during Detail Design.

Groundwater

A reduction in groundwater recharge to the subsurface will occur as a result of the construction of impermeable surfaces. Based on the relatively large regional areas from which the local watersheds and aquifers derive recharge, the potential reduction in overall groundwater recharge is not expected to be significant. It is unlikely that the potential reduction in recharge would result in a measurable impact on groundwater recharge and discharge functions including baseflow in streams and water well supply quantity.

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. An investigation on foundations for all new bridges planned for the 407 Transitway will also be conducted during Detail Design.

Concerns regarding water well supply interference will be for only those wells that remain in active use. There is no information available to confirm if the wells in the water well records still exist or are currently in operation but it is expected that wells are only in use east of Donald Cousens Parkway. The effect of construction activities on the high water table areas and the associated potential discharge will be re-assessed during Detail Design.

Fish and Aquatic Habitat

There are a total of 31 watercourse crossings occurring within the project limits: 12 within the Rouge River watershed; one within the Petticoat Creek watershed; and, 18 within the Duffins Creek watershed. See **Section 3.1.5** of this report for watercourse locations. This project has potential to directly affect the watercourses as “Serious Harm to Fish” could result from the addition of new watercourse crossings, potential channel realignments, clearing of vegetation within the riparian areas (including wetland species), modification to drainage due to increased impermeable surfaces in the vicinity of the creeks, and the addition of storm water management features.

One aquatic species, Redside Dace (*Clinostomus elongatus*) is designated as Endangered both provincially and federally and is regulated by the provincial ESA. Several watercourses located along the 407 Transitway are also regulated under the ESA, 2007 due to the presence of occupied, contributing or recovery habitat for Redside Dace. According to the Act, “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.

Structures at watercourse crossing are anticipated to be similar to the existing 407 ETR crossings. The development of these structures will be further determined during Detail Design.

The following watercourses are classified as High sensitivity, and supporting occupied or contributing habitat for Redside Dace: R4; D11, D12; D13; D14; D15; D16; D17; and D18. These watercourses will likely require open-footed or spanning structures which do not have a footprint within the channel, outward to 30 m measured horizontally from the meander belt, or which are similar to those built recently for the 407 ETR crossings. Proposed design of structures shall follow all BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011). An ESA 17(2) (c) overall benefit permit may be required from the MNR if proposed works detrimentally affect the regulated habitat.

The following watercourses are classified as High sensitivity fish habitat, but do not support Redside Dace: R10; D1; and D3. In order to avoid causing a “Serious Harm to Fish” these watercourses will likely require open-footed or spanning structures which do not have a footprint within the channel or which are similar to those built recently for the 407 ETR crossings. Structures must be sized to ensure that fish passage will not be impeded, and designed in accordance with Section 5.5.3 in the MTO Fish Guide. A *Fisheries Act* authorization may be required from DFO depending on the type of work proposed. However, “Serious Harm to Fish” is unlikely if structures are designed in accordance with the MTO Fish Guide and mitigation and BMPs are implemented.

The following watercourses are classified as Moderate sensitivity fish habitat based on stream flow permanency, thermal regime, and whether the watercourse supports fish habitat directly or indirectly: R1 R2; R3; R5; R6; R7; R7-a; R8; D4; D8; D9; and D10. Culvert/structure type will be individually assessed by watercourse, in accordance with Section 5.5.3 in the MTO Fish Guide, and that will avoid causing “Serious Harm to Fish”. At watercourses supporting direct fish habitat, passage and habitat provision will be important and thus open bottomed culverts or box culverts that are embedded with substrates may be options. At those watercourses that provide indirect fish habitat, the maintenance of flows will be important, but not provision

of fish passage. At these crossings, pipe culverts could be selected.

The following watercourses were determined to not support fish habitat (directly or indirectly) based on field investigations and consultation with MNR: R11; D5; D6; and D7. As such, further fisheries investigations are not required at these locations, and design can go ahead without additional fisheries consideration. Although these features do not provide fish habitat, standard mitigation and BMPs identified below in **Section 6.3** will be followed to mitigate impacts on water quality of the surface drainage features adjacent to the study area.

Watercourses R1; R2; R3; and R5, which function as contributing habitat for Redside Dace will be required to follow all BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011). A 17(2) (c) overall benefit permit under the ESA may be required from the MNR if proposed works detrimentally affect the regulated habitat. MNR will be further consulted during later stages of the project to determine which watercourses will be subject to the above requirements.

Vegetation and Vegetation Communities

Effects on vegetation 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 approximately 107.6 ha of vegetation communities which includes a loss of 86.2 hectares (ha) due to the runningway, and a loss of 21.3 ha due to the stations. Collectively, this will result in impacts to both terrestrial and wetland habitats. 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** presents a summary of the vegetation removals within the Transitway runningway and stations, respectively.

Kennedy Road to West of Markham Road

A total of 18.22 ha of naturalized and/or planted area will be removed as a result of the proposed 407 Transitway runningway. The largest impact will be to cultural meadow communities (CUM1-1a and b). Overall, impacts resulting in the loss of vegetation within these cultural meadow communities is considered to be minor. 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 ROW post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

In addition impacts will occur to one forest (FOD7a) and one wetland (MAS2-1a) community. Edge impacts will occur to the Lowland Deciduous Forest community. New forest edges are exposed to a greater potential for non-native and invasive species infiltration further into the forest, and as such, forest edge management is recommended. Impacts to the shallow marsh community will result in the removal of the majority of the wetland. Shallow marsh communities are widespread and common throughout Ontario and as a result, impacts are considered to be minor.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands, hedgerows and a SWM Pond. Impacts to these lands are considered to be minor.

TABLE 6.3: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY RUNNINGWAY

TRANSITWAY SEGMENT	TOTAL AREA TO BE IMPACTED (HA)
<i>Kennedy Road to West of Markham Road</i>	
Cultural Communities (CUM1-1a and b)	10.93
Forest Communities (FOD7a)	1.30
Wetland Communities (MAS2-1a)	0.11
Anthropogenically Influenced Lands (Agricultural, Hedgerow, and SWM Pond)	5.88
<i>Subtotal Kennedy Road to West of Markham Road</i>	<i>18.22 ha</i>
<i>Markham Road Station to Ninth Line Station</i>	
Cultural Communities (CUM1-1/MAS, CUM1-1b to d, and CUT1a)	8.75
Forest Communities (FOC2-2a, FOC4-1a, FOD7b, and FOM7-1a)	1.46
Wetland Communities (MAS2-1b)	0.30
Anthropogenically Influence Lands (Agricultural, Manicured, Hedgerow, and SWM Pond)	1.47
<i>Subtotal Markham Road Station to Ninth Line Station</i>	<i>11.98 ha</i>
<i>Ninth Line Station to Donald Cousens Parkway</i>	
Cultural Communities (CUM1-1c and CUW1c)	5.104
Wetland Communities (MAS2-1c and SWTa)	0.91
Anthropogenically Influence (Manicured)	0.04
<i>Subtotal Ninth Line Station to Donald Cousens Parkway Station</i>	<i>6.054 ha</i>
<i>Donald Cousens Parkway to Whites Road Station</i>	
Cultural Communities (CUM/MAM, CUM1-1d to k, CUS1a and b, and CUW1e and f)	18.36
Forest Communities (FOC, FOC2-2b, FOC4-1 b and c, FOM7-1b, and FOM7-2)	2.34
Wetland Communities (MAM2-2 a and b, MAM2-5, MAS2-1e and SWTb)	1.36
Anthropogenically Influence Lands (Agricultural, Manicured, Hedgerow, and SWM Pond)	8.52
<i>Subtotal Donald Cousens Parkway Station to Whites Road Station</i>	<i>30.58 ha</i>
<i>Whites Road Station to Rossland Road</i>	
Cultural Communities (CUM1-1k and l)	4.18
Forest Communities (FOD5 and FOD7-2)	0.97
Wetland Communities (MAM2-2c and d, MAS2-1f, and SWTc)	0.89
Anthropogenically Influence Lands (Agricultural, and Hedgerows)	3.48
<i>Subtotal Whites Road Station to Rossland Road Station</i>	<i>9.52 ha</i>
<i>Rossland Road to Brock Road Station</i>	
Cultural Communities (CUM1-1l and j, and CUW1g)	2.74
Forest Communities (FOC1-2, FOC4-1d, FOC6-5b, and FOD7)	3.70
Wetland Communities (OAO, SWC1-1, MAM2-10 and MAS2-1g)	0.97
Anthropogenically Influence Lands (Agricultural)	0.32
<i>Subtotal Rossland Road Station to Brock Road Station</i>	<i>7.73 ha</i>
<i>Transitway East of Brock Road Station</i>	
Cultural Communities (CUM1-1m, and CUS1c)	0.97
Forest Communities (FOC4-1d)	1.18
<i>Subtotal East of Brock Road Station</i>	<i>2.15 ha</i>
<i>Total Impacted Area (ha) for the Transitway Runningway</i>	<i>86.234</i>

TABLE 6.4: SUMMARY OF VEGETATION REMOVALS WITHIN THE TRANSITWAY STATIONS

TRANSITWAY SEGMENT	TOTAL AREA TO BE IMPACTED (HA)
<i>Markham Road Station</i>	
Cultural Communities (CUM1-1c and CUW1a)	1.24
Wetland Communities (MAS2-1b)	0.13
Anthropogenically Influenced Lands (Agricultural)	3.57
<i>Subtotal Markham Road Station</i>	<i>4.94 ha</i>
<i>Ninth Line Station</i>	
Cultural Communities (CUM1-1c)	8.14
<i>Subtotal Ninth Line Station</i>	<i>8.14 ha</i>
<i>Donald Cousens Parkway Station</i>	
Cultural Communities (CUM1-1d and CUT1b)	2.41
Anthropogenically Influence Lands (Manicured)	0.06
<i>Subtotal Reesor Road Station</i>	<i>2.47 ha</i>
<i>Whites Road Station</i>	
Cultural Communities (CUM1-1k)	0.07
Anthropogenically Influence Lands (Agricultural and Hedgerow)	4.26
<i>Subtotal Whites Road Station</i>	<i>4.33 ha</i>
<i>Brock Road Station</i>	
Anthropogenically Influence Lands (Agricultural and Hedgerow)	1.47
<i>Subtotal East of Brock Road Station</i>	<i>1.47 ha</i>
<i>Total Impacted Area (ha) for the Stations</i>	<i>21.35 ha</i>

Markham Road Station

Construction of the Markham Road Station will result in the removal of a portion of cultural meadow (CUM1-1c) and cultural woodland (CUW1a). Cultural communities typically persist in areas that are subject to regular disturbance. Consequently, impacts to the cultural communities are considered to be minor. In addition, a small portion of cattail shallow marsh (MAS2-1b) will be removed as a result of the proposed construction of the Markham Road Station. Efforts will be made to retain the remaining portions of the shallow marsh community post-construction. Shallow marsh communities are widespread and common across Ontario.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands and hedgerows. Impacts to these lands are considered to be minor.

Markham Road Station to Ninth Line Station

A total of seven ELC community types will be affected as a result of the proposed Transitway runningway between the Markham Road Station and Ninth Line Station including cultural meadow (CUM1-1), cultural thicket (CUT1), coniferous forest (FOC2-2a and FOC4-1a), lowland deciduous forest (FOD7b), white cedar-sugar maple deciduous forest (FOM7-1) and cattail shallow marsh (MAS2-1b), with a total of 11.98 ha of land 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 meadow and cultural thicket communities are considered to be minor.

Impacts to the FOC2-2a and FOM7-1 communities will result in the removal of the edge of the community adjacent to 407 ETR. Forest edge management will be implemented to protect the newly exposed forest edge. Impacts to the FOD7b and FOC4-1a will result in the removal of the majority of the community. Compensation will be provided for the removal of these two forest communities.

Impacts to the cattail shallow marsh community will result in the removal of a large portion of the community adjacent to 407 ETR. Efforts will be made to retain the remaining portion of the MAS2-1b community to the extent possible. Cattail shallow marsh communities are widespread and common in Ontario and the loss of a portion adjacent to the preferred runningway is not expected to have any negative impacts to the remaining portions of cattail shallow marsh within the study area.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands, hedgerow, manicured lands and a SWM Pond. Impacts to these lands are considered to be minor.

Ninth Line Station

Impacts associated with the construction of the Ninth Line Station will occur to a cultural meadow (CUM1-1c) community. Cultural meadow communities typically persist in areas that are subject to regular disturbance. Consequently, impacts to the cultural meadow communities are considered to be minor. Cultural Meadows are widespread and common throughout Ontario.

During the PIC concerns were raised by local residents in regards to the location of the Ninth Line Station. Impacts associated with the potential construction of the Ninth Line Station on the east side of Ninth Line will result in the removal of 6.38 ha of natural areas including cultural meadow (CUM1-1d), cultural woodland (CUW1b), cattail shallow marsh (MAS2-1c), and swamp thicket (SWTa). Impacts to the cultural communities are considered to be minor. Impacts to the shallow marsh (MAS2-1e) will remove the majority of the community and only a small portion will remain. It is likely the remaining portion of the shallow marsh community will persist post construction. Impacts to the swamp thicket will involve the removal of a portion of the community, only a small portion of this community will be retained. Efforts will be made to ensure the remaining portion of this swamp thicket community is retained.

Ninth Line Station to Donald Cousens Station

Impacts to vegetation communities between Ninth Line and the Donald Cousens Future Potential Station will result in the removal of approximately 6.054 ha of vegetation communities including the removal of a portion of cultural meadow (CUM1-1c), cultural woodland (CUW1c), shallow marsh (MAS2-1d), swamp thicket (SWTa) and manicured lands.

Impacts to the cultural meadow (CUM1-1c) and cultural woodland (CUW1c) are considered to be minor. 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 cattail shallow marsh (MAS2-1d) and swamp thicket (SWTa) will result in the removal of a small portion of the northern edge of each community. These wetland communities form part of the newly designated Provincially Significant Cedar Grove Wetland Complex. The runningway will cross over these areas in order to avoid and/or minimize impacts to this wetland complex. Impacts to anthropogenically influenced lands will include the removal of a portion of manicured lands. Impact to these manicured lands are considered to be minor.

Donald Cousens Parkway Station

Impacts associated with the construction of the Donald Cousens Parkway Station will occur to cultural meadow (CUM1-1d) and cultural thicket (CUT1b). Impacts to the cultural communities is considered to be minor. Impacts to anthropogenically influenced lands will include the removal of a portion of manicured lands. Impacts to these lands are considered to be minor.

Donald Cousens Parkway Station to Whites Road Station

Impacts to vegetation communities between Donald Cousens Parkway Station to Whites Road Station will result in the removal of approximately 3.58 ha of vegetation communities including the removal of a portion of cultural meadow (CUM/MAM, CUM1-1d to k), cultural savannah (CUS1a and b), cultural woodland (CUW1e and f), coniferous forest (FOC, FOC2-2b, FOC4-1b and c), mixed forest (FOM7-1b and FOM7-2), meadow marsh (MAM2-2a and b, MAM2-5), shallow marsh (MAS2-1e) and swamp thicket (SWTb).

Impacts to the cultural meadow (CUM/MAM, CUM1-1d to k), cultural savannah (CUS1a and b), and cultural woodland (CUW1e and f) are considered to be minor. 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.

Construction of the runningway will result in the removal of the northern edge of the white cedar coniferous forest (FOC2-2b and FOC4-1b and c), ash lowland deciduous forest (FOM7-2) and white cedar-sugar maple mixed forest (FOM7-1b). Though removal of the northern portion of the communities can have a negative impact, the adjacent forest lands are large and will likely continue to persist post-construction. Forest edge management will be implemented to protect the newly expose forest edges. Impacts to the coniferous forest (FOC) community will result in the removal of a small portion of the southern edge of the community. The coniferous forest community is highly disturbed as a result of the existing 407 ETR alignment and as a result, impacts to the FOC community are considered to be minor.

Impacts to the meadow marsh (MAM2-2a and b), cattail shallow marsh (MAS2-1e) and swamp thicket (SWTb) will result in the removal of a small portion of the northern edge of each community. These wetland communities are widespread and common throughout Ontario and the loss of a portion of these vegetation communities is not expected to have any negative impacts to the remaining portions within the study area. Impacts to the narrow leaved sedge meadow marsh (MAM2-5) and green ash deciduous swamp (SWD2-2) will result in the removal of the majority of the community, it is likely this community will cease to exist post-construction. Compensation will be provided for the impacts to these wetland communities.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands, hedgerow, manicured lands and a SWM Pond. Impacts to these lands are considered to be minor.

Rouge National Urban Park

The Rouge National Urban Park transverses the study area within this section, although the 407 Transitway corridor does not fall within the park boundaries. It starts east of the CP/Havelock Railway (Proposed GO Line) tracks eastward to York Durham Line. Impacts to vegetation communities within this subsection will result in the removal of approximately 10.17 ha of vegetation communities including 1.25 ha of wetlands (SWT2b, STW2-2b, MAM2-2a, MAS2-1e), 5.62 ha of cultural meadow (CUM1-1e, CUM1-1f, CUM1-1g, CUM1-1h), 0.14 ha of deciduous forest (FOM7-1b), 0.76 ha of coniferous forest (FOC4-1b, FOC2-2b,FOC), 2.39 ha of hedge and agricultural areas.

Whites Road Station

Construction of the Whites Road Station will result in the removal of a portion of cultural meadow, agricultural lands and hedgerow. Overall, impacts to vegetation and vegetation communities are considered to be minor. It is anticipated plant species displaced and/or disturbed within the cultural meadow community will re-colonize available lands adjacent to the Whites Road Station.

Whites Road Station to Rossland Road

Impacts to vegetation communities between Whites Road Station and Rossland Road will result in the removal of approximately 9.52 ha of vegetation communities including cultural meadow (CUM1-1k and l), deciduous forest (FOD5 and FOD7-2), and wetland communities (MAM2-2c and d, MAS2-1f, and SWTc).

Cultural meadow communities are typically disturbance tolerant vegetation communities dominated by non-native and invasive plant species and as such, removal of a portion of cultural meadow communities is considered to be minor.

Impacts to the sugar maple deciduous forest (FOD5) will result in the removal of the entire portion of the community with an exception of a narrow strip adjacent to the existing 407 ETR. Impacts to the lowland deciduous forest (FOD7) community will result in the removal of a small portion of the southern edge of the community and as such, these impacts are considered to be minor. Forest edge management is recommended along the new edge of the FOD7 community.

Impacts to the cattail shallow marsh (MAS2-1f), meadow marsh (MAM2-2c and d), and swamp thicket (SWTc) will result in the removal of a portion of the edge of each community. Efforts will be made to retain the remaining portion of these wetland communities to the extent possible. All of these wetland community types are widespread and common in Ontario.

Impacts to anthropogenically influenced lands will include the removal of a portion of agricultural lands and hedgerows. Impacts to these lands are considered to be minor.

Rossland Road to Brock Road Station

A total of 7.73 ha of vegetation and vegetation communities will be removed as a result of the 407 Transitway

preferred runningway between the Rossland Road Station and Brock Road Station. Impacts will occur to cultural meadow (CUM1-1l and j) communities, cultural woodland (CUW1g), coniferous forest (FOC1-2, FOC4-1d), deciduous forest (FOD6-5b and FOD7), and wetland communities (MAM2-10, MAS2-1g, OAO, and SWC1-1).

Impacts to the cultural meadows (CUM1-1l and j) and cultural woodland (CUW1g) are considered to be minor. 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 coniferous forest (FOC1-2, FOC4-1d) and deciduous forest (FOD6-5b and FOD7) will bisect the northern portion of the communities, creating a forest fragment. Though forest fragmentation can have a negative impact, the remaining portion of these communities to the south are large and as such, it is likely they will continue to persist post-construction. Forest edge management is recommended to prevent further impacts to the coniferous and deciduous forest communities.

Construction of the 407 Transitway will result in the removal of a small portion of the open aquatic (OAO) and coniferous swamp (SWC1-1). Impacts to the meadow marsh (MAM2-10) and shallow marsh (MAS2-1g) will remove a large portion of the community and only small fragments will remain. Efforts will be made to retain the remaining portion of these wetland communities to the extent possible. All of the above mentioned wetland communities are widespread and common in Ontario.

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

Brock Road Station

Impacts to vegetation and vegetation communities associated with the construction of the Brock Road Station will result in the removal of a portion of agricultural lands and hedgerow. A portion of the Brock Road Station has already been cleared for the Highway 407 East – Phase 1. Overall, impacts to vegetation and vegetation communities are considered to be minor.

East of Brock Road Station

Impacts to vegetation communities east of Brock Road will result in the removal of approximately 2.15 ha of vegetation communities including the removal of a portion of a cultural meadow, cultural savannah and coniferous forest. Impacts to the cultural meadow (CUM1-1m) and cultural savannah (CUS1c) community are considered to be minor. Both cultural meadow and cultural savannah are disturbance tolerant vegetation communities dominated by non-native and invasive plant species. These communities are widespread and common throughout Ontario.

The impact to the coniferous forest communities will involve the removal of a small portion of the coniferous forest (FOC4-1d) adjacent to Highway 7. Newly exposed forest edges are exposed to a greater potential for non-native and invasive species infiltration further into the forest. Therefore forest edge management is recommended to prevent negative impacts to the remaining portions of sugar maple deciduous forest.

Removal of Wetland and Forest Communities

Compensation for the removal of wetland and forest communities will be provided. Compensation will be provided at a rate determined with agencies during Detail Design.

Impacts to wetland communities within the study area will primarily be to wetlands which have developed due to the presence of drainage ditches, have been created due to concentrated development which has resulted in increased runoff in localized areas, as well as wetlands along low grade areas along agricultural fields. These wetland vegetation communities include meadow and shallow marshes, swamp thickets and deciduous swamps. However, the function of these wetlands, as well as habitat qualities still provide a valuable function that includes 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 Transitway and its related components, that being said, mitigation/compensation for the impacts to wetlands will be undertaken during Detail Design.

Impacts to forest communities within the study area will primarily result in the creation of new forest edges. 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;
- changes to hydrology; and,
- increased noise.

Forest edge management will be implemented to protect the new community edge as the majority of forests within the study area are components of larger valley systems.

Forest edge management in accordance with the TRCA *Forest Edge Management Plan Guidelines* (2004) is recommended at the forest communities described above. 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 will 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 will be somewhat similar to those in the adjacent habitat and be non-invasive in nature.

- Grading within areas where edges will be newly created will 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 will be site specific. Where decompaction is required, it will extend to a minimum depth of approximately 25 cm.
- Drainage patterns adjacent to newly created edges will 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.
- A plan will be in place to immediately mitigate the spread/invasion of aggressive plant species.
- A monitoring plan will be developed to ensure that the newly planted material survives and fulfils the intended function and to ensure that the inadvertent spread of aggressive or non-native plant species is appropriately managed.

A detailed planting plan will be developed during Detail Design once areas identified for restoration have been determined. It is recommended that the planting of forest and wetland habitat be undertaken with the appropriate native and non-invasive plant species which will be presented on site-specific plans to be developed by an experienced landscape architect.

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 BMPs that are to be followed in the planting and tending of these sites. In particular, management will need to be undertaken for those invasive/ aggressive plant species.

Displacement of Rare, Threatened or Endangered Vegetation and Vegetation Communities

A total of 14 butternut trees were identified during the botanical survey. The butternut trees are located over 25 m away from the Transitway runningway. Consequently, no impacts to the identified butternut trees are anticipated and as such, no requirements under the ESA, 2007 are needed to address the presence of these trees. A detailed butternut survey will be conducted during Detail Design to ensure no butternut seedlings are present within the preferred runningway and station locations.

A total of 35 TRCA plant species of concern were identified within the study area. Efforts will be made during the Detail Design and construction phase to avoid regionally rare plants that will be affected due to the proposed 407 Transitway and associated station. During Detail Design, further discussions will be carried out with TRCA to explore opportunities to salvage regionally rare plant species that cannot be avoided.

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;
- 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.

Kennedy Road to West of Markham Road

Much of the habitat within this segment consists of cultural meadow or active agricultural lands. A small deciduous forest and a small marsh are also present as well as a stormwater management pond. The natural heritage features potentially affected by the 407 Transitway runningway consist entirely of disturbed low quality wildlife habitat. 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 human development.

Markham Road Station

Construction of the Markham Road Station will result in the removal of a portion of an agricultural field, cultural meadow and cultural woodland habitat. It will also be constructed directly adjacent to marsh habitat. The impacts to these communities are considered to be minor. Efforts will be made to retain the remaining portions of the shallow marsh community post-construction.

Markham Road Station to Ninth Line Station

The runningway in this section will affect cultural meadow, marsh and forest habitat. Residential development is much closer to the runningway in this section than in the previous one. However, a large valley exists in which a substantial buffer is present. The cultural meadow west of the Ninth Line Station has the potential to contain Eastern Meadowlark and/or Bobolink habitat, although none were observed during field investigations. As such, the species in this area may be more sensitive to disturbance than the communities in other portions of this segment. However, as mentioned above, 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.

Ninth Line Station

Impacts associated with the construction of the Ninth Line Station will occur to a cultural meadow community, the western portion of which could potentially be Eastern Meadowlark and/or Bobolink habitat. Although

these communities are subject to regular disturbance, especially in this urban setting, and they are widespread and common throughout Ontario, further surveys for species at risk will be conducted in the western portion of this station location prior to construction to ensure that no species at risk are affected by the construction of this station.

During the PIC held in April 2015, concerns were raised by local residents in regards to the location of the Ninth Line Station. Impacts associated with the construction of the Ninth Line Station on the east side of Ninth Line will occur to cultural meadow, cultural woodland, marsh and swamp habitat. The impacts to the cultural communities are considered to be minor whereas the impacts to the marsh will remove the majority of the community. The wetland habitat is associated with a tributary of the Rouge River (R5), which will need to be piped or realigned to accommodate the station. Although no SAR were observed in the wetland, habitat-specific species exist there (e.g., Swamp Sparrow - *Melospiza georgiana*) and will be displaced. Efforts will be made to ensure the remaining portion of this community is retained.

Ninth Line Station to Donald Cousens Parkway Station

The majority of the lands within this segment consist of cultural meadow and marsh habitats. No significant species or habitat are located in this section and a relatively large buffer exists for much of the area south of the runningway. 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.

Donald Cousens Parkway Station

Impacts associated with the construction of the Donald Cousens Parkway Station will occur to cultural meadow and cultural thicket habitats, and marsh habitat associated with an existing stormwater management pond. The cultural meadow/thicket communities provide potential habitat for Eastern Meadowlark and/or Bobolink in this area. In addition, Barn Swallow were observed in these habitats and could potentially be using the barn structures in the southeast portion of this area for nesting. As such future surveys are needed during the appropriate seasons to determine whether these SARs are present in this habitat. In addition, impacts associated with the construction of this station will occur to manicured lands with limited habitat capability. Overall, impacts resulting in the loss of these manicured lands are considered to be minor.

Donald Cousens Parkway Station to Whites Road Station

The relatively long section of runningway between these two stations consists mainly of cultural vegetation communities bordering agricultural lands. There are two large, forested valley crossings as well, one of which is associated with the West Duffins Creek Environmentally Significant Area. The runningway will be bisecting this designated area. In addition, there is a small portion of the Locust Hill Wetland Complex, a non-provincially significant wetland that will be affected by the runningway to the west of York Durham Line. The forested valleys and wetland habitats have previously been disturbed by the creation of the 407 ETR corridor. However, impacts to these areas are anticipated. In order to minimize effects, the Transitway runningway will span over the valley crossings within the West Duffins Creek to the extent possible. The design of these structures will be refined during Detail Design. Effects on all other cultural and agricultural habitats are expected to be minor as no significant wildlife species or habitats were noted during field investigations in

these areas.

Whites Road Station

Construction of the Whites Road Station will result in the removal of a portion of agricultural lands and hedgerow. Overall, impacts to wildlife habitat are considered to be minor.

Whites Road Station to Rossland Road

The majority of the habitat in this segment consists of cultural meadows and agricultural lands. There are two significant valley crossings as well, which are forested. With the exception of the valleys, no significant effects on wildlife and wildlife habitat are expected to occur as a relatively large buffer exists to the south located between the 407 Transitway and human landscapes. With regard to the valleys, a small area of forest cover will be removed, but these removals will be along edges previously disturbed by the creation of the 407 ETR corridor. As such, limited negative effects are anticipated.

Rossland Road to Brock Road Station

Most of the wildlife habitat in this segment consists of agricultural lands and cultural meadows and hedgerows. A small deciduous forest and swamp habitat will also be affected. Efforts will be made to minimize impacts to these two habitats as they are not commonly occurring throughout the 407 Transitway corridor.

Brock Road Station

The construction of the Brock Road Station will result in the removal of a portion of agricultural lands and hedgerow. A portion of the Brock Road Station has already been cleared for the Highway 407 East - Phase 1. Overall, impacts to wildlife and wildlife habitats are considered to be minor.

East of Brock Road Station

Much of the land within this segment is currently under construction for the Highway 407 East - Phase 1. The eastern portion of this segment consists of a coniferous forest associated with Brougham Creek. Efforts will be made to minimize impacts to this forest habitat.

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

Three species at risk have been identified as potentially being present within the 407 Transitway study area based on records from the Natural Heritage Information Centre or based on field surveys undertaken in 2015. Eastern Meadowlark, Barn Swallow and Bobolink are listed and are regulated as 'Threatened' under the ESA.

Field investigations conducted in 2015 have concluded that Eastern Meadowlark and Bobolink have the potential to be present within the study area in two locations. Both of these locations will be affected by the construction of stations: Ninth Line Station and Donald Cousens Parkway Station. During Detail Design, further field investigations, undertaken during the appropriate season using MNRF protocols for surveying for these species, will be conducted to establish their presence or absence, and, the appropriate steps for protection and permitting.

No new barriers to wildlife passage are expected to occur as a result of the construction of the 407 Transitway. All major corridors associated with valleylands will be maintained and new crossings will mimic the existing crossings to facilitate wildlife passage. The bridge structures at several watercourse/valley crossings within the study area provide the only significant wildlife passage corridors as the entire 407 ETR corridor is fenced and/or the smaller existing culvert associated with small watercourse crossings do not accommodate wildlife passage. These crossings are (from west to east): Rouge River (R4); Little Rouge Creek (R10); West Duffins Creek and tributaries (D1, D2, D3); Urfe Creek (D15), Brougham Creek (D16) and Brougham Creek (D17). At present, these large structures provide passage to both small wildlife species (e.g., raccoons, frogs) and large species (e.g., white-tailed deer). The fencing mentioned above also functions to funnel wildlife species towards these corridors by forcing them to move laterally until they reach a suitable crossing area.

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 analyzing a structure's component measurements (i.e., height x width / structure length). Generally, a greater OR value is expected to increase the likelihood of wildlife utilization of a given structure or culvert. To maximize the OR, structures should be designed to have a larger opening and the shortest length 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. A minimum clearance height of 3 m for structures that will provide passage for large animals is recommended. In addition, natural substrates will be used to encourage wildlife to utilize crossing structures. Ground cover will be continuous with the substrates found outside and adjacent to the structural entrances thereby encouraging animals to pass through the structure (Yanes *et al.* 1995).

During Detail Design, or once structure sizes are confirmed, OR can be calculated for each of the new structures to determine whether large animals can use the structures for passage. It should be noted that structures sizes for the 407 ETR are already 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.

Designated Natural Areas

The runningway will traverse a portion of the Cedar Grove Provincially Significant Wetland Complex and the West Duffins Environmentally Significant Area. The runningway will be span the wetland complex and the environmental significant area to minimize any impacts. No impacts will occur to the Provincially Significant Milne Park Wetland Complex as it is located north of 407 ETR.

Rouge National Urban Park

The area between the CP/Havelock Railway (Proposed GO Line) and York Durham Line is part of the Rouge National Urban Park. The Management Plan for this park indicates that all above-ground provincial, municipal, and regional infrastructure is excluded from the Park boundaries. The Transitway runningway is proposed to be located outside the boundaries of the park and efforts will be made to minimize impacts to the adjacent natural environment to support the Management Plan objectives and targets, where feasible. Watercourse crossings are required at the Little Rouge Creek, an unnamed watercourse, and Petticoat Creek. In addition, a portion of the Non-Provincially Significant Locust Hill Wetland Complex will be affected by the runningway.

During Detail Design, consultation with Parks Canada will be conducted on developing landscape plans, vegetation restoration and forest edge management plans in order to be compatible with the Park’s objectives.

One of the Management Plan objectives is to explore the feasibility and utility of a park shuttle that connects areas within the park to public transportation hubs. During Detail Design, discussions will be held with Parks Canada regarding future opportunities for a park shuttle to connect to Transitway Stations.

The MTO owns the lands along the Highway 407 infrastructure corridor within the Rouge National Urban Park. These lands have been excluded from the Management Plan’s Rouge National Urban Park area, as it is identified as part of the provincial infrastructure network. The runningway will be located within these segregated lands, south of the existing Highway 407. In addition, there is a parcel of land located at York Durham Line and Highway 407 that is identified as ‘MTO Property Protection’. These lands are being protected to accommodate environmental compensation activities associated with this project.

Environmentally Significant/Sensitive Areas

Impacts to the West Duffins Environmentally Significant Area are anticipated. In order to minimize effects, the Transitway runningway will span over the valley crossings within the West Duffins Creek to the extent possible. The design of these structures will be refined during Detail Design and consultation with regulatory agencies will take place to discuss the implementation of mitigation measures and compensation.

Non-provincially Significant Wetlands

No impacts will occur to the Whitevale Wetlands. A small portion of the Locust Hill Wetland west of York Durham Line will be removed. Compensation for the removal of this wetland feature is recommended.

Air Quality

Footprint impacts to air quality do not apply. Please see **Sections 6.3** and **6.4** for construction, and operations and maintenance impacts.

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	Management of excess soil Potential for grading changes	A large volume of soil will be displaced by excavation activities. Excess soil may be generated that cannot be reused within the study area. The excess soil may be stained, odorous, containing debris or found to be contaminated. These excess soils will require management as waste. Regrading may be required.	Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (i.e. Ontario Provincial Standard Specification 180 – General Specification for the Management of Excess Materials, <i>Management of Excess Soil – A Guide for Best Management Practices</i> (2014)) will be used when developing an Excess Materials Management Plan. The management of excess soils will be further developed during Detail Design and in consultation with MOECC.	If excavation is required in areas identified to be ‘highly likely’ to have waste or contamination, intrusive environmental investigations (i.e. Phase 2 Environmental Site Assessment) 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.
Contaminated Property and Waste	Potential footprint impacts to contaminated property and waste.	Several properties within the study area have a history of development and there may be issues of potential environmental concern associated with these properties that were not evident based on the level of assessment. Two properties require further assessment to determine whether subsurface investigations would be warranted (a Phase 1 ESA is recommended). The two properties are the Hydro Distribution Station (near Markham Road Station) and Unknown Fill located east of York Durham Line. Two properties require subsurface environmental investigation to determine whether soil and/or groundwater impacts exist at the properties. The two properties are Cresthaven Gold Course and Markham Green Gold Course. See Table 6-6 for construction impacts to contaminated property and waste.	Once the design of the Transitway is refined during Detail Design, a Phase 1 ESA will be conducted for the Hydro Distribution Station and Unknown Fill if applicable. Also, subsurface environmental investigation to determine whether soil and/or groundwater impacts exist at the two Golf Courses will be conducted during Detail Design, as applicable.	Conduct Phase 1 ESA for Hydro Distribution Station and Unknown Fill if applicable and subsurface investigation at two golf courses..

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
Surface Water, Drainage and Stormwater	<p>Possible impacts on existing drainage patterns along 407 ETR due to proposed grading of the Transitway</p> <p>Increase level of imperviousness, increased runoff volumes to watercourses</p> <p>Floodplain water level increases</p> <p>Water quality degradation</p> <p>Impacts of climate change – increase flooding and extreme weather events- on the 407 transtway infrastructure</p>	<p>Pond LR-1 upstream of Donald Cousens Parkway Station may be impacted by the proposed 407 Transitway. The existing 407 ETR pond LR-5, east of WC#18 may be impacted by the proposed 407 Transitway existing facility. The existing pond 03West, located north of Brock Road Station may be impacted by the proposed 407 Transitway.</p> <p>There are potential impacts to water quality, quantity, temperatures, sediment loads, and seasonal and daily flow variations.</p> <p>Potential flooding in the area.</p>	<p>It is recommended that pond LR-1 be re-graded to suit proposed transitway profile; retaining walls may be required on the north side of the Transitway.</p> <p>Pond re-grading may be required due to proposed embankments of the 407 Transitway encroaching into the existing facility. Regrading of pond embankment may be required to allow grading of the proposed 407 Transitway embankment.</p> <p>SWM measures include wet ponds at each station location, and enhanced swales in a form of dry ponds for transitway sub-areas.</p> <p>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.</p> <p>Additional capacity was incorporated in the drainage design to increase resiliency against potential for extreme weather events arising from climate change such as:</p> <ul style="list-style-type: none"> ▪ Increased clearances at all crossings between the high water level and the underside of bridges; ▪ Increased freeboard for the majority 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. <p>Incorporation of green roadways, permeable pavements, LID features and green technologies will be considered during Detail Design.</p>	<p>Summer maintenance and cleaning of sediments in the SWM ponds will be undertaken.</p> <p>The SWF will be monitored after large storm events.</p> <p>Consider green roadways, permeable pavements, LID features and green technologies during Detail Design.</p>
Groundwater	<p>Potential alterations to the groundwater regime and recharge due to the construction of the Transitway facilities</p> <p>Potential for groundwater contamination</p>	<p>A reduction in groundwater recharge to the subsurface will occur as a result of the expansion or construction of impermeable pavement surfaces. New impermeable surfaces associated with the Transitway road and the station locations will reduce the overall recharge within the study area.</p> <p>Profile lowering, ditch relocations, embankments, drainage improvements and utility installations have the potential to permanently dewater or lower the local water table.</p> <p>Approximately 30 shallow bored wells are present in the east portion of the study area. The greatest potential for well interference would be associated with deep excavations and/or construction dewatering.</p>	<p>Recharge lost to impermeable surfaces can in part be mitigated by direction of runoff to ground surfaces, by the construction of permeable pavements or by other low-impact development infiltration techniques.</p> <p>Discharge functions within the study area may be reduced depending on the final Detail Design of the proposed works.</p>	<p>Reassess the potential impacts along with more detailed site specific hydrological data during Detail Design and incorporate appropriate mitigation measures into the design.</p> <p>Effectiveness of mitigation measures will be assessed through direct investigation during construction.</p>
Fish and Aquatic Habitat	<p>Potential impacts to fish habitat and fisheries resources</p>	<p>This project will directly affect the watercourses. “Serious Harm to Fish” could result as a result of the proposed works with the addition of new watercourse</p>	<p>During Detail Design the following design considerations will be investigated to mitigate any effects:</p> <ul style="list-style-type: none"> ▪ For watercourses classified as High sensitivity fish habitat and support Redside Dace 	<p>Because the proposed works will affect the habitat of Redside Dace in regulated watercourses, it is likely that permitting will be required during Detail Design. A 17(2)</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>crossings, potential channel realignments, clearing of vegetation within the riparian areas (including wetland species), modification to drainage due to increased impermeable surfaces in the vicinity of the creeks, and the addition of storm water management features.</p> <p>Several watercourses being affected by the Transitway corridor are also regulated under the ESA, 2007 due to the presence of occupied, contributing or recovery habitat for Redside Dace.</p> <p>The following watercourses are classified as High sensitivity, and support ,contributing or recovery habitat for Redside Dace: R4; D11, D12; D13; D14; D15; D16; D17; and D18. These watercourses may require open-footed or spanning structures which do not have a footprint within the channel, outward to 30 m measured horizontally from the meander belt, or which are similar to those built recently for the 407 ETR crossings.</p>	<p>crossings: will require open-footed or spanning structures which do not have a footprint within the channel, outward to 30 m measured horizontally from the meander belt, or which are similar to those built recently for the 407 ETR crossings. Proposed design of structures shall follow all BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).</p> <ul style="list-style-type: none"> ■ For watercourses classified as High sensitivity fish habitat and do not support Redside Dace – crossings, in order to avoid causing a “Serious Harm to Fish”, will likely require open-footed or spanning structures which do not have a footprint within the channel or which are similar to those built recently for the 407 ETR crossings. Structures must be sized to ensure that fish passage will not be impeded, and designed in accordance with Section 5.5.3 in the MTO Fish Guide. ■ For watercourses classified as Moderate sensitivity fish habitat based on stream flow permanency, thermal regime, and whether the watercourse supports fish habitat directly or indirectly - culvert/structure type will be individually assessed by watercourse, in accordance with Section 5.5.3 in the MTO Fish Guide, and that will avoid causing “Serious Harm to Fish”. At watercourses supporting direct fish habitat, passage and habitat provision will be important and thus open bottomed culverts or box culverts that are embedded with substrates may be options. At those that provide indirect fish habitat, the maintenance of flows will be important, but not provision of fish passage. At these crossings pipe culverts could be selected. ■ For watercourses classified as Low sensitivity fish habitat which appear to support fish habitat indirectly. Culvert types will be individually assessed by watercourse in accordance with Section 5.5.3 in the MTO Fish Guide to avoid causing “Serious Harm to Fish”. Box culverts or pipe culverts can be options as flow maintenance is the main factor in the consideration of culvert types. <p>A <i>Fisheries Act</i> authorization may be required from DFO depending on the type of work proposed. However, “Serious Harm to Fish” is unlikely if structures are designed in accordance with the MTO Fish Guide and mitigation measures are implemented.</p> <p>Watercourses R1; R2; R3; and R5, which function as contributing habitat for Redside Dace will be required to follow all BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011). A 17(2) (c) overall benefit permit may be required from the MNRF if proposed works detrimentally affect the regulated habitat.</p>	<p>(c) overall benefit permit may be required from the MNRF if proposed works detrimentally affect the regulated habitat.</p> <p>A <i>Fisheries Act</i> authorization may be required from DFO depending on the type of work proposed. However, “Serious Harm to Fish” is unlikely if structures are designed in accordance with the MTO Fish Guide and mitigation measures are implemented.</p> <p>An Environmental Management Plan will be prepared during Detail Design.</p> <p>Meander belt width analysis will be completed.</p>
Vegetation and Vegetation Communities	Loss of and disturbance to vegetation and vegetation communities	<p>Overall, there will be a loss of 107.6 ha of vegetation communities which includes a loss of 86.2 ha due to the preferred runningway, and a loss of 21.3 ha due to the stations. Collectively, this will result in impacts to both terrestrial and wetland habitats. All of the vegetation communities identified within the study area are considered to be widespread and common in Ontario and secure globally.</p> <p>The removal of forest vegetation along existing forest edges or the removal of a portion of a forested feature</p>	<p>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> <p>Forest edge management in accordance with the TRCA <i>Forest Edge Management Plan Guidelines</i> (2004) is recommended at the forest communities described above. 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 will be undertaken as soon as possible following vegetation removals. Plantings along the disturbed forest 	<p>Compensation for the removal of wetland and forest communities will be provided. Compensation will be provided at a rate determined with agencies during Detail Design.</p> <p>A monitoring plan will be developed to immediately mitigate the spread/invasion of aggressive plant species, to ensure the newly planted material survives and fulfils the intended function and to ensure that 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>that results in the exposure of a new forest edge will have several negative impacts along forest borders and within the forest interior.</p> <p>A small portion of the Locust Hill Wetland west of York Durham Line will be removed.</p> <p>Portions of the West Duffins Creek ESA and Cedar Grove PSW will be affected as the runningway will be crossing over this area.</p>	<p>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.</p> <ul style="list-style-type: none"> ▪ 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 will be site specific. Where decompaction is required, it will 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. ▪ A plan must be in place to immediately mitigate the spread/invasion of aggressive plant species. ▪ A monitoring plan must be developed to ensure that the newly planted material survives and fulfils the intended function and to ensure that the inadvertent spread of aggressive or non-native plant species is appropriately managed. <p>A detailed planting plan will be developed during the Detail Design phase once areas identified for restoration have been determined. It is recommended that the planting of forest and wetland habitat be undertaken with the appropriate native and non-invasive plant species which will be presented on site-specific plans to be developed by an experienced landscaped architect.</p> <p>At a minimum, planting plans 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; and, ▪ A description of the BMPs that are to be followed in the planting and tending of these sites. In particular, management will need to be undertaken for those invasive/ aggressive plant species. 	<p>inadvertent spread of aggressive or non-native plant species is appropriately managed.</p> <p>A detailed planting plan will be developed during Detail Design once areas identified for restoration have been determined. The planting for forest and wetland habitat will be undertaken.</p> <p>A detailed butternut survey will be conducted during Detail Design to ensure no butternut seedlings are present within the preferred runningway and station locations.</p> <p>Consultation with Parks Canada will be conducted during Detail Design in regards to areas adjacent to the Rouge National Urban Park.</p>
Wildlife and Wildlife Habitat	<p>Effects related to the implementation of the 407 Transitway could include:</p> <ul style="list-style-type: none"> ▪ Displacement of Wildlife and Wildlife Habitat; ▪ Barrier Effects on Wildlife Passage; and, ▪ Displacement of Rare, 	<p>Three species at risk have been identified as potentially being present within the 407 Transitway study area. Eastern Meadowlark, Bobolink and Barn Swallow are regulated under the ESA as 'Threatened' species.</p> <p>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</p>	<p>During Detail Design, further field investigations for species at risk will be undertaken during the appropriate season using MNRF protocols for surveying their absence/presence. Appropriate steps for protection and permitting will be done after the detailed field investigation during Detail Design. Subject to further field investigations additional permitting requirements under the ESA may apply.</p> <p>During Detail Design, or once structure sizes are confirmed. Openess Ratio can be calculated for each of the new structures to determine whether large animals can use the structures for</p>	<p>Openness ratios will be calculated as required at all structures.</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
	Threatened or Endangered Wildlife or Significant Wildlife Habitat.	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 accommodate wildlife passage. These crossings are (from west to east): Rouge River (R4); Little Rouge Creek (R10); West Duffins Creek and tributaries (D1, D2, D3); Urfe Creek (D15), Brougham Creek (D16) and Brougham Creek (D17). At present, these large structures provide passage to both small wildlife species (e.g., raccoons, frogs) and large species (e.g., white-tailed deer). The fencing mentioned above also functions to funnel wildlife species towards these corridors by forcing them to move laterally until they reach a suitable crossing area.	passage. Please note that structures sizes for the 407 ETR are already 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. The minimum Openess Ratio for small animals will be 0.05 and the minimum OR for large animals will be 0.6. A minimum clearance height of 3 m for structures that will provide passage for large animals is recommended. In addition, natural substrates will be used to encourage wildlife to utilize crossing structures. Ground cover will be continuous with the substrates found outside and adjacent to the structural entrances thereby encouraging animals to pass through the structure.	
Designated Natural Areas	Impacts to designated natural areas in and adjacent to the study area	Portions of the Cedar Grove Provincially Significant Wetland Complex and the West Duffins Creek Environmentally Significant Area will be impacted as a result of the proposed construction of the runningway. The Transitway will be constructed within the MTO protected lands outside the Rouge National Urban Park.	The proposed runningway will be crossing over the Cedar Grove Wetland Complex and the West Duffins Creek Environmentally Significant Area to minimize any direct impacts. The MTO owns lands along the Highway 407 infrastructure corridor within the Rouge National Urban Park. These lands have been excluded from the Management Plan's Rouge National Urban Park area, as it is identified as part of the provincial infrastructure network. The runningway will be located within these lands, south of the existing Highway 407. In addition, there is a parcel of land located at York Durham Line and Highway 407 that is identified as 'MTO Property Protection'. These lands are being protected to address to accommodate environmental compensation activities associated with this project.	During Detail Design, compensation measures will be discussed with relevant agencies in regards to impacts on the Cedar Grove Wetland Complex and the West Duffins Creek Environmetnal Significant Area. During Detail Design, consultation with Parks Canada will be conducted to develop landscape plans, vegetation restoration and forest edge management plans in order to be compatible with the Park's objectives and discussions regarding future opportunities for a park shuttle to connect to Transitway Stations.
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, cultural environment and transportation within the study area. In general, the land uses adjacent to the 407 Transitway 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. Two built heritage features have been identified as affected by the construction of the 407 Transitway. Further archaeological investigations will be needed at some locations within the footprint of the 407 Transitway. This study will be conducted during Detail Design. 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

Minor amendments to the City of Markham and City of Pickering Official Plans have been identified. These amendments have been discussed with the municipalities throughout the duration of this study. No major concerns were identified from the municipalities. The areas where amendments are required are: Ninth Line Station, Donald Cousens Station, area just east of York Durham Line, Whites Road Station and Brock Road Station.

Private properties will be affected by the Transitway, at Kennedy Road (north of 407ETR) due to the placement of the runningway, and at Donald Cousens Station due to the placement of access road to the station. The design of the runningway and the access road will be investigated in greater detail 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.

Kennedy Road to Markham Road Runningway

This section of the study area is entirely located within the PBWP area. Some small areas at Kennedy Road (north of Highway 407) are designated in the Markham Official Plan as 'Residential Low Rise' (0.12 ha), 'Mixed Use Mid Rise' (0.1 ha) and 'Transportation and Utilities' (0.65 ha). Since the impact assessment was conducted assuming a 50 m wide ROW, the impact to these small areas will be further refined during Detail Design.

The runningway lands within the PBWP area, is designated as 'Road', 'Inter-urban Transit' and 'Public Open Space and Buffer Area'. The majority of the runningway follows the 'Inter-urban Transit' land use designation, which was approved under Parkway Belt Amendment 147 'Highway 407 Inter-Urban Transitway, Mississauga to Markham (January 2000). During the course of the TPAP, the study team has made some modifications to the runningway within the study area, between McCowan Road and Markham Road. In this section, the original station location at McCowan Road has been eliminated and the Markham Road Station has been relocated to the west side of Markham Road. The relocated Markham Road Station site does conform with the PBWP, as discussed below. However, an amendment to the PBWP to recognize the change is recommended.

The existing land uses within the runningway consist of open fields and small woodlots and hedgerows, and the Highway 407 transportation corridor. The runningway is located north of the Cresthaven Golf Club and

hydro corridor. No existing land uses will be displaced within this section.

Markham Road Station

The Markham Road Station is proposed within the PBWP area, in an area designated as 'Public Open Space and Buffer Area' and 'Inter-urban Transit'. The station is compatible with the land use provisions for these land use designations. As noted above, the runningway and stations lands are identified in the PBWP (Amendment 147). An amendment to the PBWP to recognize the new facility footprint is recommended.

Markham Road to 9th Line Runningway

Most of the runningway through this section is located within a 60 m Transitway corridor that was approved as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East of Brock Road: Environmental Assessment Report (1997). It is designated as 'Transportation and Utilities' and 'Residential Low Rise' in the Markham Official Plan. The Residential Low Rise designation is to allow secondary land uses on the provincial lands at this location that are not required for Transitway infrastructure.

Existing land uses within the runningway lands include open space lands containing fields, forests, and the Rouge River. The Markham Green Golf Club is located in close proximity to the runningway at the Rouge River. The golf club facilities are located approximately 20 m from the ROW. Potential impacts to this golf course will be further investigated once more details are available regarding the Transitway design. Residential communities are located just south of the runningway throughout this section. Further noise and traffic studies will be conducted during Detail Design to assess the potential impacts of this alignment, and to identify appropriate mitigation measures.

Ninth Line Station

A station will be located on the west side of 9th Line, between the Highway 407 ETR corridor and the residential community. Transitway plans predate the residential community and a warning clause was included on title for all of the subdivision lots indicating that the transitway and station would be implemented in the future. The lands within the footprint of the station are provincially owned and designated as 'Transportation and Utilities' (0.42 ha), 'Residential Low Rise' (5.8 ha) and 'Residential Mid Rise' (1.9 ha). The lands designated for residential use are in place to allow secondary land uses on the station site which is vacant. Noise and traffic studies will be conducted to assess the potential impacts of this station, and to identify appropriate mitigation measures.

At a PIC, local residents requested that the south-east quadrant of 9th Line and Highway 407 be considered for the station. The south-east quadrant contains a much smaller parcel of land adjacent to Highway 407 designated as 'Transportation and Utilities' in the City of Markham Official Plan. The lands just south of this parcel include the Box Grove retail plaza (commercial land use) and the undeveloped Business Park Employment land use designation. The re-designation of these lands to residential and service uses by York Region is pending approval by the OMB. The placement of a station in this quadrant would require a new access road through private lands. The station would also affect the adjacent planned residential uses similar to the impacts in the south-west quadrant.

Ninth Line to York Durham Line Runningway

The runningway through this section is located within a 60 m Transitway corridor that was approved as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East of Brock Road: Environmental Assessment Report (1997). This section is located within lands designated as ‘Transportation and Utilities’ in the City of Markham Official Plan. Therefore, the runningway is compatible with the local Official Plan. However, efforts will be made to design the Transitway to minimize impacts to adjacent sensitive land uses (i.e. planned residences).

The farm located at 8119 Reesor Road has structures that are located approximately 45 m from Highway 407 ETR. This farm and its structures will be in close proximity to the Transitway alignment. Please see Built Heritage and Cultural Heritage Landscapes section for further details on this property.

The area between the CP/Havelock Railway (Proposed GO Line) and York Durham Line is part of the Rouge National Urban Park. The Transitway facilities will be outside of the Park Management Plan boundaries. However, efforts will be made to minimize impacts to the natural environment to support the Management Plan objectives and targets, where feasible. One of the Management Plan objectives is to explore the feasibility and utility of a park shuttle that connects areas within the park with links to public transportation hubs. During Transitway Detail Design, discussions will be held with Parks Canada regarding future opportunities for a park shuttle to connect to Transitway Stations.

The lands between Reesor Road and York Durham Line are part of the Greenbelt Plan Protected Countryside and Natural Heritage System. The Greenbelt Plan includes the following policies with respect to infrastructure:

4.2.1.1: All existing, expanded or new infrastructure subject to and approved under the *Canadian Environmental Assessment Act*, the *Environmental Assessment Act*, the *Planning Act*, the *Aggregate Resources Act*, the *Telecommunications Act* or by the National or Ontario Energy Boards, or which receives a similar environmental approval, is permitted within the Protected Countryside, subject to the policies of this section and provided it meets one of the following two objectives: a) It supports agriculture, recreation and tourism, rural settlement areas, resource use or the rural economic activity that exists and is permitted within the Greenbelt; or b) It serves the significant growth and economic development expected in southern Ontario beyond the Greenbelt by providing for the appropriate infrastructure connections among UGCs and between these centers and Ontario’s borders.

4.2.1.2: The location and construction of infrastructure and expansions, extensions, operations and maintenance of infrastructure in the Protected Countryside, are subject to the following:

- a) Planning, design and construction practices shall minimize, wherever possible, the amount of the Greenbelt, and particularly the Natural Heritage System, traversed and/or occupied by such infrastructure;
- b) Planning, design and construction practices shall minimize, wherever possible, the negative impacts and disturbance of the existing landscape, including, but not limited to, impacts caused by light intrusion, noise and road salt;
- c) Where practicable, existing capacity and coordination with different infrastructure services is

optimized so that the rural and existing character of the Protected Countryside and the overall urban structure for southern Ontario established by the Greenbelt and any provincial growth management initiatives are supported and reinforced;

- d) New or expanding infrastructure shall avoid key natural heritage features or key hydrological features unless need has been demonstrated and it has been established that there is no reasonable alternative; and,
- e) Where infrastructure does cross the Natural Heritage System or intrude into or result in the loss of a key natural heritage feature or key hydrological feature, including related landform features, planning, design and construction practices shall minimize negative impacts and disturbance on the features or their related functions, and where reasonable, maintain or improve connectivity.

As stated earlier, an EA Study was completed in 1997 for the 407 Transitway from Markham Road to Highway 7 East of Brock Road. The EA received approval prior to the establishment of the Greenbelt Plan in 2005. The EA documents the process that was followed to determine the location of the Transitway facility. The need for this transportation infrastructure was demonstrated during the EA, and a number of route planning alternatives were developed and evaluated, considering a range of factors including potential impacts on the agricultural system and natural environment.

Potential impacts of the runningway on key natural heritage features including Little Rouge Creek, one unnamed watercourse, Petticoat Creek, and the Non-Provincially Significant Locust Hill Wetland Complex are anticipated. As per the Greenbelt Plan’s Section 4.2.1.2, the design of the runningway has been proposed to minimize footprint impacts to these key natural heritage features to the extent possible. The Transitway crossing over the Little Rouge Creek will be designed to minimize impacts and mitigation measures will be provided as per BMPs in accordance with *MTO/DFO/MNR Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings* (2013) and *MTO Environmental Guide for Fish and Fish Habitat* (2009). Vegetation mitigation, compensation and landscaping are planned and further discussion with Parks Canada and Infrastructure Ontario will be conducted during Detail Design. The runningway is located just south of the Highway 407 ETR alignment, concentrating urban infrastructure within one corridor. In addition, no stations have been planned within the Greenbelt Plan area.

The design and construction practices identified in Section 4.2.1.2 of the Greenbelt Plan will be evaluated and addressed in the Detail Design of the Transitway.

Donald Cousens Parkway Station

Donald Cousens Parkway Station is proposed west of Reesor Road. Most of the lands within the footprint of this station are approved as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East of Brock Road: Environmental Assessment Report (1997) and are designated as ‘Transportation and Utilities’, ‘Business Park Employment’, and ‘Greenway’. The potential future station will displace approximately 0.34 ha of ‘Business Park Employment’ and 0.12 ha of ‘Greenway’. The Donald Cousens Parkway Station footprint has been reduced to the extent possible, and the minor impacts to these land uses are unavoidable to accommodate the necessary land area for the station.

The Donald Cousens Parkway Station footprint was modified to avoid impacts to two farms located at 8119

Reesor Road and 8042 Reesor Road, which have been identified for conservation. However, approximately 0.45 ha of the property (fields) associated with 8042 Reesor Road will be displaced by the station. This displacement will result in the loss of Soil Capability Class 2 agricultural lands (Agricultural Information Atlas 2015). Efforts have been made to modify the station footprint, as the original station would have resulted in the removal of both farms at 8119 and 8042 Reesor Road. The impact to the northerly portion of the property at 8042 Reesor Road will result in the displacement of prime agricultural lands and the removal of lands from agricultural cultivation. Since the property is owned by Infrastructure Ontario, the land is already under provincial ownership. In addition, the property is designated as 'Business Park Employment' and 'Greenway' in the City of Markham Official Plan. However, both farm properties are designated as a recognized community landmark, under the City of Markham By-law 2004-42. Mitigation measures to reduce the impact of the land use change on the farm will be considered, including replacement of fencing, re-establishment of drainage, and maintenance of access related to farm activities during and post construction. Should the community landmark designation be modified on all/part of the provincial lands, it would provide opportunity for station expansion to meet all future needs including parking.

This station has potential to serve as a center for transit activities, as a GO station is planned east of the station, on the rail line near Reesor Road.

York Durham Line to Sideline 24 Runningway

The MTO owns lands along the Highway 407 infrastructure corridor within the Rouge National Urban Park. These lands have been excluded from the Management Plan's Rouge National Urban Park area, as it is identified as part of the provincial infrastructure network. The runningway will be located within these lands, south of the existing Highway 407 ETR.

The runningway through this section is located within a 60 m transitway corridor that was approved as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East of Brock Road: Environmental Assessment Report (1997). It is located within areas designated within the CPDP as 'Duffins Rouge Agricultural Preserve', 'Natural Heritage System – Primary Designation', and 'Prestige Employment Lands'. However, more recent planning studies (Seaton Community Neighbourhood Plans) have further refined the boundaries of these land use designations. See **Chapter 3** of the EPR for further details.

The Neighbourhoods Plan for the Seaton Community designates the majority of runningway lands as 'Controlled Access Area' and 'Agricultural Areas'. The runningway is consistent with the land uses permitted within the 'Controlled Access Area' designation. The area affected within 'Agricultural Areas' (City of Pickering Official Plan) includes approximately 3.9 ha. The agricultural lands in this area are classified as Class 1 (prime agricultural) soils, and are part of the Duffins Rouge Agricultural Preserve. An agricultural tile drainage system is located south of the runningway, west of Duffins Creek (Lot 34, Concession 5, City of Pickering) (Ontario Agricultural Information Atlas). The runningway parallels the existing Highway 407 ETR and no Transitway stations are proposed within the Duffins Rouge Agricultural Preserve. Efforts will be made to minimize impacts to the agricultural lands within this area, by minimizing the footprint of the runningway (where feasible), and by avoiding or restoring any affected agricultural tile drainage systems and fencing.

Minor footprint impacts to 'Prestige Employment Node' (0.43 ha), 'Seaton Natural Heritage System' (0.68 ha), and 'Natural Areas' (0.1 ha) are anticipated. These are minor edge impacts to planned land uses within the

Seaton Neighbourhood Plan. Since the impact assessment is based on a 60 m wide ROW, the impacts will be further refined during Detail Design. The impacts to 'Prestige Employment Node' and 'Seaton Natural Heritage System' are unavoidable, as they are required to accommodate the interchange at Highway 407 ETR and future Whites Road. Efforts will be made to ensure that the runningway design is compatible with adjacent land uses, and that impacts to natural heritage features (within the Seaton Natural Heritage System and Natural Areas) are mitigated.

Existing land uses that will be affected include: natural heritage features, agricultural fields and a hiking trail. Efforts will be made to reduce the impact of the runningway on natural features and agricultural fields, where possible. As noted above, there is a systematic agricultural tile drainage system south of the Highway 407 ETR, east of York Durham Line (Lot 34, Concession 5). Efforts to avoid or repair/reinstate the tile drainage system within the Transitway corridor through the Duffins Rouge Agricultural Preserve will be made as well as any fencing for active agricultural fields. A hiking trail is identified as a Secondary Recreational Trail in the Seaton Neighbourhoods Plan, and access to the trail will be maintained in the runningway design. Another trail is planned at Sideroad 26; however, it is anticipated that trail access will be provided along the municipal road.

The lands between York Durham Line and east of the Duffins Rouge Agricultural Preserve are part of the Greenbelt Plan Protected Countryside and Natural Heritage System. The design of the runningway and the proposed Whites Road Station meet the requirements of the Greenbelt Plan's Section 4.2 by minimizing footprint impacts and/or minimizing negative impacts to the exiting landscape. The runningway is proposed to be located closer to an existing transportation corridor, the 407 ETR and it is compatible with the proposed future community development within the area. Watercourse crossings were designed to span over them in order to minimize adverse impacts as much as possible.

Whites Road Station

A station will be located on the west side of the future Whites Road. The lands within the footprint of the station are designated as 'Controlled Access Area' (1.6 ha) and 'Prestige Employment Node/Future Transitway Station' (2.69 ha). The station is consistent with the planned land uses for this area.

Sideline 24 to Realigned Brock Road Runningway

The runningway through this section is located within a 60 m Transitway corridor that was approved as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East of Brock Road: Environmental Assessment Report (1997). It is located within areas designated within the CPDP as 'Natural Heritage System – Primary Designation', and 'Prestige Employment Lands'. However, more recent planning studies (Seaton Community Neighbourhood Plans) have further refined the boundaries of these land use designations, as presented in **Chapter 3** of the EPR.

The Neighbourhood Plans for the Seaton Community designates the runningway lands as 'Controlled Access Area', except for the portion east of Brock Road, which is located within the 'Future Transitway Station' land use designation (also designated as 'Prestige Employment Node' and 'Seaton Natural Heritage System'). Given that the runningway is planned for an area designated for the future Transitway station, the runningway through this section is consistent with the Neighbourhood Plans for the Seaton Community.

Brock Road Station

Prior to implementation of the Brock Road Station, a portion of the planned station lands will be used for a commuter carpool lot to support GO Express Bus Service on Highway 407 East and local transit services as well as carpool spaces. The Brock Road Commuter Parking Lot includes approximately 300 parking spaces, a complete bus loop, with up to six bus bays and platforms and amenities including radiant heaters, lighting and seating, bicycle racks, and provisions for public telephone within the lot. It is anticipated that the parking lot for the Brock Road Station will provide an additional 200 parking spaces (i.e. approximately 500 parking spaces in total). The future Detail Design of the station will include a redesign of the existing commuter parking lot to accommodate the design of the larger station.

The Brock Road Station has been modified, by reducing the footprint north of Brougham Creek, and adjusting the westerly boundary to include a more continuous block of land adjacent to the existing Brock Road Commuter Parking Lot. These changes to the station footprint will affect lands planned for 'Prestige Employment Node'. However, the new Transitway footprint is overall smaller than the original proposed Transitway. In addition, some lands previously identified as 'Future Transitway Station' at Old Brock Road will now be available for 'Prestige Employment Node' as a result of the changes.

East of Realigned Brock Road Runningway

The runningway within this section is located within areas designated within the CPDP as 'Prestige Employment Lands'. However, more recent planning studies (Seaton Community Neighbourhood Plans) have further refined the boundaries of these land use designations.

The Neighbourhood Plans for the Seaton Community designate the runningway lands as 'Prestige Employment Node' and 'Seaton Natural Heritage System'. The impact on these land uses is unavoidable given that the alignment from the Brock Road Station needs to go around the Highway 407 East/Realigned Brock Road interchange, and north to the alignment of Highway 407 East. The lands east of Sideline 16 are designated as 'Natural Areas' in the City of Pickering Official Plan. The alignment of the runningway parallels the Highway 407 East, so that infrastructure is contained within this corridor. Impacts to natural heritage features and functions will be assessed and appropriate mitigation measures will be implemented.

Greenbelt Plan

The Greenbelt Plan Policy 3.2.2.4 states:

Where non-agricultural uses are contemplated within the Natural Heritage System, applicants shall demonstrate that:

- a. At least 30 percent of the total developable area of the site will remain or be returned to natural self-sustaining vegetation, recognizing that section 4.3.2 establishes specific standards for the uses described there;
- b. Connectivity along the system and between key natural heritage features or key hydrologic features located within 240 metres of each other is maintained or enhanced; and

- c. Buildings or structures do not occupy more than 25 percent of the total developable area and are planned to optimize the compatibility of the project with the natural surroundings.

The 407 Transitway crosses the Greenbelt Plan east and west of the York /Durham Town Line between Reesor Road and just west of Duffins Creek. The Transitway has already received Route Planning EA approval at this location as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East of Brock Road: Environmental Assessment Report (1997).

Connectivity between key natural heritage features and key hydrological features will be maintained as Transitway structures will be spanning over these features and stormwater drainage features will be designed to maintain connectivity of hydrologic features.

Noise and Vibration

Footprint impacts regarding noise and vibration do not apply.

Built Heritage Features and Cultural Heritage Landscapes

New transportation infrastructure may potentially affect BHR and CHL in a number of ways. The effects 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. There is one cultural heritage resource listed by the City of Markham (CHL3) and two are designated under Part IV of the *Ontario Heritage Act* (CHL1 and CHL2) (see **Figure 6.1** for locations). No impacts are anticipated to CHL3, 7960 Reesor Road. Three cultural heritage resources (CHL1, CHL2, and CHL10) will be affected by the implementation of the Transitway as a result of removal of buildings, barns, and landscape features. The remaining six cultural heritage resources (CHL4, CHL5, CHL6, CHL7, CHL8, and CHL9) will experience impacts during the construction stage (see **Section 6.3.2**).

CHL 1 (8119 Reesor Road) – Alterations to this resource include the removal of a barn, driveshed, fenced yard, and gravel driveway leading to Reesor Road. Excavation, grading and the removal of landscape features including mature trees and pastures.

CHL 2 (8042 Reesor Road) – Anticipated impacts include excavation, grading and the removal of landscape features including mature trees and pastures to the north and west of the residence and outbuildings. There are no anticipated impacts to the existing structures.

CHL10 (3440 Old Brock Road, currently Elsa Storry Avenue) – Alterations to this resource include the removal of a barn, two outbuildings, and fenced pasture. Anticipated impacts also include excavation, grading and the removal of landscape features including mature trees and agricultural fields.

A HIA was conducted for the two properties designated under Part IV of the *Ontario Heritage Act*. The HIA report was submitted to Infrastructure Ontario and the City of Markham for review in February 2016. The HIA indicated that the two properties (8119 Reesor Road and 8042 Reesor Road) retain cultural heritage value following a review of their respective heritage designation by-laws and application of Regulation 9/06 of the *Ontario Heritage Act*. Application of Regulation 10/06 confirmed that the subject properties do not have provincial significance. Given that the two properties were confirmed to retain cultural heritage significance,

FIGURE 6.1: LOCATION OF CULTURAL HERITAGE LANDSCAPES DESIGNATED UNDER PART IV OF THE ONTARIO HERITAGE ACT AND LISTED BY THE CITY OF MARKHAM



the preservation/retention of the resource on site was recommended.

The two properties (8119 Reesor Road and 8042 Reesor Road) are currently owned by Infrastructure Ontario, and are expected to be affected by the 407 Transitway. During Detail Design, where technically possible, further adjustments to the design will be explored to reduce impacts to the cultural heritage resources. The following are recommendations presented in the HIA to consider during Detail Design:

1. The proposed designs for the Donald Cousens Parkway Station will be designed in a manner that preserves the cultural heritage resources with no impacts to identified heritage attributes;
2. Where full preservation is not feasible, a plan for partial preservation/retention of the cultural heritage resources in situ should be developed. This would entail: developing a plan for stewardship and re-use; protection of vehicular access; protection during construction; and protection of context through the use of sympathetic landscaping techniques. In order of preference, a partial plan of retention for this project would involve the following:
 - a. In situ retention of all buildings and part of the landscape at 8042 Reesor Road and the farmhouse at 8119 Reesor Road, resulting in direct impacts to the outbuildings and landscape features located north of the dwelling on 8119 Reesor Road. If feasible, it is recommended that the barn located at 8119 Reesor Road be retained, possibly through the inclusion of a retaining wall to reduce grading; and,
 - b. In situ retention of the dwellings at 8042 Reesor Road and 8119 Reesor Road, resulting in direct impacts to the outbuildings on both properties, and landscape features located north of the respective farmhouses and driveways.
3. Where direct or indirect impacts to cultural heritage resources are unavoidable, investigate the feasibility of relocating the cultural heritage resource to a new location on its current site. If it is determined that it is not feasible to undertake such mitigation strategy in a manner that conserves the heritage character of the resource and in a manner consistent with public safety, it is recommended that the resource be relocated to a new nearby site in a manner that makes limited to minimal changes to its heritage character. Such a mitigation strategy would include completion of a documentation report of the property, and development of a relocation plan which would lay out the actions required and responsibilities of stakeholders in order to relocate and re-use the resource.
4. Should relocation of the resource not be feasible, and where demolition activities are anticipated, a property-specific documentation report shall be undertaken for each property, and a salvage plan developed and implemented. Demolition and salvage activities will be monitored by a qualified professional for documenting any additional features uncovered during the demolition process. Additionally, if any old documents are found during the course of demolition, such as old newspaper, land deeds, letters, photographs, etc., these will be sent to the Markham Museum and Archives.

A HIA was conducted for the 3440 Old Brock Road (now Elsa Storry Avenue) and concluded that the property was not determined to be of provincial significance. This HIA was submitted to IO and the City of Pickering in October 2016 and December 2016 respectively. It was determined to retain local cultural

heritage value and the following are recommendation for Detail Design:

1. The proposed development should attempt to avoid direct and indirect impacts to landscape and intangible heritage attributes associated with 3440 Brock Road to result in compatible alterations to the property and limit the isolation of the heritage resources from their physical, historical, and contextual setting.
2. If retention and relocation of the barn and driveshed (located northeast side of the property) most has been demonstrated to be unfeasible by the proponent, a Cultural Heritage Documentation and Salvage Report will be completed by a qualified heritage practitioner and distributed to the City of Pickering Heritage Planning staff and IO.

Archaeological Features

A Stage 1 Archaeological Assessment was carried out in accordance with the *Ontario Heritage Act* (2005) and the *Standards and Guidelines for Consulting Archaeologists* (2011) (S & G). The Stage 1 Archaeological Assessment Report was submitted to the Ministry of Tourism, Culture and Sports in February 2016. Stage 2 Archaeological Assessment was recommended for all lands considered to have archaeological site potential and that may be disturbed by the proposed Transitway construction. Two archaeological sites will require Stage 3 Site-Specific Assessment and another two archaeological sites will require Stage 4 Mitigation of Development Impacts by Protection and Avoidance. Details on the location of the lands recommended for further archaeological study are found in **Appendix F, G and H** of this report. Once the design of the 407 Transitway is further defined during Detail Design, the following assessment will be conducted:

- Stage 2 property assessment by test pit survey at five metre intervals and pedestrian survey at five metre intervals, as appropriate, is recommended for parts (54.5 ha) of the study area prior to any proposed disturbance by the project. The Stage 2 assessment, will confirm whether other known archaeological sites located adjacent to the study area extend into the runningway and stations sites. Identified potential archaeological sites that could extend into the runningway and station sites are: Sideline site (ALGs-175); Cobb site (ALGs-176); Ken Reesor 2 site (ALGt-14); Ansell site (ALGt-29); Burkholder 2 site (ALGt-35); and Fyfe site (ALGt-246). If these sites are confirmed to extend into the runningway and station sites, further archaeological assessment will be required.
- The study area crosses the Rouge River, Little Rouge Creek and West Duffins Creek. The submerged channels of these watercourses cannot be assessed by the current land-based Stage 1 archaeological assessment according to regulations under the *Ontario Heritage Act*. If there are any planned impacts, the TRCA should be contacted for further advice prior to any proposed disturbance to these areas;
- Site ALGs-177 has been documented to possess CHVI and is located within 50 m of the study area. This site requires Stage 3 site-specific assessment to determine the nature and extent of the cultural deposits, prior to any proposed impacts to the site. The Stage 3 assessment of this site should include:
 - Pedestrian survey at one meter intervals followed by a CSP of any surface finds; and,
 - Test unit (one meter square unit) hand excavation at 10 m intervals across the site plus additional units amounting to 40% of the gird total placed in areas of interest. Based on the respective size of the site and the area affected, ASI estimates that this site will require the excavation of six units.

- Site AIGs-179 has been documented to possess CHVI and is located within 50 m of the study area. This site requires Stage 3 site-specific assessment to determine the nature and extent of the cultural deposit, prior to any proposed impacts to the site. The Stage 3 assessment of this site should include:

- Pedestrian survey at one meter intervals followed by a CSP of any surface finds; and,

Test unit (one meter square unit) hand excavation at 10 m intervals within the study area immediately adjacent to the site's location to confirm whether it extends into the study area. If the site is documented to extend into the study area, test-unit excavation at 10 m intervals will be required across the site's extent plus additional units amounting to 40% of the grid total placed in areas of interest. Based on the respective size of the site and the area affected, ASI estimates that this site will initially require the excavation of one unit. The Ludger Gros-Louis site (AIGs-302) has been documented to possess CHVI and is included in the current 407 Transitway Project study area. This site has been previously recommended to require Stage 4 Mitigation of Development Impacts by Protection and Avoidance. If the site cannot be avoided and protected within the project design, then it must be subject to a comprehensive Stage 4 Excavation in accordance with S & G Section 4.2.2. Stage 4 archaeological assessment of this site should include:

- Stage 4 salvage excavation entails hand excavation in accordance with S & G, Section 4.2.2. All units will be excavated by hand into 5 cm of subsoil and all excavated soil will be screened through 6 mm wire mesh to facilitate artifact recovery. All identified cultural features will be excavated and fully documented only after complete exposure;
 - Stage 4 salvage excavations will follow the methodology outlined in S & G, Section 4.2.4 for Woodland archaeological sites. Stage 4 hand excavation should start around Stage 3 test units presenting high artifact counts and also include a sample of units dug in areas away from high concentrations as per Section 4.2.4;
 - Standard 1b. Hand excavation must extend a minimum of two meters beyond uncovered cultural features;
 - Stage 4 salvage excavation will entail mechanical stripping, as outlined in S & G, Section 4.2.3, only after hand excavation is complete. This will involve the mechanical removal of topsoil to expose underlying subsoil and mechanical stripping must extend a minimum of 10 m beyond any cultural features; and,
 - Stage 4 protection and avoidance should include the erection of a temporary barrier around the prescribed protective buffer of the sites and “no go” instructions should be issued for all on-site crews. Any grading or soil disturbance activities adjacent to the limit of protection should be monitored by a licensed archaeologist to verify the effectiveness of this avoidance strategy. Observation of any cultural features may require an increase to the prescribed area of protection, in accordance with the S & G, Sections 4.1.1 and 4.1.3.
- The Carl R. Murphy site (AIGs-368) has been documented to possess CHVI and is affected by the current 407 Transitway Project study area. This site has been previously recommended to require Stage 4 Mitigation of Impacts by Protection and Avoidance. If the site cannot be avoided and protected within the project design, then it must be subject to a comprehensive Stage 4 excavation in accordance with S & G Section 4.2.2. Stage 4 archaeological assessment of these sites should include:
 - Stage 4 salvage excavation entails hand excavation in accordance with S & G, Section 4.2.2. All units

will be excavated by hand into 5 cm of subsoil, and all excavated soil will be screened through 6 mm wire mesh to facilitate artifact recovery. All identified cultural features will be excavated and fully documented only after complete exposure;

- Stage 4 salvage excavations will follow the methodology outlined in S & G, Section 4.2.4 for Woodland archaeological sites. Stage 4 hand excavation should start around Stage 3 test units presenting high artifact counts and also include a sample of units dug in areas away from high concentrations as per Section 4.2.4, Standard 1b. Hand excavation must extend a minimum of two meters beyond uncovered cultural features;
- Stage 4 salvage excavation will entail mechanical stripping, as outlined in S & G, Section 4.2.3, only after hand excavation is complete. This will involve the mechanical removal of topsoil to expose underlying subsoil and mechanical stripping must extend a minimum of 10 m beyond any cultural features; and,
- Stage 4 protection and avoidance should include the erection of a temporary barrier around the prescribed protective buffer of the sites and “no go” instructions should be issued for all on-site crews. Any grading or soil disturbance activities adjacent to the limit of protection should be monitored by a licensed archaeologist to verify the effectiveness of this avoidance strategy. Observation of any cultural features may require an increase to the prescribed area of protection, in accordance with the S & G, Sections 4.1.1 and 4.1.3.

- Part of the study area includes the Brougham Pioneer Cemetery. Cemetery lands require protection and avoidance from any impacts proposed by the project. Lands adjacent to known cemetery limits require completion of a Cemetery Investigation prior to any proposed impacts by the Project;
- To minimize the risk of affecting an ossuary within the Project lands, a licensed archaeologist must be present to monitor the removal of topsoil for all areas that are within one kilometer of previously registered Iroquoian village sites and 300 m of water;
- The remainder of the study area is documented to have been subject to previous archaeological assessment or to possess conditions which indicate that archaeological potential has been removed. No further archaeological assessment is required for these lands; and,
- Should the proposed work extend beyond the current study area then further Stage 1 assessment must be conducted 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 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.

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

ENVIRONMENTAL VALUE / CRITERION	ENVIRONMENTAL ISSUES / CONCERNS	POTENTIAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Land Use	Potential impacts on the existing, planned, and future land uses within the study area	<p>Private properties will be affected by the Transitway, at Kennedy Road (north of 407ETR) due to the placement of the runningway, and at Donald Cousens Station due to the placement of access road to the station.</p> <p>Minor amendments to the City of Markham and City of Pickering Official Plans have been identified. These amendments have been discussed with the municipalities throughout the duration of this study. No major concerns were identified from the municipalities. The areas where amendments are required are: Ninth Line Station, Donald Cousens Station, area just east of York Durham Line, Whites Road Station and Brock Road Station.</p> <p>The runningway section from Kennedy Road to Markham Road is entirely located within the Parkway Belt West Plan area. No existing land uses will be displaced within this section.</p> <p>The location of Markham Road Station was changed from east of McCowan Road to west of Markham Road. However, the new location of the station is consistent with the Parkway Belt West Plan area.</p> <p>The runningway section from Markham Road to York Durham Line is located within a 60 m Transitway corridor that was approved as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East of Brock Road: Environmental Assessment Report (1997).</p> <p>There is potential impacts to lands between Reesor Road and York Durham Line as they are part of the Greenbelt Plan Protected Countryside and Natural Heritage System. Key natural heritage features include Little Rouge Creek, an unnamed watercourse, and Petticoat Creek, and the Non-Provincially Significant Locust Hill Wetland Complex.</p> <p>The area between the CP/Havelock Railway (Proposed GO Line) and York Durham Line is part of the Rouge National Urban Park.</p> <p>Potential impacts of the runningway in agricultural lands part of the Duffins Rouge Agricultural Preserve and agricultural tile drainage system located south of the runningway.</p>	<p>Efforts will be made to design the Transitway to minimize impacts to adjacent sensitive land uses (i.e. existing residences, planned residences).</p> <p>Efforts have been made to modify the Donald Cousens Parkway Station footprint to avoid two farms identified for conservation (CHL1 – 8119 Reesor Road and CHL2 – 8042 Reesor Road). Mitigation measures to reduce the impact of the land use change on the farm will be considered, including replacement of fencing, re-establishment of drainage, and maintenance of access related to farm activities during and post construction.</p> <p>Efforts will be made during Detail Design to minimize the impacts to the agricultural lands within the Duffins Rouge Agricultural Preserve area, by minimizing the footprint of the runningway (where feasible), and by avoiding or restoring any affected agricultural tile drainage systems and fencing.</p> <p>The impacts to ‘Prestige Employment Node’ and ‘Seaton Natural Heritage System’ are unavoidable, as they are required to accommodate the interchange at Highway 407 and future Whites Road. Efforts will be made during Detail Design to ensure that the runningway is compatible with adjacent land uses, and that impacts to natural heritage features (within the Seaton Natural Heritage System and Natural Areas) are mitigated.</p> <p>Existing land uses that would be affected include: natural heritage features, agricultural fields and a hiking trail. Efforts will be made to reduce the impact of the runningway on natural features and 407 Transitway from Kennedy Road to Brock Road, where possible.</p> <p>The alignment of the runningway parallels the Highway 407 East, so that infrastructure is contained within this corridor. Impacts to natural heritage features and functions will be assessed and appropriate mitigation measures will be implemented.</p>	<p>The design of the runningway and the access road will be investigated in greater detail to determine if possible refinements can be made to reduce or minimize impacts to private property. 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>An amendment to the PBWP for the new Markham Road Station facility footprint may be required.</p> <p>During Detail Design, discussions will be held with Parks Canada regarding future opportunities for a park shuttle to connect to Transitway Stations.</p> <p>During Detail Design, further assessment will be conducted to refine impacts to existing and planned land uses that are in close proximity to the preferred Transitway runningway and stations. If property is required to implement the preliminary design, the MTO Property process will be followed to purchase any required properties.</p> <p>Where portions/edges of agricultural fields are displaced by the runningway and stations, further assessment will be required during Detail Design to determine appropriate mitigation measures. Consideration will be given to repairing any agricultural infrastructure (i.e., fences, agricultural tile drain).</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 BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
		<p>Ninth Line Station to be located between the Highway 407 corridor and the residential community has potential impacts associated with the station which may include noise and traffic.</p> <p>Impact from the Donald Cousens Parkway Station to the northerly portion of the property at 8042 Reesor Road will result in the displacement of prime agricultural lands and the removal of lands from agricultural cultivation.</p> <p>The runningway section from York Durham Line to Sideline 24 is located within a 60 m transitway corridor that was approved as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East of Brock Road: Environmental Assessment Report (1997). It is located within areas designated within the Central Pickering Development Plan as 'Duffins Rouge Agricultural Preserve', 'Natural Heritage System – Primary Designation', and 'Prestige Employment Lands'.</p> <p>The Neighbourhoods Plan for the Seaton Community designates the majority of runningway lands as 'Controlled Access Area' and 'Agricultural Areas'. The runningway is consistent with the land uses permitted within the 'Controlled Access Area' designation. The area affected within 'Agricultural Areas' (City of Pickering Official Plan) includes approximately 3.9 ha. The agricultural lands in this area are classified as Class 1 (prime agricultural) soils, and are part of the Duffins Rouge Agricultural Preserve. An agricultural tile drainage system is located south of the runningway, west of Duffins Creek (Lot 34, Concession 5, City of Pickering) (Ontario Agricultural Information Atlas). The runningway parallels the existing Highway 407 and no Transitway stations are proposed within the Duffins Rouge Agricultural Preserve.</p> <p>Minor footprint impacts to 'Prestige Employment Node' (0.43 ha), 'Seaton Natural Heritage System' (0.68 ha), and 'Natural Areas' (0.1 ha) are anticipated. These are minor edge impacts to planned land uses within the Seaton Neighbourhood Plan.</p> <p>The lands within the footprint of the Whites Road Station are designated as 'Controlled Access Area' (1.6 ha) and 'Prestige Employment Node/Future Transitway Station' (2.69 ha). The station is consistent with the planned land uses for this area. No impacts to land use are anticipated.</p> <p>The runningway section from Sideline 24 to Brock Road Station is located within a 60 m Transitway corridor that was approved as part of the Highway 407/Transitway Markham Road Easterly to Highway 7 East</p>		<p>During Detail Design, the need to implement environmental compensation activities associated with the project environmental commitments on MTO protected property will be further assessed.</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 BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
		<p>of Brock Road: Environmental Assessment Report (1997). It is located within areas designated within the Central Pickering Development Plan as 'Natural Heritage System – Primary Designation', and 'Prestige Employment Lands'. The Neighbourhood Plans for the Seaton Community designates the runningway lands as 'Controlled Access Area', except for the portion east of Brock Road, which is located within the 'Future Transitway Station' land use designation (also designated as 'Prestige Employment Node' and 'Seaton Natural Heritage System'). Given that the runningway is planned for an area designated for the future Transitway station, the runningway through this section is consistent with the Neighbourhood Plans for the Seaton Community. The impact on these land uses is unavoidable given that the alignment is needed from the Brock Road Station.</p> <p>The Brock Road Station has been modified, by reducing the footprint north of Brougham Creek, and adjusting the westerly boundary to include a more continuous block of land adjacent to the existing Brock Road Commuter Parking Lot. These changes to the station footprint will rimpact lands planned for 'Prestige Employment Node'.</p>		
Noise and Vibration	Footprint impacts regarding noise and vibration do not apply.			
Built Heritage and Cultural Heritage Landscapes	Displacement of built heritage and/or cultural heritage landscapes	<p>Anticipated impacts to cultural heritage resources are:</p> <ul style="list-style-type: none"> ▪ CHL 1 (8119 Reesor Road) - Alterations to this resources include the removal of a barn, driveshed, fenced yard, and gravel driveway leading to Reesor Road. Excavation, grading and the removal of landscape features including mature trees and pastures. ▪ CHL 2 (8042 Reesor Road) – Anticipated impacts include excavation, grading and the removal of landscape features including mature trees and pastures to the north and west of the residence and outbuildings. There are no anticipated impacts to the existing structures. ▪ CHL10 (3490 Old Brock Road) - Alterations to this resource include the removal of a barn, two outbuildings, and fenced pasture. Anticipated impacts also include excavation, grading and the removal of landscape features including mature trees and agricultural fields. 	<p>The following are recommendations presented in the HIA for the 8119 Reesor Road and 8042 Reesor Road properties to consider during Detail Design:</p> <ol style="list-style-type: none"> 1. The proposed designs for the Donald Cousens Parkway Station will be designed in a manner that preserves the cultural heritage resources with no impacts to identified heritage attributes; 2. Where full preservation is not feasible, a plan for partial preservation/retention of the cultural heritage resources in situ will be developed. This would entail: developing a plan for stewardship and re-use; protection of vehicular access; protection during construction; and protection of context through the use of sympathetic landscaping techniques. In order of preference, a partial plan of retention for this project would involve the following: <ol style="list-style-type: none"> a. In situ retention of all buildings and part of the landscape at 8042 Reesor Road and the farmhouse at 8119 Reesor Road, resulting in direct impacts to the outbuildings and landscape features located north of the dwelling on 8119 Reesor Road. If feasible, it is recommended that the barn located at 8119 Reesor Road be retained, possibly through the inclusion of a retaining wall to reduce grading; and, b. In situ retention of the dwellings at 8042 Reesor Road and 8119 Reesor Road, resulting in direct impacts to the outbuildings on both properties, and landscape features located 	Should future work require an expansion of the study area, then a qualified heritage consultant will be contacted in order to confirm the impacts of proposed work on potential cultural heritage resources.

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 BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			<p>north of the respective farmhouses and driveways.</p> <ol style="list-style-type: none"> Where direct or indirect impacts to cultural heritage resources are unavoidable, investigate the feasibility of relocating the cultural heritage resource to a new location on its current site. If it is determined that it is not feasible to undertake such mitigation strategy in a manner that conserves the heritage character of the resource and in a manner consistent with public safety, it is recommended that the resource be relocated to a new nearby site in a manner that makes limited to minimal changes to its heritage character. Such a mitigation strategy would include completion of a documentation report of the property, and development of a relocation plan which would lay out the actions required and responsibilities of stakeholders in order to relocate and re-use the resource. Should relocation of the resource not be feasible, and where demolition activities are anticipated, a property-specific documentation report shall be undertaken for each property, and a salvage plan developed and implemented. Demolition and salvage activities should be monitored by a qualified professional for documenting any additional features uncovered during the demolition process. Additionally, if any old documents are found during the course of demolition, such as old newspaper, land deeds, letters, photographs, etc., these should be sent to the Markham Museum and Archives <p>The HIA concluded that the 3440 Old Brock Road (now Elsa Storry Avenue) property was not determined to be of provincial significance. It was determined to retain local cultural heritage value and the following are recommendation for Detail Design:</p> <ol style="list-style-type: none"> The proposed development should attempt to avoid direct and indirect impacts to landscape and intangible heritage attributes associated with 3440 Brock Road to result in compatible alterations to the property and limit the isolation of the heritage resources from their physical, historical, and contextual setting. If retention and relocation of the barn and driveshed (located northeast side of the property) most has been demonstrated to be unfeasible by the proponent, a Cultural Heritage Documentation and Salvage Report will be completed by a qualified heritage practitioner and distributed to the City of Pickering Heritage Planning staff and IO. 	
Archaeological Features	Potential loss/displacement of archaeological resources within the study area.	<p>The study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources, depending on how much disturbance the soils have been subject to. Parts of the study area also possess potential for ancestral Huron-Wendat ossuary sites.</p> <p>Stage 2 Archaeological Assessment was recommended for all lands considered to have archaeological site potential and that may be disturbed by the proposed Transitway construction (54.5 ha). Two archaeological sites will require Stage 3 Site-Specific Assessment and another two archaeological sites will require Stage 4 Mitigation of Development Impacts by Protection and Avoidance.</p>	<ul style="list-style-type: none"> Stage 2 property assessment by test pit survey at five metre intervals and pedestrian survey at five metre intervals, as appropriate, is recommended for parts (54.5 ha) of the study area prior to any proposed disturbance by the project. The Stage 2 assessment, will confirm whether other known archaeological sites located adjacent to the study area extend into the runningway and stations sites. Identified potential archaeological sites that could extend into the runningway and station sites are: Sideline site (AlGs-175); Cobb site (AlGs-176); Ken Reesor 2 site (AlGt-14); Ansell site (AlGt-29); Burkholder 2 site (AlGt-35); and Fyfe site (AlGt-246). If these sites are confirmed to extend into the runningway and station sites, further archaeological assessment will be required. The study area crosses the Rouge River, Little Rouge Creek and West Duffins Creek. The submerged channels of these watercourses cannot be assessed by the current land-based Stage 1 archaeological assessment according to regulations under the <i>Ontario Heritage Act</i>. If there are any planned impacts, the TRCA will be contacted for further advice prior to any proposed disturbance to these areas; 	Nine previously registered archaeological sites require various degrees of further archaeological assessment prior to any proposed disturbances by the project.

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 BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			<ul style="list-style-type: none"> ▪ Site AIGs-177 has been documented to possess CHVI and is located within 50 m of the study area. This site requires Stage 3 site-specific assessment to determine the nature and extent of the cultural deposits, prior to any proposed impacts to the site. ▪ Site AIGs-179 has been documented to possess CHVI and is located within 50 m of the study area. This site requires Stage 3 site-specific assessment to determine the nature and extent of the cultural deposit, prior to any proposed impacts to the site. ▪ The Ludger Gros-Louis site (AIGs-302) has been documented to possess CHVI and is included in the current 407 Transitway Project study area. This site has been previously recommended to require Stage 4 Mitigation of Development Impacts by Protection and Avoidance. If the site cannot be avoided and protected within the project design, then it must be subject to a comprehensive Stage 4 Excavation in accordance with S &G Section 4.2.2. ▪ The Carl R. Murphy site (AIGs-368) has been documented to possess CHVI and is impacted by the current 407 Transitway Project study area. This site has been previously recommended to require Stage 4 Mitigation of Impacts by Protection and Avoidance. If the site cannot be avoided and protected within the project design, then it must be subject to a comprehensive Stage 4 excavation in accordance with S &G Section 4.2.2. ▪ Part of the study area includes the Brougham Pioneer Cemetery. Cemetery lands require protection and avoidance from any impacts proposed by the project. Lands adjacent to known cemetery limits require completion of a Cemetery Investigation prior to any proposed impacts by the Project. ▪ To minimize the risk of affecting an ossuary within the Project lands, a licensed archaeologist must be present to monitor the removal of topsoil for all areas that are within one kilometer of previously registered Iroquoian village sites and 300 m of water. ▪ The remainder of the study area is documented to have been subject to previous archaeological assessment or to possess conditions which indicate that archaeological potential has been removed. No further archaeological assessment is required for these lands. ▪ Should the proposed work extend beyond the current study area then further Stage 1 assessment must be conducted to determine the archaeological potential of the surrounding lands. 	

6.2.3. Transportation

The footprint of the Transitway will provide positive effects to the transportation system by encouraging transit usage and carpooling through the presence of park and ride facilities at all stations; as well as convenient transfer opportunities between the various transit agencies, through the inclusion of bus looping

and lay-by facilities at most stations. There will be no negative footprint effects to transportation. Refer to **Table 6.7** which shows the Footprint Impacts, proposed mitigation measures and recommended monitoring for Transportation.

TABLE 6.7: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR TRANSPORTATION

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Markham Station				
Structures crossing arterials	Underpass or overpass crossing	Transitway crosses under N-E ramp and Markham Road.	No action required	
Local traffic effects	New roads, new intersections	New signalized intersection required to access station approximately 220 m south of EB 407 ETR ramp intersection.	No action required	
Impact on 407 ETR infrastructure	Impact to ramps	EB exit ramp requires grading on south side to transitway level.	No action required. Detail design will address difference in grade.	
Ninth Line Station				
Structures crossing arterials	Underpass or overpass crossing	Transitway crosses under Ninth Line.	No action required	
Local traffic effects	New roads, new intersections,	Access roadway to station connects to existing Rouge Bank Drive via Old Ninth Line with added signalization. SB Right in-right out connection provided approximately 100 m south of EB 407 ETR exit ramp.	No action required	
Impact on 407 ETR infrastructure	Impact to ramps	EB exit ramp requires regrading on south side. Possible retaining wall between ramp and station platform.	No action required. Detail Design will address difference in grade.	
Donald Cousens Station				
Structures crossing arterials	Underpass or overpass crossing	Transitway crosses under Donald Cousens Pkwy and future NE Ramp.	No action required	
Local traffic effects	New roads, new intersections	New signalized intersection required to access station approximately 280 m south of EB 407 ETR ramp intersection.	No action required	
Impact on 407 infrastructure		EB exit ramp requires regrading on south side.	No action required. Detail Design will address difference in grade.	
Whites Road Station				
Structures crossing arterials	Underpass or overpass crossing	Transitway crosses under Whites Road.	No action required	

TABLE 6.7: FOOTPRINT IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR TRANSPORTATION

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATIONS AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Local traffic effects	New roads, new intersections	New signalized intersection to be provided approximately 250 m south of future EB 407 Exit ramp as part of new development in SW quadrant. Provides access to station. SB Right in- right out entrance to be provided approximately 150 m south of future EB 407 ETR exit ramp.	No action required	
Impact on 407 ETR infrastructure	Impact to ramps	EB exit ramp requires regrading on south side. Likely retaining wall provided between ramp and station platform. Future ramp S-E would pass over transitway.	No action required. Detail Design will address difference in grade.	
Brock Road Station				
Structures crossing arterials	Underpass or overpass crossing	Transitway crosses under Brock Road.	No action required	
Local traffic effects	New roads, new intersections.	New signalized intersection to be provided approximately 250 m south of EB 407 ETR exit ramp as part of new development in SW quadrant. Provides access to station. SB Right in- right out entrance to transitway for buses to be provided approximately 150 m south of EB 407 ETR exit ramp.	No action required	
Impact on 407 ETR infrastructure	Impact to ramps	No impact to 407 ETR ramps as all access is well south of highway.	No action required	

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 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.

During Detail Design further field investigation and consultations with the utility owners will be carried out before defining or confirming the type of solution. Detail Design will also assess loading capacity 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, 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

The clay and loam soils located along the Transitway facility are susceptible to erosion and will be affected during construction of the mainline and station facilities. Consequently, soil disturbance associated with drainage improvements, grading revisions, culvert extensions, 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. 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 during Detail Design.

Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (i.e. Ontario Provincial Standard Specification 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.

The management of excess soils will be further developed during Detail Design and in consultation with MOECC.

Contaminated Properties and Waste

If areas containing fill are to be disturbed during construction, the quality of the fill will be confirmed through available background information or by completing subsurface environmental investigations to determine appropriate management and disposal options. No other specific indications of issues of potential environmental concern were observed within the study area.

As per MTO objectives, 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 materials will be reviewed by a qualified professional. The wastes which will be generated by the project will generally consist of:

- Reclaimed asphalt pavement 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.

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.

Surface Water, Drainage and Stormwater

The erosion and sediment control practices to be developed during Detail Design 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

Interaction with groundwater and construction activities are, as expected, to be the result of deep excavations below the water table. Although most excavations are expected to be relatively shallow, deeper excavations may be necessary for bridge and buried utility and sewer construction. Discharge functions at the bridge construction locations may be affected temporarily during construction activities; however, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures.

Fish and Aquatic 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 and barriers to fish movement. **Table 6.8** presents a summary of proposed in-stream work, mitigation measures and net environmental effects.

TABLE 6.8. SUMMARY OF PROPOSED IN STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS			
NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
R1: Tributary of the Rouge River	Open footed structure	Impacts to indirect, warmwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the Redside Dace timing window (July 1- September 15). Work will be done “in the dry” Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
R2: Tributary of the Rouge River	Concrete circular structure	Impacts to indirect, warmwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the Redside Dace timing window (July 1- September 15). Work will be done “in the dry” Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
R3: Tributary of the Rouge River	Concrete circular structure	Impacts to direct, warmwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the Redside Dace timing window (July 1 to September 15). Work will be done “in the dry”. Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
R4: Rouge River	Clear span bridge structure	Impacts to direct, coolwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works (if required) and work on the banks to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Works are to follow all conditions of the MTO Best Management Practices Manual for Fisheries Clear Span Bridges (MTO 2015). Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
R5: Tributary of the Rouge River	Open footed structure	Impacts to direct, coolwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Work will be done “in the dry”. Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
R6: Tributary of Little Rouge Creek	Open footed structure	Impacts to direct, coolwater fish habitat will be determined during later design stages	<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”.
R7: Tributary of Little Rouge Creek	Open footed structure	Impacts to direct, warmwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater timing window (July 1 to September 15).

TABLE 6.8. SUMMARY OF PROPOSED IN STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS			
NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
R7a: Tributary of Little Rouge Creek	Open footed structure	Impacts to direct, warmwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> Work will be done “in the dry”. In-water works to be conducted within the coldwater timing window (July 1 to September 15). Work will be done “in the dry”.
R8: Tributary of Little Rouge Creek	Open footed structure	Impacts to direct, coolwater fish habitat will be determined during later design stages	<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”.
R9: Tributary of Little Rouge Creek	Channel Realignment Existing CSP will be re-located to the west of the railway crossing structure	Impacts to indirect, coolwater fish habitat associated with channel realignment and culvert placement will be determined during later design stages	<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”. Form and function of the realigned channel shall be maintained.
R10: Little Rouge Creek	Clear span bridge structure	Impacts to direct, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works (if required) and work on the banks to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Works are to follow all conditions of the MTO Best Management Practices Manual for Fisheries Clear Span Bridges (MTO 2015).
R11: Tributary of Little Rouge Creek	Concrete circular structure	No impacts to fish habitat	<ul style="list-style-type: none"> Follow standard mitigation and BMPs for surface water quality.
P1: Petticoat Creek	Concrete circular structure	Impacts to indirect, warmwater fish habitat will be determined during later design stages	<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”.
D1: West Duffins Creek	Clear span bridge structure	Impacts to direct, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works (if required) and work on the banks to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Works are to follow all conditions of the MTO Best Management Practices Manual for Fisheries Clear Span Bridges (MTO 2015).
D2: Tributary of West Duffins Creek	Clear span bridge structure	Impacts to indirect, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works (if required) and work on the banks to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Works are to follow all conditions of the MTO Best Management Practices Manual for Fisheries Clear Span Bridges (MTO 2015).

TABLE 6.8. SUMMARY OF PROPOSED IN STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS			
NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
D3: Tributary of West Duffins Creek	Clear span bridge structure	Impacts to direct, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works (if required) and work on the banks to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Works are to follow all conditions of the MTO Best Management Practices Manual for Fisheries Clear Span Bridges (MTO 2015).
D4: Tributary of West Duffins Creek	Open footed structure	Impacts to direct, coldwater fish habitat will be determined during later design stages	<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”.
D5: Tributary of West Duffins Creek	unknown	No impacts to fish habitat	<ul style="list-style-type: none"> Follow standard mitigation and BMPs for surface water quality.
D6: Tributary of Whitevale Creek	unknown	No impacts to fish habitat	<ul style="list-style-type: none"> Follow standard mitigation and BMPs for surface water quality.
D7 Tributary of Whitevale Creek	unknown	No impacts to fish habitat	<ul style="list-style-type: none"> Follow standard mitigation and BMPs for surface water quality.
D8: Tributary of Tributary of Whitevale Creek	Open footed structure	Impacts to indirect, coldwater fish habitat will be determined during later design stages	<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”.
D9: Tributary of Whitevale Creek	Realignment, into D10 structure	Impacts to indirect, coldwater fish habitat will be determined during later design stages	<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”. Form and function of the realigned channel shall be maintained.
D10: Whitevale Creek	Open footed structure	Impacts to indirect, coldwater fish habitat will be determined during later design stages	<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”.
D11: Tributary of Ganatsekiagon Creek	Open footed structure	Impacts to indirect, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Work will be done “in the dry”. Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).

TABLE 6.8. SUMMARY OF PROPOSED IN STREAM WORK, MITIGATION MEASURES AND NET ENVIRONMENTAL EFFECTS			
NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
D12: Ganatsekiagon Creek	Open footed structure	Impacts to indirect, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Work will be done “in the dry”. Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
D13: Tributary of Urfe Creek	Channel realignment	Impacts to seasonal coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Work will be done “in the dry”. Natural channel design will be incorporated into the realigned channel. Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
D14: Tributary of Urfe Creek	Open footed structure	Impacts to direct, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Work will be done “in the dry”. Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
D15: Urfe Creek	Clear span bridge	Impacts to direct, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works (if required) and work on the banks to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Works are to follow all conditions of the MTO Best Management Practices Manual for Fisheries Clear Span Bridges (MTO, 2015). Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
D16: Brougham Creek	Open footed structure	Impacts to direct, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Work will be done “in the dry”. Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
D17: Tributary of Brougham Creek	Open footed structure	Impacts to indirect, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> In-water works to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). Work will be done “in the dry”. Works may be subject to the BMPs outlined in

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

NAME	PROPOSED WORKS	NET ENVIRONMENTAL EFFECTS	SITE SPECIFIC MITIGATION
			the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).
D18: Tributary of Brougham Creek	Open footed structure	Impacts to direct, coldwater fish habitat will be determined during later design stages	<ul style="list-style-type: none"> ■ In-water works to be conducted within the coldwater/Redside Dace timing window (July 1 to September 15). ■ Work will be done “in the dry”. ■ Works may be subject to the BMPs outlined in the Draft Guidance for Development Activities in Redside Dace Protected Habitat (MNR 2011).

Vegetation and Vegetation Communities

Effects on vegetation such as the displacement or loss of vegetation and vegetation communities will occur from the construction of the 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 designated for protection. Therefore, areas designated for protection will be clearly shown on all construction plans and marked in the field using tree protection barrier. Efforts will be taken during construction to minimize impacts to existing wetland vegetation communities including swamps, meadow marsh and shallow marsh communities located within the study area. Wherever possible, locally rare and uncommon species will be avoided. Mitigation measures will be further developed during Detail Design.

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 displacing native plant species over time. 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.

Tree protection plans, edge management plans, restoration plans and suitable compensation for vegetation losses will be prepared during Detail Design.

Wildlife and Wildlife Habitat

Field investigations during preliminary design have concluded that Eastern Meadowlark, Barn Swallow and Bobolink have the potential to be present within the study area. These three species are listed and regulated as ‘Threatened’ under the ESA. During the Detail Design stage, further field investigations, undertaken during the appropriate season using MNRF protocols for surveying for these species, will be conducted to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.

Numerous birds located within the project limits are listed under the MBCA. The MBCA prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. No vegetation removals will occur during the nesting season to meet the requirements of the MBCA. The nesting season for the majority of the species is from April 1 to August 15. This timing restriction will also protect the birds found within the study area and listed under the FWCA.

Air Quality

The construction of the 407 Transitway has the potential to affect the air quality in the vicinity of the site during the construction phase. As with any construction site, these emissions will be of relatively short duration and are unlikely to have any long-lasting effect on the surrounding area. Dust impacts will be mitigated through the use of proper controls. Night time construction activities will also be considered in order to reduce emissions from vehicles that are slowed down by any reduced road capacity during the day. BMPs will be implemented to mitigate air quality impacts during construction.

TABLE 6.9: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Physiography and Soils	Potential for erosion during construction	The clay and loam soils located along the Transitway facility are susceptible to erosion and will be impacted during construction of the mainline and station facilities. Consequently, soil disturbance associated with drainage improvements, grading revisions, culvert extension, etc. may result in erosion of, and sedimentation to, sensitive receiving watercourses.	Standard erosion and sedimentation control measures will be followed during construction in accordance with Ontario Provincial Standard Specification 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 will be identified during Detail Design following the Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects (MTO 2007). Erosion and sedimentation control measures will include:	An Erosion and Sedimentation Plan will be developed during Detail Design including measures to monitor and maintain erosion and sedimentation control during construction to ensure their effectiveness.

TABLE 6.9: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
		<p>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 during Detail Design.</p>	<ul style="list-style-type: none"> ▪ placing straw bale flow checks at regular intervals in ditches down-gradient from areas of soil disturbance in rural sections; ▪ 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. <p>Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (i.e. Ontario Provincial Standard Specification 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.</p> <p>The management of excess soils will be further developed during Detail Design and in consultation with MOECC.</p>	<p>A Waste Management Plan will be developed during Detail Design</p>
Contaminated Property and Waste	Potential for disturbance and/or disposal of contaminated waste and/or soils during construction.	Disturbance of contaminated waste and/or soils during construction.	<p>Phase 1 Environmental Site Assessments and Phase 2 Environmental Soil & Groundwater Investigations will be conducted in areas where excavation and other soil disturbing construction activities will take place and are 'highly likely' to have waste materials/contamination. The Phase 1 ESAs and Phase 2 ESAs will be conducted during Detail Design, and their results and proposed mitigation measures will be implemented as applicable. In addition, MTO will implement its standard construction methods and BMPs regarding contaminated property/waste issues.</p> <p>As per MTO objectives, 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 materials will be reviewed by qualified professional. The wastes which will be generated by the project will generally consist of:</p> <ul style="list-style-type: none"> ▪ Reclaimed asphalt pavement 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. <p>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.</p> <p>The disposal of contaminated materials will be directed to an MOECC approved soil treatment site or waste disposal site.</p>	<p>The Contingency Plan will be developed to include commitment to contact MOECC's York Durham District Office if contaminated sites are encountered during construction.</p>

TABLE 6.9: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Surface Water, Drainage and Stormwater	Impact to quality and quantity of water	<p>Erosion and sedimentation impacts from construction.</p> <p>Impacts associated with any positive dewatering implemented during construction. There is a strong possibility of positive dewatering being needed for bridge crossings for the deeper stream valleys and may be required elsewhere for culvert and buried utility construction. The impacts associated with the construction dewatering activities are expected to be temporary.</p> <p>Potential impact from spills during construction.</p> <p>Floodplain disturbance.</p>	<p>Surface roughening will take place wherever possible as a means of temporary erosion and sediment control measures. Sediment barriers, rock check dams and temporary construction access will be installed prior to any topsoil stripping. All erosion and sediment control measures (temporary silt fencing, temporary catchbasin sediment control, temporary mudmats, temporary tree protection (if required), straw bale protection, and rock check dams) will be installed prior to construction and will be left in place until the site is fully restored and stabilized including final ditching. Silt fences will be installed in a manner that minimizes the build-up of water at low points along the fence.</p> <p>All topsoil stock piles will be surrounded with sediment fence. Silty/sediment laden water from the work area is to be pumped to filter bags or equivalent prior to discharge. Disturbed areas will be minimized to the extent possible, and temporary or permanently stabilized or restored as the work progresses. All points of construction egress or ingress shall be maintained to prevent tracking or flowing of sediment onto public roads or abutting properties.</p> <p>Implementation of BCPs 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 MOECC. 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. ▪ 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>Erosion will be monitored and a sediment removal program will be followed.</p> <p>Works will be conducted during favourable weather conditions.</p> <p>Cleaning of sediments in the temporary SWM ponds will be undertaken as needed.</p> <p>The SWF will be monitored after large storm events.</p>
Groundwater	<p>Potential alterations to the groundwater regime and recharge</p> <p>Potential for groundwater contamination</p>	<p>Bridge construction may cause temporary impact to local groundwater discharge to watercourses; however, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures.</p> <p>Areas of high water table may affect construction progress and technique. For areas of relatively coarse silt and sand such as those thought to exist in the area</p>	<p>Should dewatering or deep excavation be required, a door-to-door water well survey will be conducted within 250 m of locations at which the dewatering or deep excavation may occur. The preconstruction survey will be followed by monitoring of water levels in selected wells during dewatering activities to confirm any decline in water level within the domestic water supply wells.</p> <p>Allow 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.</p> <p>Contaminated groundwater will be managed in accordance with provincial legislation and regulations including the MOECC <i>Guidelines for Use at Contaminated Sites in Ontario</i> (1997).</p>	<p>Potential impacts will be re-assessed along with more detailed site specific hydrogeological data at the Detail Design stage and appropriate mitigation measures incorporated into the design.</p> <p>A water well survey (preconstruction) will be conducted during the Detail Design stage of this project to assess any impacts to water wells. Affected water well owners will continue to have water supplies of appropriate quality and in adequate quantities. Any work done on affected wells or any replacement wells will be done</p>

TABLE 6.9: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
		<p>of Kennedy Road to McCowan Road, there is presence of high water table.</p> <p>Impacts associated with any positive dewatering implemented during construction. There is a strong possibility of positive dewatering being needed for bridge crossings for the deeper stream valleys and may be required elsewhere for culvert and buried utility construction. The impacts associated with the construction dewatering activities are expected to be temporary.</p> <p>Approximately 30 shallow bored wells are present in the east portion of the study area. The greatest potential for well interference would be associated with deep excavations and/or construction dewatering.</p> <p>Mobile vehicles re-fueling during construction presents a risk of impact to local wells as a result of accidental releases of fuel.</p>	<p>Permits to Take Water for construction will be applied for as necessary.</p>	<p>pursuant to O.Reg. 903, Wells (pursuant to the <i>Ontario Water Resources Act</i>).</p> <p>Monitoring of water levels in selected wells during positive dewatering activities will be conducted. Monitoring of any wetlands and groundwater located within the zone of influence for dewatering will occur.</p> <p>Effectiveness of mitigation measures will be assessed through direct investigation during construction.</p>
Fish and Aquatic 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 and barriers to fish movement.</p> <p>The proposed works identified at each of the crossings will result in a temporary alteration and disruption of fish habitat. The mitigation measures proposed will minimize negative impacts to fish and fish habitat.</p>	<p>For details on mitigation measures and potential residual effects on each watercourse crossing please see 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. 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 minimal 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 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; ▪ 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; and, ▪ fish isolated by construction activities (if present) will be captured by a qualified fisheries specialist 	<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 as below:</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. ▪ In areas where riparian vegetation removal is necessary to accommodate construction, measures to protect the local fish communities shall include the following: no clearing of mature trees providing a bank stabilization function; no felling of trees into the watercourse; minimize the amount of debris produced from entering the watercourse; and only clear the vegetation required to complete the necessary works. <p>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</p>

TABLE 6.9: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			<p>and safely released to the watercourse.</p> <p>Standard erosion and sedimentation control measures will be implemented prior to soil disturbance / ground breaking, as necessary, to mitigate impacts on water quality of the surface drainage features adjacent to the study area. In addition, best management / construction practices will be implemented during construction to reduce the potential for spills or other materials to exit the work area. Mitigation measures which shall be implemented to avoid impacts to fish and fish habitat are described below.</p> <p>Implementation of best construction practices 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 MOECC. 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. ▪ No construction machinery or vehicles will cross any watercourse at any time during construction. <p><u>Erosion and Sedimentation Control</u></p> <p>Effective erosion and sedimentation control will be achieved throughout the project with careful planning and design, stringent construction supervision, monitoring of the site, and maintenance of control works throughout their operational life. The following temporary erosion and sedimentation control measures will be implemented prior to soil disturbance / ground breaking to mitigate impacts on water quality and fish habitat:</p> <ul style="list-style-type: none"> ▪ The extent and duration that disturbed soils are exposed to the elements will be kept to a minimum. ▪ Disturbed areas will be stabilized through seeding, mulching or use of an erosion control blanket, as appropriate, to provide slope protection and long-term slope stabilization. ▪ Silt fencing will be placed along the watercourse margins in areas of disturbance to prevent the entry of sediment into the watercourses. ▪ Flow checks will be placed at appropriate intervals in lateral ditches down gradient from areas of soil disturbance to trap suspended sediments and reduce the erosive force of runoff. <p>These erosion and sedimentation control measures shall remain in place until soils have been re-stabilized. A number of special provisions related to erosion and sedimentation control are</p>	<p>warmwater timing window. Works are also to be conducted during a period of low flow and precipitation to further reduce the potential impacts. Negative residual effects range from low to moderate.</p>

TABLE 6.9: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			<p>recommended to be included in the contract package to ensure that the above measures are implemented including:</p> <ul style="list-style-type: none"> ▪ Construction Specification for Seed and Cover to stabilize disturbed areas. ▪ Construction Specification for Topsoil 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 to cover the installation, maintenance, monitoring and removal of the temporary erosion and sediment control measures and the removal of sediment accumulated by the control measures. ▪ Amendments to the Construction Specification for Temporary Erosion and Sediment Control Measures to specify the type of temporary erosion and sedimentation control measures to be installed and the timing constraints for the installation and removal of the control measures. ▪ Any Non-Standard Special Provisions (NSSPs) required to stipulate the time interval (i.e., maximum of 20 calendar days) between the commencement and completion of any work that disturbs earth surfaces, and to provide direction for seeding, mulching or use of an erosion control blanket to be placed in areas of soil disturbance to provide slope protection and long-term slope stabilization. ▪ General Specification for the Management of Excess Materials 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> 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> <p>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.</p> <p>In areas where riparian vegetation removal is necessary to accommodate construction, measures to protect the local fish communities shall include the following: no clearing of mature trees providing a bank stabilization function; no felling of trees into the watercourse; minimize the amount of debris produced from entering the watercourse; and only clear the vegetation required to complete the necessary works.</p> <p><u>Storm Water Management</u> A storm water management study has been done 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"> ▪ During Detail Design, a storm water management plan will be prepared that will address both 	

TABLE 6.9: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			<p>water quantity and quality, in accordance with MTO guidelines and in consultation with regulatory agencies.</p> <ul style="list-style-type: none"> ▪ 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 during the design phase 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. ▪ Where feasible, opportunities for providing ease of containment of accidental spills will be provided during the design of storm water management facilities (MTO 1997). 	
Vegetation and Vegetation Communities	Potential displacement of and/or disturbance to vegetation and vegetation communities	<p>Effects on vegetation related to the construction of the 407 Transitway between Kennedy Road and Brock Road and associated facilities could include:</p> <ul style="list-style-type: none"> ▪ 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. 	<p>At a minimum the following mitigation measures will 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. 	Regionally rare plants that cannot be avoided will be located and salvaged prior to construction in consultation with regulatory agencies.
Wildlife and Wildlife Habitat	<p>Effects could include:</p> <ul style="list-style-type: none"> ▪ Displacement of Wildlife and Wildlife Habitat; ▪ Potential Impacts to Migratory Birds; and, ▪ Displacement of Rare, Threatened or Endangered Wildlife or Significant Wildlife Habitat. 	<p>Three species at risk have been identified as potentially being present within the 407 Transitway study area. Eastern Meadowlark, Bobolink and Barn Swallow are regulated under the ESA as 'Threatened' species.</p> <p>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.</p>	<p>During Detail Design, further field investigation will be undertaken during the appropriate season using MNRF protocols for surveying the absence/presence of Eastern Meadowlark, Bobolink and Barn Swallow. Appropriate steps for protection and permitting will be done after the detailed field investigation during Detail Design.</p> <p>All major corridors associated with valleylands will be maintained and new crossings will mimic the existing crossings to facilitate wildlife passage.</p> <p>While migratory insectivorous and non-game birds are protected year-round, migratory game birds are only protected from March 10 to September 1. To comply with the requirements of the MBCA, disturbance, clearing or disruption of vegetation where birds may be nesting will be completed outside the window of April 1 to August 15. In the event that these activities must be undertaken from April 1 to August 15, a nest survey will be conducted by a qualified avian biologist to identify and locate active nests of species covered by the MBCA. If an active nest is located, a mitigation plan shall be developed and provided to Environment Canada – Ontario Region for review prior to implementation. A MTO NSSP (Operation Constraint – Migratory Bird Protection – General) will be included in the contract document to ensure the contractor is in compliance with the MBCA.</p>	

TABLE 6.9: CONSTRUCTION IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES BUILT-IN POSITIVE ATTRIBUTES AND/OR MITIGATION AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			Wildlife salvage shall occur prior to clearing and grubbing activities 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	
Designated Natural Areas	Impacts to designated natural areas in and adjacent to the study area.	Potential impacts to Cedar Grove Wetland Complex and West Duffins Creek Environmentally Significant Area during construction.	Please see mitigation measures under Surface Water, Drainage and Stormwater; Fish and Fish Habitat; and Vegetation and Vegetation Communities.	
Air Quality	There is a potential for air quality impacts to occur during construction	Dust emissions and exhaust emission from construction equipment will impact air quality of the area.	<p>BMPs such as MTO Standards and Practices and Environment Canada’s ‘Best Practices for the Reduction of air Emissions from Construction and Demolition Activities’ will be implemented to prevent the potential release of dust and other airborne pollutants off site, such as:</p> <ul style="list-style-type: none"> ■ Periodic watering of unpaved construction areas; ■ Period watering of stockpiles; ■ Use of water sprays during the loading of materials; and, ■ Sweeping and/or water flushing of the entrances to the construction zones. <p>These types of control aid in minimizing impacts to the environment during the construction phase.</p> <p>Night time construction activities will also be considered in order to reduce emissions from vehicles that are slowed down by any reduced road capacity during the day.</p>	

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

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 and may include: traffic disruption and/or delays, access restrictions, noise, and dust.

Noise and Vibration

Noise and vibration impacts will be temporary and will occur within time and place restrictions outlined in the various applicable municipal noise by-laws, or an exemption will be sought prior to commencement of construction. The impact 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 project development will result in soil disturbance, alterations in topography, and tree removal. The cultural heritage features to be affected by construction activities only are: CHL 4, CHL 5, CHL 6, CHL 7, CHL 8, and CHL 9. Construction activities and staging will be suitably planned and undertaken to avoid impacts to identified cultural heritage resources. Please see **Section 6.2.2** for footprint impacts to three cultural heritage features (CHL1, CHL2, and CHL10).

Archaeological Features

Stage 2 Archaeological Assessment was recommended for all lands considered to have archaeological site potential and that may be disturbed by the proposed Transitway construction. Two identified archaeological sites were identified requiring Stage 3 Site-Specific Assessment and another two requiring Stage 4 Mitigation of Development Impacts by Protection and Avoidance. The above studies will be conducted prior to construction.

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

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	ENVIRONMENTAL IMPACT AND PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Land Use	Potential impacts to existing, planned, and future land uses within the study area	Temporary impacts associated with construction are anticipated to affect all land use factors. Temporary impacts may include: traffic disruption and/or delays, access restrictions, noise, and dust.	<p>Efforts have been made to minimize effects of the Donald Cousens Station footprint to avoid two parcels identified for conservation. Mitigation measures to reduce the impact of the land use change on the farm will be considered, including replacement of fencing, re-establishment of drainage, and maintenance of access related to farm activities during and post construction.</p> <p>Temporary impacts to residences, recreational and community, commercial and industrial facilities will be mitigated through the following measures:</p> <ul style="list-style-type: none"> ▪ Access and egress for emergency vehicles and school buses will be maintained at all times during construction; ▪ To prevent the emission of pollutants, including dust, to the atmosphere, provisions will be made to ensure there is no unnecessary idling of vehicles. Dust suppressants will be used to combat dust, where appropriate; ▪ Construction activities will adhere to local noise by-law regulations. Noise by-law exemptions will be obtained from the municipality where construction activities will occur within the prohibited times; ▪ Construction activities will be staged to avoid/minimize traffic delays to residents, business owners, recreational and community facility operators/users and motorists travelling within the study area to the extent possible; ▪ Access to the 407 ETR, regional roads and local municipal roads will be maintained at all times, or detours will be identified; and, ▪ The local public will be kept informed of the progress of the Transitway construction and notified of any disruptions such as road closings. 	Best practices will be used to minimize impacts on local land uses.
Noise and Vibration	Potential noise and vibration impacts during construction.	Temporary noise and vibration impacts during construction.	<p>The implementation of the following measures will help to mitigate potential noise impacts during construction:</p> <ul style="list-style-type: none"> ▪ Limit construction to the time periods allowed by the City of Markham and City of Pickering noise by-laws. ▪ Should there be a need to complete work outside of the hours allowed in the applicable noise bylaws, MTO 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. ▪ Contracts shall include explicit indication that all construction equipment used on the project is to meet the sound level criteria from NPC-115 and NPC-118, and be well maintained and operating with effective muffling devices that are in good working order. ▪ The separation distance between construction 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 potholes 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 	<p>Best practices will be used to minimize impacts on local land uses.</p> <p>A Complaints Protocol will be developed during Detail Design.</p>

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

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	ENVIRONMENTAL IMPACT AND PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
			<p>implemented, including verification of construction equipment sound levels per NPC-115 and NPC-118.</p> <ul style="list-style-type: none"> 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 contribute to mitigate potential vibration impacts during construction:</p> <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 will be operated as far away from vibration-sensitive sites as possible. Where possible, activities that have potential to cause off-site vibrations will be phased such that as few as possible are occurring simultaneously. Construction activities that have potential to cause off-site vibration during the night-time hours will be avoided. A complaints protocol will be established for this project for receiving, investigating and addressing construction vibration complaints received from the public. The Contract documents will 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 will consider implementing a measurement program to evaluate the vibration impacts. 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 and Cultural Heritage Landscapes	Potential impacts to built heritage and/or cultural heritage landscapes	<p>Construction activities associated with the development will result in soil disturbance, alterations in topography, and tree removal. The cultural heritage features to be impacted are:</p> <ul style="list-style-type: none"> CHL4 (Reesor Road)- Alterations to this resource include disturbance due to the construction of a bridge over Reesor Road, involving construction activities such as grading and excavation on the road margins. However, due to the temporary nature of the impacts and the previous construction of the Highway 407 bridges directly to the north, these impacts are not considered to negatively impact the historical context of the resource. 	<p>Construction activities and staging will be suitably planned and undertaken to avoid impacts to identified cultural heritage resources. Steps will be taken to ensure the residence and other structures and surrounding vegetation are retained and protected during construction-related activities.</p> <p>Where possible, further adjustments to profile, cross-section, and grading limits will be made to reduce encroachment and avoid removal of mature trees.</p> <p>Where impacts to existing vegetation are anticipated, post-construction rehabilitation will include plantings sympathetic to the historical context of the resource.</p> <p>CHL 9 - if the proposed impacts do not involve the construction of a bridge causing the destruction of the resource or a significant change in alignment, additional work is required. In</p>	Construction activities will be undertaken in a manner to limit impacts on cultural heritage resources.

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

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	ENVIRONMENTAL IMPACT AND PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
		<ul style="list-style-type: none"> ▪ CHL5 (CP Rail Line) Alterations to this resource include temporary construction-related impacts from the construction of a bridge over the existing tracks. Due to the temporary nature of the impacts and the previous construction of the Highway 407 bridges directly to the north, these impacts are not considered to negatively affect the historical context of the resource. There are no anticipated impacts to the present railway alignment. ▪ CHL6 (Rouge Creek, CHL7 (Little Rouge Creek), CHL8 (West Duffins Creek) -Alterations to this resource include excavation and grading of the creek valley and the removal of mature trees to facilitate construction of a road bridge over the resource. ▪ CHL9 (Seaton Hiking Trail) - Alterations to this resource include excavation and grading of the creek valley and the removal of mature trees to facilitate construction of a road bridge over the resource. There is no anticipated impact to the present alignment or structure of the pedestrian trail. 	<p>this case, prior to alteration of the setting, the areas of impact will be subject to photographic documentation and compilation of a resource-specific cultural HIA report.</p> <p>Instructions will be issued to construction crews, and fenced no-go zones will be established in order to prevent impacts to the existing structures.</p>	
Archaeological Features	Potential loss/displacement of archaeological resources within the study area	The study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources, depending on how much disturbance the soils have been subject to. Parts of the study area also possess potential for ancestral Huron-Wendat ossuary sites.	The required Stage 2, Stage 3 and Stage 4 archaeological studies will be conducted prior to construction.	<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 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>

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

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	ENVIRONMENTAL IMPACT AND PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
				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.

6.3.3. Transportation

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

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 during Detail Design to address the potential congestion and delays that could be caused by 407 Transitway construction activities. Also, during Detail Design, consultation with the corresponding Municipal and Provincial Authorities (York Region, City of Markham, Durham Region, City of Pickering and MTO), as well as other stakeholders (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	ENVIRONMENTAL IMPACT	ENVIRONMENTAL IMPACT AND 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.	During Detail Design, 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: <ul style="list-style-type: none"> ▪ Markham Road ▪ Ninth Line ▪ Donald Cousens Pkwy ▪ York/Durham Line ▪ Whites Road <p>The plan will describe all measures to allow safe passage of traffic in the 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 speed through the work sites.

TABLE 6.11: CONSTRUCTION IMPACTS: TRANSPORTATION SYSTEM EFFECTS AND MITIGATION

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL ISSUES/CONCERNS	ENVIRONMENTAL IMPACT	ENVIRONMENTAL IMPACT AND PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Crossings of 407 ETR by the Transitway.	Number of crossings Ability to maintain 407 ETR traffic during crossing construction.	Likelihood of delay to 407 ETR 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/over 407 ETR.	The Transitway does not cross 407 ETR core lanes. It does cross under several eastbound on-ramps in which case temporary detour ramps will be built in coordination with MTO Corridor Management, and 407 ETR.	

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 minor since the 407 Transitway will be located within a corridor consisting of two major highways and previously disturbed open 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 Operations and Maintenance Impacts, proposed mitigation measures and recommended monitoring for the Natural Environment.

Physiography and Soils

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

Contaminated Property and Waste

No operations impacts are anticipated. Impacts to contaminated property and waste are discussed under Footprints Impacts section of this report.

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 MOECC'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

Water table conditions are not expected to be affected once conditions equilibrate around the new structures. If required, enhanced infiltration techniques will be considered to mitigate against any measure recharge. If required, site-specific testing to assess the need for and the suitability of the areas for enhanced techniques will be further conducted during Detail Design.

Fish and Aquatic 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. It 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 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 Transitway and its related components. Mitigation/compensation for the impacts to wetlands will be addressed during Detail Design.

Wildlife and Wildlife Habitat

Barriers to wildlife passage will be created as a result of the 407 Transitway. However, given the urban nature of the study area and the existence of the 407 ETR, the 407 Transitway is not expected to have a major impact on wildlife passage. Existing wildlife corridors located at watercourse crossings and along rail line corridors will be maintained and restrictions to wildlife movement through these areas will not occur.

The addition of pavement for the runningway will introduce a travel surface that will result in an increased risk of mortality for selected wildlife species that may elect to cross the Transitway. While the introduction of a paved runningway will not prohibit crossing of the Transitway by small and large animals, it poses a hazard to some of these species by introducing an exposure to vehicle conflicts. The increase in wildlife mortality resulting in the construction and operation of the Transitway is expected to be minor given that most wildlife species found in the study area are tolerant of human disturbance and existing migration pathways will be

maintained.

Noise, light and visual intrusion may alter wildlife activities, patterns and behaviors. In urban settings, wildlife is generally acclimatized to the urban conditions and only those species that are tolerant of human activities remain. Given the extent of urbanization in the study area, the tolerance of the wildlife to human activities and the limited zone of influence of the 407 Transitway, disturbance to wildlife from noise, light and visual intrusion is expected to be minor.

Designated Natural Areas

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

Air Quality

An air quality and 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 with detailed air dispersion modelling. Estimated concentrations of all pollutants of concern were shown to be below their corresponding ambient air quality criteria and standards, except benzo[a]pyrene and annual benzene which have background concentrations already above their respective AAQC limits. The project's contribution to the cumulative concentration of benzene for the annual averaging period is insignificant. Conversely, the project's contribution to the cumulative concentration of benzo[a]pyrene for the 24-hr and annual averaging periods is more substantial. However, since benzo[a]pyrene is assessed in significantly small quantities, model-predicted concentrations are very sensitive to even a minor increase in emissions. Compared to existing conditions (2015), NO₂, CO and SO₂ show a significant decrease in both Future Build and Future No-Build scenarios. All VOCs (i.e. acrolein, acetaldehyde, benzene, 1,3-butadiene, formaldehyde and benzo[a]pyrene) stay relatively constant in both Future Build and Future No-Build scenarios. Significant changes at two receptors are shown for 24-hour benzo[a]pyrene, which are in close proximity to the proposed nearby stations. However, it should be restated that benzo[a]pyrene is assessed in significantly small quantities and therefore model-predicted concentrations are very sensitive to even a minor increase in emissions. Moreover, despite future increases in traffic volumes within the study area, these gaseous tailpipe emissions decrease due to improved engine technologies and better fuel standards. As a result, the increase in gaseous air pollutants attributable to this project is deemed to be insignificant.

TSP and PM₁₀ concentrations are predicted to increase in the "Future with the 407 Transitway" scenario relative to existing conditions. Although, the estimated increase in emissions of TSP and PM₁₀ are attributable to the project, this increase is considered to be insignificant and the predicted concentrations are well below the applicable ambient air quality criteria, indicating no public health risk. The change in PM_{2.5} concentrations in the Future Build scenario relative to the Existing Conditions and Future No-Build scenarios is insignificant. Emissions of CO_{2e} are also shown to increase in the "Future with the 407 Transitway" scenario relative to future conditions without the Project as well as existing conditions. However, the percent change is less than 10% in both cases, therefore, the increase is considered to be insignificant.

TABLE 6.12: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Physiography and Soils	Change in the local terrain management of excess soils.	Soils will not be disturbed by the operations and maintenance activities of the 407 Transitway.		
Surface Water, Drainage and Stormwater	Possible impacts on existing watercourses and drainage patterns	<p>Erosion at creek crossings.</p> <p>Erosion at each outlet to the creeks.</p> <p>Potential spills from vehicles and equipment used in the operation and/or maintenance of the transitway.</p> <p>Road salt application for the safe operations of the 407 Transitway may pose adverse impacts to the quality of the surface water.</p>	<p>Slope protection and vegetation establishment</p> <p>Implementation of BMPs will reduce potential impacts 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. All spills that could potentially cause damage to the environment will be reported to the Spills Action Centre of the MOECC. 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. No operation/maintenance machinery or vehicles will cross any watercourse at any time. 	<p>Erosion monitoring and sediment removal program will be undertaken. Monitoring will occur after large storm events. Best practices will be employed for potential spills.</p> <p>Use of road salt will be kept to a minimum where practical.</p>
Groundwater	Potential for groundwater contamination	<p>Shallow wells located near the study area may be susceptible to impact by de-icing salt application.</p> <p>Water table conditions are not expected to be affected once conditions equilibrate around the new structures.</p>	<p>Where practical, road salt application within the ROW will be at the minimum levels allowed within the context of MTO's standard road salt application procedures.</p> <p>If required, enhanced infiltration techniques will be considered to mitigate against any measured recharge. If required, site-specific testing to assess the need for and the suitability of the areas for enhanced techniques will be further conducted during Detail Design.</p>	Use of road salt will be kept to a minimum where practical.
Fish and Aquatic Habitat	Potential impacts to fish habitat and fisheries resources	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. It 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 Stormwater Management Plan details.
Vegetation and Vegetation Communities	Loss and disturbance of vegetation and vegetation communities.	<p>All impacts to vegetation are transient and relate to the footprint and construction impacts.</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 Transitway and its related components, that being</p>	Efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species at a minimum will include the following:	The Landscape Plan will include recommended actions to minimize the spread of non evasive and evasive plant species.

TABLE 6.12: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
		said, mitigation/compensation for the impacts to wetlands will be undertaken during Detail Design.	<ul style="list-style-type: none"> ▪ where there are dense patches of common buckthorn, swallow-wort or garlic mustard, the appropriate removal and control of these species by a qualified specialist will be undertaken; ▪ minimize the exposure of bare soil, where bare soil must persist over a period of time, consideration will be given for planning of a non-invasive annual cover crop for an interim period; and, ▪ no non-native and invasive ornamentals plants will be used for landscaping (e.g., Norway maple, purple loosestrife, Japanese knotweed, Japanese honeysuckle, etc.). 	
Wildlife and Wildlife Habitat	Effects related to the operation of the 407 could include: <ul style="list-style-type: none"> ▪ Wildlife/Vehicle Conflicts; and, ▪ Disturbance to Wildlife from Noise, Light and Visual Intrusion 	Wildlife/vehicle conflicts appear to be very minor at present within the 407 ETR corridor as wildlife passages exist at the larger watercourse crossings (valleylands), which are spanned by bridges. Because these wildlife movement corridors will be maintained under the 407 Transitway through construction of similarly dimensioned structures, no additional conflicts are expected to occur. Noise, light and visual intrusion may alter wildlife activities and patterns. In the 407 ETR setting wildlife has become acclimatized to the noise, light and visual conditions associated with the operation of the highway and only those fauna that are tolerant of human activities tend to persist. Given that wildlife found within the study area are 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.	The minimization of light pollution will be considered during Detail Design.
Designated Natural Areas	Potential impacts to designated natural areas.	The operation and maintenance activities of 407 Transitway will not affect any designated natural areas found in the study area.		
Air Quality	Air quality effects due to the operation of an 18 kilometre busway, fuelled by diesel.	Estimated concentrations of all pollutants of concern were shown to be below their corresponding ambient air quality criteria and standards, except benzo[a]pyrene and annual benzene which have background concentrations already above their respective AAQC limits. The project's contribution to the cumulative concentration of benzene for the annual averaging period is insignificant. Conversely, the project's contribution to the cumulative concentration of benzo[a]pyrene for the 24-hr and annual averaging periods is more substantial. However, since benzo[a]pyrene is assessed in significantly small quantities, model-predicted concentrations are very sensitive to even a minor increase in emissions. Compared to existing conditions (2015), NO ₂ , CO and SO ₂ show a significant decrease in both Future Build and Future No-Build scenarios. All VOCs (i.e. acrolein, acetaldehyde, benzene, 1,3-butadiene, formaldehyde and benzo[a]pyrene) stay relatively constant in both Future Build and Future No-Build scenarios. Significant changes at two receptors are shown for 24-hour benzo[a]pyrene, which are in close proximity to the proposed nearby stations. However, it should be restated that benzo[a]pyrene is assessed in significantly small quantities and therefore model-predicted concentrations are very		

TABLE 6.12: OPERATIONS AND MAINTENANCE IMPACTS: POTENTIAL IMPACTS, MITIGATION AND MONITORING FOR NATURAL ENVIRONMENT

ENVIRONMENTAL VALUE/CRITERION	ENVIRONMENTAL MEASURE	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
		<p>sensitive to even a minor increase in emissions. Moreover, despite future increases in traffic volumes within the study area, these gaseous tailpipe emissions decrease due to improved engine technologies and better fuel standards. As a result, the increase in gaseous air pollutants attributable to this project is deemed to be insignificant.</p> <p>TSP and PM₁₀ concentrations are predicted to increase in the “Future with the 407 Transitway” scenario relative to existing conditions. Although, the estimated increase in emissions of TSP and PM₁₀ are attributable to the project, this increase is considered to be insignificant and the predicted concentrations are well below the applicable ambient air quality criteria, indicating no public health risk. The change in PM_{2.5} concentrations in the Future Build scenario relative to the Existing Conditions and Future No-Build scenarios is insignificant. Emissions of CO_{2e} are also shown to increase in the “Future with the 407 Transitway” scenario relative to future conditions without the Project as well as existing conditions. However, the percent change is less than 10% in both cases, therefore, the increase is considered to be insignificant.</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 activities of the 407 Transitway. No impacts to archaeological and built heritage features 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

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 during Detail Design of this project regarding the integration of the 407 Transitway with municipal services.

Noise and Vibration

The future with the 407 Transitway will be under the MTO absolute sound level limits of 65 dBA at all representative receptor locations. The incremental impacts are less than the MTO criteria off +5 dBA at all but two locations. MTO will further investigate the feasibility for mitigation control installation during Detail Design.

As indicated two areas within the Transitway were found to exceed the MTO criteria for noise. An increment

of greater than 5 dBA was predicted at POR13 (Ninth Line Station), and is attributable not only to the addition of the 407 Transitway, but also to the removal of the existing berm that currently mitigates noise from the 407 ETR to an extent. An exceedance of MTO criteria was also identified at POR24 (Brock Road Station), which is a future area of development in the lands designated for the Seaton Community. The impact at this location was found to be due to the presence of the proposed parking lot at Brock Road.

An evaluation of the technical, economic and administrative feasibility was conducted for the area residential area adjacent to Ninth Line Station and it was found that a barrier located at the Transitway shoulder (i.e., within the ROW) of 3.5 m height and 550 m length is feasible. The impact at the Brock Road Station was found to be due to the presence of the proposed parking lot at Brock Road. At this location, it was found that a 375 m long barrier of 5 m height along the south end of the parking lot would be 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.

Built Heritage and Cultural Heritage Landscape

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	ENVIRONMENTAL IMPACT	PROPOSED MITIGATION MEASURES AND SIGNIFICANCE OF ANY POTENTIAL RESIDUAL EFFECTS	MONITORING AND RECOMMENDATION
Land Use	Land uses within the study area impacted by the operation and maintenance activities.	The operation of the 407 Transitway conforms with the adjacent land uses.	Consultation with the municipalities will continue during the Detail Design stage of this project regarding the integration of the 407 Transitway with municipal services.	A Consultation Plan will be developed during the Detail Design stage.
Noise and Vibration	Potential noise and vibration impacts from operation of the 407 Transitway	<p>An increment of greater than 5 dBA was predicted at POR11/13, and is attributable not only to the addition of the 407 Transitway, but also to the removal of the existing berm that currently mitigates noise from the 407 ETR to an extent. An exceedance was also predicted at POR24 (Brock Road Station), which is a future area of development in the lands designated for the Seaton Community. The impact at this location was found to be due to the presence of the proposed parking lot at Brock Road.</p> <p>An evaluation of the technical, economic and administrative feasibility was conducted for this group of homes, and it was found that a barrier located at the Transitway shoulder (i.e., within the ROW) of 3.5 m height and 550 m length along the south side is feasible for first row receptors in this area. Also, an evaluation of the technical, economic and administrative feasibility was conducted for POR24, no evaluation of the technical, economic and administrative feasibility was conducted. At this location, it was found that a 375 m long barrier of 5 m height along the south end of the parking lot would be feasible.</p> <p>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.</p>		
Built Heritage and Cultural Heritage Landscape	Potential impacts to built heritage 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.	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 or LRT operations on the Transitway will have no interference with general traffic on arterial roads. However, there is potential for transportation 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, Metrolinx 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: in order 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
Markham 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 regional services in the vicinity of the station. No mitigation required 	The introduction of any regional services will be integrated with station.
	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 	NA
	Location of station and transit access	Convenient station local integrated into local development will attract greater ridership. Potential for buses to be be delayed by traffic entering/leaving station area.	<ul style="list-style-type: none"> ▪ Station is convenient to local residential and commercial development. No mitigation required ▪ Mixed traffic operation from Markham Road to bus loop could result in bus delay. Provide priority egress for buses leaving bus loop. 	Priority treatment for buses will be investigated during Detail Design.
	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"> ▪ Station location west of Markham Road requires 200 m walk from on street stops to center of platform access. Provide direct sidewalk connection along Transitway and stair access to bus stops on Markham Road. 	Review proposed design and modify if possible
	Reduce level of services for vehicular traffic	Revised signal timing at local intersections could reduce level of service.	<ul style="list-style-type: none"> ▪ Revised configuration at Rouge Bank drive results in acceptable level of service for all users. No additional mitigation required. To be confirmed during Detail Design. 	NA
	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"> ▪ Sidewalk access provided from Markham Road intersection to station. No mitigation required 	NA
	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. 	NA
	Reduction in main street intersection capacities due to rapid transit operations	Additional signalized intersection copuld reduce road capacity throughput.	<ul style="list-style-type: none"> ▪ New access road signalized intersection will be coordinated with adjacent intersection operations to maximize flow capacity. No additional mitigation required 	On-going monitoring of traffic flow and adjust signal timing as necessary
Ninth Line 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 regional services in the vicinity of the station. No mitigation required 	The introduction of any regional services will be integrated with station.
	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 provides direct connection between Transitway service and local services. No mitigation required. 	NA

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	Convenient station location integrated into local development will attract greater ridership. Potential for buses to be delayed by traffic entering/leaving station area	<ul style="list-style-type: none"> Station immediately north of residential development with direct pedestrian access to be provided in consultation with residents. No additional mitigation required. Mixed traffic operation from Ninth Line to bus loop could result in bus delay. Provide priority egress for buses leaving bus loop. 	NA	
	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"> Sidewalk access proposed from on street bus stops. Station location west of Ninth Line requires 80 m walk from proposed on street stops to center of platform access. Walking distance is acceptable. No mitigation required 	NA	
	Reduce level of services for vehicular traffic	Introduction of new signalized intersections could increase delays for local residents.	<ul style="list-style-type: none"> New signalized intersection at Rouge Bank and Old Ninth line to accommodate exiting traffic from the station may increase delays for local residents entering/leaving subdivision. Signal timing phasing will be designed to minimize delay. To be confirmed during Detail Design. 	On-going monitoring of traffic flow and adjust signal timing 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"> Residential area to the south can be connected to sidewalk access to the station via pedestrian walkways. Commercial area to the east connected through Rouge Bank Drive intersection and sidewalk access. No additional mitigation required 	NA	
	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 	NA	
	Reduction in main street intersection capacities due to rapid transit operations	Additional signalized intersection could reduce road capacity throughput	<ul style="list-style-type: none"> Reconfiguration of Rouge Bank Drive intersection provides sufficient capacity for forecast demand. 	On-going monitoring of traffic flow and adjust signal timing as necessary	
	Donald Cousens Station	Connections to inter-regional transit services	Connection to regional services enhances the overall attractiveness of the system	<ul style="list-style-type: none"> No current regional services in the vicinity of the station. If GO Transit decides to operate in the future, using the abandoned CP Havelock corridor, potential GO Rail station may be constructed east of Reesor Road and integrated with Transitway station. No mitigation required 	The introduction of any regional services, including GO Rail station, will be integrated with transitway station.
	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. 	NA	
Location of station and transit access	Convenient station local integrated into local development will attract greater ridership. Potential for buses to be delayed by traffic entering/leaving station area.	<ul style="list-style-type: none"> Existing and planned road system provides direct connection to station. Mixed traffic operation from Donald Cousens Parkway to bus loop could result in bus delay. Provide priority egress for buses leaving bus loop. 	Monitor future development applications to insure convenient connection to station.		
Travel time and service reliability for on-street-stop transit services	Station location east of Donald Cousens Pkwy requires 200m walk from any on street stops to centre of platform access.	<ul style="list-style-type: none"> No on-street stops proposed for access to station, serves local area only. No mitigation required. 			
Reduce level of services for vehicular traffic	Signal timing at local intersections could reduce level of service.	<ul style="list-style-type: none"> Revised configuration at Copper Creek Drive/Donald Cousens Parkway to add station and local access results in acceptable level of service for all users. No additional mitigation required. 	On-going monitoring of traffic flow and adjust signal timing 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"> Sidewalk access provided from Donald Cousens Parkway and future local development area. No mitigation required. 	NA		
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 	NA		
Reduction in main street intersection capacities due to rapid transit operations	Additional signalized intersection could reduce road capacity throughput	<ul style="list-style-type: none"> Reconfiguration of Copper Creek Drive intersection provides sufficient capacity for forecast demand 	On-going monitoring of traffic flow and adjust signal timing 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
Whites Road Station	Connections to inter-regional transit services	Connection to regional services enhances the overall attractiveness of the system	<ul style="list-style-type: none"> No current regional services in the vicinity of the station. No mitigation required 	The introduction of any regional services will be integrated with station.
	Compatibility with local transit services	Provision of fast convenient connecton with local transit services could encourage 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. If local buses are to stop on street, consideration will be given to stops and access stairs at the Transitway crossing. 	Monitor future service operation and provide on street stop location and stair access at transitway crossing.
	Location of station and transit access	Convenient station local integrated into local development will attract greater ridership.	<ul style="list-style-type: none"> Local transit operation to on site transit loop provides superior service. Since area is currently undeveloped, there is an opportunity to provide excellent access from proposed land use to the station. 	Monitor site plan development to insure convenient pedestrian connections are provided.
	Reduce level of services for vehicular traffic	Signal timing at local intersections could reduce level of service.	<ul style="list-style-type: none"> Signal timing at proposed new intersection should be adjusted with demand and coordinated with other area signals. 	On-going monitoring of traffic flow and adjust signal timing 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"> Since area is currently undeveloped, there is an opportunity to provide excellent access from proposed land use to the station. 	Monitor site plan development to insure convenient pedestrian connections are provided.
	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 	
	Reduction in main street intersection capacities due to rapid transit operations	Additional signalized intersection could reduce road capacity throughput	<ul style="list-style-type: none"> Traffic operations will be assessed again when development (including Whites Road and 407 ETR Interchange) is built. 	On-going monitoring of traffic flow and adjust signal timing as necessary
Brock Road Station	Connections to inter-regional transit services	Connection to regional services enhances the overall attractiveness of the system	<ul style="list-style-type: none"> Brock Road GO bus service can be integrated with Transitway and local service with direct connection at the station 	The introduction of any regional services will be integrated with station.
	Compatibility with local transit services	Lack off fast convenient connecton with local transit services could discourage ridership.	<ul style="list-style-type: none"> Local transit operation to on site transit loop provides superior service. Planned off street bus loop and on street stops, provide direct connection between Transitway service and local services. No mitigation required. 	NA
	Location of station and transit access	Convenient station local integrated into local development will attract greater ridership.	<ul style="list-style-type: none"> Local transit operation to on site transit loop provides superior service. Since area is currently undeveloped, there is an opportunity to provide excellent access from proposed land use to the station 	Monitor site plan development to insure convenient pedestrian connections are provided.
	Travel time and service reliability for on-street-stop transit services	Potential for buses to be be delayed by traffic entering/leaving station area.	<ul style="list-style-type: none"> Mix of bus entering traffic and kiss and ride traffic could lead to delay of buses. Consideration could be given to separating the roadways. 	
	Reduce level of services for vehicular traffic	Signal timing at local intersections could reduce level of service	<ul style="list-style-type: none"> Signal timing at proposed new intersection should be adjusted with demand and coordinated with other area signals. 	On-going monitoring of traffic flow and adjust signal timing 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"> Since area is currently undeveloped, there is an opportunity to provide excellent access from proposed land use to the station. 	Monitor site plan development to insure convenient pedestrian connections are provided
	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 	NA
Reduction in main street intersection capacities due to rapid transit operations	Additional signalized intersection could reduce road capacity throughput	<ul style="list-style-type: none"> Local transit operation to on site transit loop provides superior service. Planned off street bus loop and on street stops, provide direct connection between Transitway service and local services. No mitigation required 	On-going monitoring of traffic flow and adjust signal timing as necessary	

6.5. MTO Protected Sites

6.5.1. McCowan Road Site

Amendment 147 of the PBWP on November 10, 2000 has designated the McCowan Road Site area for transit including station, parking, and maintenance/storage yards.

McCowan Road is one of the main and busiest north-south arterials in the City of Markham with connections to important attraction sites such as the future Scarborough Subway (current SRT terminus station) and Markville Mall. While there are multiple station implementation constraints described in the evaluation of sites in **Chapter 4** of this report, it is recommended that the site east of McCowan Road be protected for a possible future park and ride facility to support potential future over-capacity issues at Kennedy Road and/or Markham Road and surrounding road network in the future.

Vegetation communities within this protected site consist of approximately 3.54 ha of cultural meadow (CUM1-1), 1.44 ha of deciduous forest (FOD7). The closest watercourse to the protected site is a tributary of the Rouge River (crossing R3) which is approximately 210 m to the west. This watercourse is classified by MNRF as warmwater, having moderate sensitivity and contributes to Redside Dace habitat. No groundwater issues were identified within this site. No endangered species were identified within the protected site during field investigations in Summer of 2015. There are no designated natural areas within this site. If future development of this site were to occur, no significant impacts to the terrestrial and aquatic habitat are anticipated. No potential subsurface contamination issues were identified.

There are no previously registered archaeological sites and cultural heritage features within the site. The northern section of the protected site: between the hydro corridor and the 407 ETR ROW, has been identified as having archaeological potential and a Stage 2 Archaeological Assessment is recommended. There were no noise sensitive areas identified adjacent to this site.

6.5.2. York Durham Line Site

There is a parcel of land located at York Durham Line and Highway 407 ETR that is identified as 'MTO Property Protection' on **Figure 3.8**. This site is being protected to address future transit needs or to accommodate environmental compensation activities associated with this project.

Vegetation communities within this protected site consist of approximately 5.15 ha of cultural meadow (CUM1-1), 2.04 of cultural savannah, 0.30 ha of cultural forest, 0.76 ha of wetland (MAS2-1 and MAM2-2), 1.31 of agriculture land, 1.28 ha of manicured lawn, 0.20 ha of hedge. The closest watercourse to the protected site is Petticoat Creek (crossing P1) which is approximately 500 m to the west. This watercourse is warmwater and of low sensitivity. No groundwater issues were identified within this site. No endangered species were identified within the protected site during field investigations in Summer of 2015. The western extent of this site encroaches on the non-provincially significant Locust Hill Wetland Complex. If future development of this site were to occur, no significant impacts to the terrestrial and aquatic habitat are anticipated except for impacts to the wetland. If environmental compensation were to occur at this site, measures to enhance the ecology of the site with the wetland will be considered. No potential subsurface contamination issues were identified.

There are two previously registered archaeological sites (ALGt 13 and ALGt 208) within and/or adjacent to the site. Stage 2 Archaeological Assessment is recommended for this protected site. No cultural heritage features were identified within the site. There were no noise sensitive areas identified adjacent to this site.

6.5.3. Rossland Road Site

The Rossland Road site will be protected for the potential Transitway to accommodate environmental compensation activities associated with this project or a possibility to use it as a temporary bus garage. Vegetation communities within this protected site consist of approximately 3.7 ha of agriculture land and 0.71 ha of hedge. The closest watercourse to the protected site is Ganatsekiagon Creek (crossing D12) which is approximately 125 m to the west. This watercourse is classified as coldwater and contributing to Redside Dace habitat. No groundwater issues were identified within this site. No endangered species were identified within the protected site during field investigations in Summer of 2015. The western extent of this site is located immediately adjacent to an unevaluated wetland. If future development of this site were to occur, no significant impacts to the terrestrial habitat are anticipated except for impacts to the wetland and minor impacts to the watercourse. If environmental compensation were to occur at this site, measures to enhance the ecology of the site with the wetland and the watercourse will be considered. No potential subsurface contamination issues were identified.

No previously identified archaeological sites and cultural heritage features were identified within the site. There were no noise sensitive areas identified adjacent to this site.

6.6. Conversion/Decommissioning

As described in Section 7 – Implementation, 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 preliminary 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, 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 on valley lands 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 Preliminary Design and further assessment of the impacts and detailed mitigation measures will be conducted during Detail Design. The monitoring and contingency plans are also considered preliminary, dynamic and subject to refinements during Detail Design in consultation with regulatory agencies. The specific monitoring requirements of any environmental permits/approvals/ exemptions secured during Detail Design 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 9** of this report for commitments to future work.