

## 7. IMPACT ASSESSMENT, MITIGATION, AND MONITORING

### 7.1 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 **Section 6**, may interact with the existing environmental conditions described in **Section 4**.
2. Propose mitigation measures that can be implemented during construction or 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 of the undertaking can be classified under three categories:

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

Major facilities and Activities of the 407 Transitway that may interact with the existing environmental conditions are:

#### Footprint Impacts:

- Runningway
- Bridges and culverts
- Stations (including platform, PPUDO, parking, etc.)

- Operations and Maintenance Facility
- Stormwater management facilities

#### Construction Impacts:

- 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
- Concrete forming

#### Operations and Maintenance Impacts:

- Bus rapid transit operation
- Roadway maintenance
- Stormwater management
- Station maintenance
- Testing of emergency equipment
- Snow removal

### 7.1.1 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. The following is a list of studies conducted:

- **Property Waste and Contamination Assessment** – This study identified potential property contamination and/or waste materials that could interfere with the construction of the 407 Transitway within the study area. Fill placement was also noted at interchanges along the Highway 407 corridor. At the Preliminary Design Stage, it is concluded that the identified properties are outside the ROW. It concluded that if any of the properties are impacted, further studies be carried out during the Detailed Design Stage of this project.
- **Drainage, Hydrology, SWM and Floodplain Hydraulics** – A comprehensive assessment of the impact of the proposed transitway on existing drainage and watercourses has been completed. The study area crosses three major watersheds: Humber River, Don River (West and East Don River) and Rouge River resulting in 16 water crossings along the proposed alignment. A hydraulic analysis was undertaken for each crossing. A drainage and SWM plan was prepared for the transitway and five stations, parking lots and work yards at Jane Station, GO Barrie (Concord) Station, Bathurst Station, Leslie Station and Woodbine/Rodick Station that minimizes impact on the existing watercourses and

drainage system. The remaining two stations, Yonge Station and Kennedy Station, will be planned and designed by others due to their integrated nature with other transit agencies. It concluded with a few recommendations for future study during the Detailed Design Stage of this project.

- **Fluvial Geomorphology** – An assessment of existing conditions at proposed water crossings for box culverts or bridge spans, including existing erosion problems, sedimentation problems in existing culverts, and meandering analysis was conducted to identify potential impacts and mitigation measures. The study concluded that based on Preliminary Design, no major concerns related to meander belt width or erosion limits have been found. During the Detailed Design Stage of this project, detail investigation on the potential risk to fluvial processes (as well as potential risk to the transitway structures) will be carried out.
- **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 at the Detailed Design Stage of this project of the 407 Transitway.
- **Natural Heritage** – An assessment of the potential effects of the transitway on the existing natural heritage conditions was carried out for vegetation, wildlife, fisheries and designated natural areas within the study area. It concluded that the 407 Transitway will displace previously disturbed vegetation communities and wildlife habitat characterized as urban and no in-water work is anticipated. No designated natural areas will be affected by the 407 Transitway.
- **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 the corridor is cleared from any woody vegetation as it travels along a hydro corridor, highway corridor or open space area. It recommended a landscape planning design that will mitigate the visual impacts and impacts to the existing vegetation communities. A preliminary landscape planting plan was developed as part of this study.
- **Noise and Vibration Impact Assessment** – A project-specific noise and vibration impact assessment was conducted for this undertaking. The assessment covered three scenarios: Existing Conditions (2008), Future without the 407 Transitway 10 years after the assumed date of implementation (2041) and Future with the 407 Transitway 10 years after the assumed date of implementation (2041). It concluded that the 407 Transitway alone will not increase noise levels equal to or higher than the 5dBA. However, it is predicted that overall ambient sound levels will be greater than 65dBA. MTO will investigate the feasibility for mitigation control installation during the Detailed Design Stage of this project.
- **Air Quality Impact Assessment** – A project-specific air quality impact assessment was conducted to establish the air quality effects that may arise due to the implementation of the 407 Transitway. The

assessment focused on the impacts of the common contaminants released from vehicular traffic and construction activities. The assessment covered three scenarios: Existing Conditions (2008), Future without the 407 Transitway (2031) and Future with the 407 Transitway (2031). It presented that there is a negligible difference in gaseous pollutant concentrations between the future with and future without the 407 Transitway scenarios. The study predicted that implementation of the 407 Transitway will result in an increase in particulate matter concentrations, however, when recommended mitigation measures are considered it is expected that particulate matter concentrations at sensitive receptor locations will be within standards.

- **Land Use Factors** – A secondary source information review was undertaken to identify existing land uses, designated land uses by municipalities and future planned land uses in the study area. The review concluded that the 407 Transitway reinforces the land uses of the Regional Centres, Vaughan Metropolitan Centre, Richmond Hill Regional-Langstaff Gateway Centre and Markham Centre by connecting passengers to these areas and providing opportunities for a seamless transit connection.
- **Cultural Heritage Assessment** – Built heritage resources and cultural heritage landscapes located in and adjacent to the study area in excess of 40 years of age were identified. It concluded that the 407 Transitway will result in displacement of two and disruption of one cultural heritage resources that mitigation measures will be carried out or further developed during the Detailed Design Stage of this project.
- **Stage 1 Archaeological Assessment** – A Stage 1 Archaeological Assessment was carried out in accordance with the 1993 Archaeological Assessment Technical Guidelines. A Stage 2 Archaeological Assessment was recommended for all undisturbed lands considered to have archaeological site potential and one site that may be disturbed by the proposed 407 Transitway construction.
- **Traffic Impact Assessment** - Project-specific Traffic Impact Assessments were conducted to determine future traffic impacts that may occur due to the construction and operations 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 and 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 consisted 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 study area traffic operations. Station area traffic impacts were assessed for five proposed 407 Transitway Stations: GO Barrie (Concord), Bathurst, Leslie, Woodbine/Rodick and Kennedy. 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, 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 the Detail Design Stage of the 407 Transitway to provide detailed impacts, 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 and taking into account all built-in mitigation measures. Potential residual environmental impacts were assessed as to their significance, including spatial and temporal considerations.

## 7.2 Footprint Impacts

This section discusses the permanent displacement or loss of the existing environmental features resulting from the placement of the 407 Transitway. The 407 Transitway will be built mostly within the PBWP area except for certain sections where it will divert to the urban regional centres in the Town of Richmond Hill and the Town of Markham. The 407 Transitway is a new transit facility in the study area consisting of new runningway, structures such as new bridges, underpasses, bus stations, and maintenance and storage yard.

Impacts that are temporary and occur only during construction are discussed in **Section 7.3**. Impacts from the operations and maintenance of the 407 Transitway are discussed in **Section 7.4**.

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 the transitway and associated facilities (i.e. Operations and Maintenance Facility, stations, bridges, culverts, and SWMF) have the potential to impact surface water quality and quantity and groundwater recharge.

The subsection that follows is the footprint impacts to the socio-economic and cultural environment and transportation functioning. The socio-economic and cultural environment footprint impact issues relate to two built heritage features found within the study area and need for further archaeological investigation in specific areas. 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 proposed aim to decrease the encroachment of the transitway property frontage and to minimize additional property acquisition as a whole.

The final section discussed under the heading of footprint impacts is the potential for conflicts between the 407 Transitway and utilities. Potential project effects on the utilities were identified and categorized as: conflict

anticipated, potential conflict, and no conflict anticipated. Where conflicts were anticipated, mitigation measures were recommended and include utility relocation, taking test pits for further analysis, burying cables, safeguarding utilities during the construction stage, and extension of concrete culverts.

### 7.2.1 Natural Environment

In general, the footprint impacts of the 407 Transitway to the natural environment features are the removal of vegetation and the temporary disturbance to fish and wildlife activities and increase of impervious surface having effects on surface water and groundwater quality and quantity.

#### Physiography and Soils

The 407 Transitway will have minimum impact to the terrain and soils located within the study area as it will be located primarily within the PBWP area where Highway 407, municipal roads and hydro lines have already altered the terrain.

#### Contaminated Property and Waste

No footprint impacts to contaminated property and waste are anticipated. Construction impacts to contaminated property and waste are discussed in **Section 7.3.1**.

#### 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 and contaminants such as rubber and oil. A drainage and SWM plan has been prepared to address these potential impacts. Run-off generated by the 407 Transitway will be collected and treated using approved Stormwater Management Practices (SWMP) including detention ponds and enhanced grass swales, where possible. The enhanced grass swales will be part of a treatment approach comprised of: sheet flow off the runningway surface; flow through grassed filter strips (runningway embankment); and enhanced grass swales.

#### 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 and drainage improvements have the potential to dewater or lower the local water table if the water table is intercepted and preferentially drained by ditches, swales or culverts. The effect of construction activities on the high water table areas and the associated potential discharge will be re-assessed during the Detailed Design Stage of this project. An investigation on foundations for all new bridges planned for the 407 Transitway will also be conducted during the Detailed Design Stage of this project.

The presence of municipal water supply servicing within the study area will result in many water wells identified in the well records being inactive, decommissioned, or demolished. Normally, the most susceptible wells to either

suitable or this species. However, approximately 1.2 kilometres upstream, the Keffer Marsh provides habitat suitable for the species.

Field investigations during the Detailed Design Stage of this project phase should place an emphasis on confirming presence/absence and distribution of the nine species regulated under the ESA and SARA within the study area. If species at risk are confirmed to be present, the MNR will be consulted to determine the requirements for a permit under the ESA.

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.

The overall poor quality, low structural diversity and low habitat diversity of the wildlife habitat and the type of species supported by these isolated patches of vegetation, reduces the level of significance attributable to the

loss. Wildlife species present in these areas are represented primarily by small mammals and small, migratory and resident passerine birds; species that are more tolerant of human disturbance.

Mitigation measures following best management practices will be implemented to prevent and/or minimize the impacts to the natural environment. All necessary permits under the ESA and SARA will be obtained, as required. The impacts and mitigation measures identified in **Table 7-1** are based on the Preliminary Design Stage of the 407 Transitway.

**Designated Natural Areas**

The 407 Transitway will not impact any designated natural areas found in the study area. The 407 Transitway will be located away from these areas.

**Air Quality**

Footprint impacts to air quality do not apply. Please see **Section 7.3.1** and **Section 7.4.1** for air quality impacts from construction impacts and operation and maintenance impacts.

**Table 7-1: 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 Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
Physiography and Soils	Management of excess soil	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.	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) will be used when developing an excess materials management plan.	If excavation is required in areas identified to be 'highly likely' to have waste or contamination, intrusive environmental investigations (i.e. Phase II 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.	Disturbance of contaminated waste and/or soils during construction.	No anticipated footprint impact impacts. Please see <b>Table 7-4</b> for construction impacts to contaminated property and waste.	
Surface Water, Drainage and Stormwater	Impact to quality and quantity of surface water	Increase in water runoff and local peak flows from the introduction of impervious areas such as the runningway, stations and the operations and maintenance facility.  Proposed transitway structures have none to minimal impacts to upstream and downstream of the water crossings and to regional storm water levels.  Three 407 ETR ponds that are in the way of the proposed 407 Transitway will need to be redesign and reconstructed.	SWMF will be designed for quality and quantity control. The design will include several enhanced swales for quality treatment of runoff generated by the transitway for drainage areas less than 5 hectares. Where the transitway drainage contributes to an existing SWM pond either directly or via a grass swale with or without quantity storage, quality treatment will continue to be provided by the existing SWM pond. Where the runoff does not contribute to a SWM pond, water quality treatment will be provided by the enhanced grass swales.  The SWMF will control up to and including the 100 year post-development peak flows.  The redesign and reconstruction of the three exiting ponds will be further assessed during the Detailed Design Stage.	SWM in consultation with TRCA and MOE will be developed during the Detailed Design Stage of this project. The intent and targets of the "Black Creek Stormwater Optimization Master Plan Class Environmental Assessment", when available, will be included in the design of the SWM at the Detailed Design Stage.  A stormwater monitoring plan will be developed during the Detailed Design Stage of this project. The monitoring plan will include measures to determine the effectiveness of SWMF.
Groundwater	Impact to groundwater recharge and water table	There is potential for impacts to be associated with the construction of structures near valley corridors. A reduction in groundwater recharge to the subsurface will occur as a result of the construction of impermeable surfaces.	If profile lowering is expected from ditch relocations, embankments and drainage improvements intersecting the water table, soil and groundwater conditions in these areas will be assessed along with a water well survey to identify wells, if any, that may be impacted.  Groundwater recharge lost to impermeable surface can be mitigated by	An Environmental Management Plan will be prepared during the Detailed Design Stage of the project where dewatering has potential to negatively impact fish habitat, wetlands or forests.



Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
Air Quality	Impact to air quality	Footprint Impacts to air quality do not apply. Please see Table 7-4 and Table 7-7 for air quality impacts from construction impacts and operation and maintenance impacts.		

**7.2.2 Socio-Economic and Cultural Environment**

The following section discusses the footprint impacts to the socio-economic and cultural environment within the study area. In general, the land uses adjacent to the 407 Transitway support the urban and regional transportation, highways, hydro corridors and open space. The majority of the 407 Transitway stations will serve as opportunities for transfer points with other transit and transportation systems, thereby providing greater transit options. Two built heritage features have been identified as potentially affected by the placement of the 407 Transitway, however, their original appearance and value has been considerably altered. Further archaeological investigation will be needed at some areas within the footprint of the 407 Transitway. This will be conducted during the Detailed Design Stage.

**Land Use**

During previous studies for the 407 Transitway, for which the project was deemed to be a prominent transportation development within the Greater Toronto Golden Horseshoe, ROW land protection was established. The *Need & Justification Study for the Projection of Highway 407/Parkway Belt West Transit Corridor (1992)* in particular, found that a ROW for a separate fully grade separated transitway should be protected within the Highway 407 corridor. Through those land protection studies and subsequent planning efforts, the footprint impacts anticipated for the transitway were able to be studied and minimized. Efforts to decrease the associated effects through the implementation of mitigation measures included actual refinement of the design to limit unnecessary property acquisition, where possible.

Provincial planning documents and municipal Official Plans support the implementation of the 407 Transitway within the study area. The study area is predominantly located within the PBWP, which was implemented for the purposes of creating a multi-purpose corridor to accommodate utility and inter-urban transit. The 407 Transitway was designed to minimize the encroachment on property frontage and minimize property acquisition. Its purpose is to link urban areas with each other by providing space for the movement of people, goods, energy, and information, without disrupting community integrity and function. Presently the 407 Transitway will directly travel through the Richmond Hill-Langstaff Gateway Centre and the Markham Centre, which are envisioned to be transit-oriented communities with a mix of land uses and opportunity to transfer to other transit services such as the GO Transit, TTC and YRT. Consultation with the municipalities will continue during the Detailed Design Stage of this project regarding the integration of the 407 Transitway within the urban centres.

**Noise and Vibration**

Footprint impacts regarding noise and vibration do not apply. Please see Section 7.3.2 and Section 7.4.2 noise and vibration related construction impacts and operation and maintenance impacts.

**Built Heritage Features and Cultural Heritage Landscapes**

New transportation infrastructure may potentially affect built heritage resources and cultural heritage landscapes 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. Two built heritage resources associated with the former community of Concord, formerly used as residences will be impacted by the 407 Transitway (1841 and 1889 Highway 7 residential buildings). Currently they are in commercial use and the original appearance has been considerably altered. The two built heritage resources will be displaced by the implementation of the GO Barrie (Concord) Station of the 407 Transitway. Cultural Heritage Evaluations will be conducted for the two built heritage resources prior to construction.

**Archaeological Features**

A Stage 1 Archaeological Assessment has concluded that most registered archaeological sites are cleared of archaeological concerns. The majority of the identified registered archaeological sites are far from the 407 Transitway alignment except one. The J.J. Lunau Site 1 AIGt-219 which is a Euro-Canadian homestead is likely to be impacted by the 407 Transitway. The Beechwood Cemetery will not be impacted by the 407 Transitway.

Further Stage 1 Archaeological Assessment will be conducted during the Detailed Design Stage on the following areas if they are determined to be impacted by the project:

- west and east of Dufferin Street;
- east of Yonge Street, north of Highway 7;
- east of Warden Avenue; and,
- west of Kennedy Road.

A Stage 2 Archaeological Assessment study will be conducted during the Detailed Design Stage of this project on the undisturbed lands within the 407 Transitway footprint, if it is determined to be impacted by the project. The identified areas are:

- from Highway 400 to east of Jane Street;
- southeast quadrant of Highway 407 and Keele Street;
- location of the proposed GO Barrie (Concord) Station;
- southwest quadrant of Highway 407 and Leslie Street; and,
- east of Rodick Road.

A Stage 3 Archaeological Assessment study will be conducted during the Detailed Design Stage of this project on the identified registered archaeological site, J.J. Lunau Site 1 AIGt-219, if it is to be impacted.

### 7.2.3 Transportation

The footprint of the transitway will provide positive effects to the transportation system by encouraging transit usage and car-pooling 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 lopping and lay-bay facilities at most stations. There will be no negative footprint effects to transportation.

The following **Table 7-2** Footprint Impacts: Potential Impacts, Mitigation and Monitoring for Socio-Economic and Cultural Environment describe the environmental value/criterion and associated potential environmental effects, mitigation measures, and applicable recommendations and monitoring suggestions.

**Table 7-2: 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 Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
Land Use	Conflict with existing and designated land uses in the study area.	Most of the 407 Transitway will be located within the PBWP. Only 4% of the transitway footprint will affect private property. <b>Appendix O</b> of this Report includes drawings illustrating approximate property requirements by the 407 Transitway ROW. Private effects are described below: <ul style="list-style-type: none"> <li>• West and east of the Keele Street crossing. –Strip of north edge of industrial development effected by runningway.</li> <li>• East of the GO Barrie track. Two parcels affected by access road to the station and part of the park and ride facility.</li> <li>• Richmond Hill Centre area, underground easement permanent easement will be required.</li> <li>• Planned development east of German Mills Creek. Northwest corner of Leitchcroft parcel affected by runningway.</li> <li>• Markham Centre future development (Remington lands) west of GO Stouffville.</li> <li>• Future development (potential sport facility) east of the GO Stouffville track.</li> </ul>	Detail design will ensure that access and circulation will not be affected by footprint of the transitway. Discussions and negotiations with property owners will take place and be concluded before detailed alignment is defined. <ul style="list-style-type: none"> <li>• Negotiation to acquire partial or total parcel will take place during detailed design.</li> <li>• Negotiation to acquire parcel will take place during detailed design.</li> <li>• Preliminary discussions with developers took place during the Planning Stage. Final negotiations with developers will occur during Detailed Design Stage.</li> <li>• Adjusted alignment avoids effects to the planned access road and land use development of the property. Alignment modification was done following discussions with developers.</li> <li>• Alignment was refined to minimize intrusion in private property and conceptual development plans. In the affected strip, the runningway is underground. The development plans are at conceptual level. During detailed design, when development plans are defined, property impact assessment will need to be revised, discussed and negotiated with the Town and the developers.</li> <li>• Runningway is underground, requiring permanent underground easement. A sport facility is currently being discussed to be built at this location. During detail design, when development plans are defined, property impact assessment will need to be revised, discussed and negotiated with the Town and the developers.</li> </ul>	Monitoring will depend on the final effect and mitigation measures (if applicable), defined at the detailed design stage, when development plans are defined, property impact assessment will need to be revised, discussed and negotiated with the Town and the developers. <p style="background-color: yellow;">Monitoring requirements will be identified and appropriate plans will be developed with the affected municipalities and agencies.</p>

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
Land Use (Cont'd)	Effect on adjacent properties. Minimize adverse effects on and maximize benefits for communities within the entire corridor	No major impacts to adjacent private properties are anticipated as the proposed 407 Transitway is to utilize lands within the PBWP to minimize additional property acquisition. Potential encroachment on property frontage. Potential loss of parking. Need to acquire property and displace business and/or residents..	At locations where transitway facilities are adjacent to residential neighbourhoods, the detailed design will incorporate landscaping, noise attenuation, visual screening and access control to mitigate potential adverse effects on neighbouring communities.  The corridor's protected property has been utilized wherever practical to minimize additional and unavoidable property acquisition. Alignment and facilities have been designed to minimize encroachment on property frontage and partial or full property acquisition.  Where acquisition of subsurface easements is necessary, negotiation and/or expropriation to establish fair market value with property owners will be used to mitigate effects.  The transitway design will also minimize loss of parking along the corridor, particularly in the Regional Centres.	
Noise and Vibration	Impacts to noise and vibration	Footprint impacts regarding noise and vibration do not apply. Please see <b>Table 7-5 and Table 7-8</b> for noise and vibration related construction impacts and operation and maintenance impacts.		
Built Heritage and Cultural Heritage Landscapes	Displacement of Built Heritage and Cultural Heritage Landscapes	Two built heritage buildings will be affected by the implementation of the GO Barrie (Concord) Station.	Cultural Heritage Resource Documentation Reports will be prepared for the two built heritage buildings, including a history of Concord during the Detailed Design Stage of this project.	MTO will monitor the status of these properties through its Corridor Management Office who deal with changes of ownership regarding properties. Any further required monitoring will be identified in the Cultural Heritage Resource Documentation Report.
Archaeological Features	Potential loss/displacement of archaeological resources within the study area.	One of the archaeological sites may be impacted by the transitway (The J.J. Lunau Site 1 AIGt-219).	Stage 1 and Stage 2 Archaeological Assessments will be conducted on areas identified for each Stage Archaeological Assessment as presented in <b>Section 7.2.2</b> .  A Stage 3 Archaeological Assessment study will be conducted during the Detailed Design Stage of this project on the identified registered archaeological site, J.J. Lunau Site 1 AIGt-219, if it is to be impacted.  Stage 3 and 4 Archaeological Assessments will be conducted, as warranted, depending on the results of the Stage 2 and Stage 3 Archaeological Assessment discussed above.	

#### 7.2.4 Utilities

As Indicated in **Section 6**, effects to utilities and municipal services by the construction and operations of the transitway occur mostly at the grade separated crossings of the transitway with regional and local roads. The utilities and municipal services located within the transitway footprint are identified in **Section 4.4** "Existing Study Area Conditions".

Meetings were conducted with all utility Agencies and Municipalities to discuss relocation strategy of affected plants. It was concluded that in of the majority of cases, the relocation of affected utilities is feasible and conventional, and details will be defined during the design phase in consultation with the utility owner.

There are some cases however, where due mostly to the size of the plant, its relocation may not be feasible. These cases listed and described in **Table 7-3**, will require special construction procedures in order to avoid effects to the plants. During the Detail Design Stage further field investigation and consultations with the plant owner will be carried out before defining or confirming the type of solution. The Detailed Design Stage 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.

Non-native invasive plants can establish in natural areas displacing native plant species over time. An effort to control non-native species that have become established, as well as prevent the establishment of new non-native plants is important to maintain the health and diversity of natural ecological systems.

Arborist reports, tree protection plans, edge management plans, restoration plans and suitable compensation for vegetation losses will be prepared during the Detailed Design Stage of this project in consultation with the TRCA.

**Wildlife and Wildlife Habitat**

Secondary source records identified nine wildlife species that are regulated under the ESA and SARA to be present within the study area. Field investigations during the Detailed Design Stage of this project should place an emphasis on confirming presence/absence and distribution of these nine species within the study area. Mitigation measures and permitting will be developed in consultation with MNR. 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 July 31. This timing restriction will also protect the birds found within the study area and listed under the FWCA.

In general, construction activities will pose temporary impacts to the natural environment that can be mitigated and/or protected by existing best management practices. Mitigation measures and monitoring recommendations are presented in more detail in **Table 7-4**.

**Designated Natural Areas**

The 407 Transitway will not impact any designated natural areas found in the study area. The 407 Transitway will be located away from these areas.

**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 should be mitigated through the use of proper controls. Night time construction activities should also be considered in order to reduce emissions from vehicles that are slowed down by any reduced road capacity during the day.

Best management practices will be implemented to mitigate air quality impacts during construction.

**Table 7-4: Construction Impacts: Potential Impacts, Mitigation and Monitoring for Natural Environment**

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
Physiography and Soils	Change in the local terrain Management of excess soil.	Excess soil will be generated and there is potential for the encounter of contaminated soils during construction.	Excess soil will require waste classification in accordance with regulatory requirements. Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (e.g. OPSS 180) will be used when developing an excess materials management plan. The disposal of contaminated soils will be directed to an MOE approved soil treatment site or waste disposal site. The monitoring of these facilities is the jurisdiction of the MOE.	
Contaminated Waste and Property	Potential for disturbance and/or disposal of contaminated waste and/or soils during construction.	Disturbance of contaminated waste and/or soils during construction.	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.	Monitoring plan will be undertaken in accordance with the Ontario <i>Environmental Protection Act</i> . The disposal of contaminated materials will be directed to an MOE approved soil treatment site or waste disposal site.
Surface Water, Drainage and Stormwater	Impact to quality and quantity of water.	Erosion and sedimentation impacts from construction.  Three 407 ETR ponds that are in the way of the proposed 407 Transitway will need to be redesigned and reconstructed.	Measures will be put in place during construction to minimize disturbance to watercourses from inputs of soil, concrete dust/washwater and other materials. Measures will be included in the final design process to ensure that stormwater impacts will be minimal and that water features are protected as part of the proposed construction.  Any in-water construction activity will be assessed during the Detailed Design Stage of this project.  In areas where construction sites are located in proximity to watercourses, the use of minor grading to direct surface runoff away from aquatic habitats will be implemented. This generally consists of the slope leading to a very shallow swale created by a low ridge of topsoil.  In order to prevent and minimize the release of sediment to watercourses, various sediment and erosion control measures will be implemented during construction, such as:	Environmental inspections of the construction site will be conducted to assess the performance of erosion and sedimentation control measures and identify any required maintenance. The inspections will permit the identification of localized erosion and sedimentation control issues that require site specific attention. A detail erosion and sedimentation control plan will be prepared during the final design.  During Detailed Design Stage a protocol for SWM surface and groundwater monitoring and emergency spill prevention and reporting will be developed.  During the course of construction, there is a risk of spills or discharges of pollutants or contaminants by the Contractor. The following contingency plan will be put in place:



Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
			<p>standards that will offset vegetation losses and achieve a net gain in vegetation area, attributes and functions;</p> <ul style="list-style-type: none"> <li>• prepare edge management plans for areas where encroachment on vegetation communities will occur; and,</li> <li>• prepare planting plans to include the use of native and salt-tolerant vegetation species.</li> </ul> <p>Recommended mitigation measures to control non-native species include:</p> <ul style="list-style-type: none"> <li>• the restoration of disturbed areas post-construction using only native plant species that once established can help to mitigate the establishment of non-native plant species;</li> <li>• where there are dense patches of common buckthorn (<i>Rhamnus cathartica</i>), swallow-wort (<i>Cynanchum rossicum</i>) or garlic mustard (<i>Alliaria petiolata</i>), the appropriate removal and control of these species by a qualified specialist, would benefit the ecological integrity of the surrounding natural features; and,</li> <li>• no invasive, non-native ornamentals plants should be used for landscaping (e.g., Norway maple, purple loosestrife, Japanese knotweed, Japanese honeysuckle, etc.).</li> </ul>	
Wildlife and Wildlife Habitat	<p>The 407 Transitway project has the potential to result in displacement of and disturbance to wildlife and wildlife habitat. Effects on wildlife can be described as follow:</p> <ul style="list-style-type: none"> <li>• displacement of wildlife and wildlife habitat;</li> <li>• barrier effects on wildlife passage;</li> <li>• displacement of wildlife species at risk.</li> </ul>	<p>Temporary disturbance to wildlife species.</p> <p>Potential for encountering species regulated under ESA and SARA.</p>	<p>To meet the requirements of the MBCA, no vegetation removals will occur during the nesting season. . The nesting season for the majority of the species is from April 1 to July 31. This timing restriction will also protect the birds found within the study area and listed under the FWCA.</p> <p>A Special Provision will be placed in the contract package to inform the contractor of the need to protect the species from any harm.</p> <p>Any permits required under ESA or SARA will be obtained during the Detailed Design Stage.</p>	<p>During construction, an environmental inspector will make frequent random site visits for the duration of work at the water crossing locations. The environmental inspector will be responsible for delineating work areas, ensuring that erosion and sedimentation control measures are functional and that the provisions related to fisheries and watercourse protection are met.</p> <p><b>Contingency</b> If active nests are found, a site-specific mitigation plan in consultation with the Canadian Wildlife Services will be prepared.</p>
Designated Natural Areas	Impacts to designated natural areas in and adjacent to the study area.	The 407 Transitway will not impact any designated natural areas found in the study area. The 407 Transitway will be located away from these areas.		
Air Quality	There is 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>Best management practices 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"> <li>• Periodic watering of unpaved construction areas;</li> <li>• Period watering of stockpiles;</li> <li>• Use of water sprays during the loading of materials; and,</li> <li>• Sweeping and/or water flushing of the entrances to the construction zones.</li> </ul> <p>These types of control aid in minimizing impacts to the environment during the construction phase.</p> <p>Night time construction activities should also be considered in order to reduce emissions from vehicles that are slowed down by any reduced road capacity during the day.</p>	The public will be provided with contact information on how to raise issues/concerns regarding air emissions. Any complaints will be investigated and resolved in an effective and efficient manner.

**7.3.2 Socio-Economic and Cultural Environment**

**Land Use**

Construction activities are not anticipated to impact land uses within the study area as most of the transitway is located within the PBWP lands. **Property requirements are discussed in Table 7-2.**

**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**

There is potential for disruption impacts due to the construction of the 407 Transitway to the Rives-Wolfe Residence located at 99 YMCA Boulevard, now used as a meeting centre for the YMCA. This building is a

municipally designated property under the Part IV of the *Ontario Heritage Act* and protected by a municipal heritage conservation easement. Access to the building may be impacted during construction activities for the 407 Transitway resulting in isolation of the property. Consultation with the Town of Markham will be conducted to discuss options in mitigation impacts to the heritage building.

**Archaeological Features**

Construction impacts to archaeological features are related to footprint impacts. See **Section 7.2.2 and Table 7-5** for details.

In general, residents and businesses may be inconvenienced by construction activities but the impacts will be relatively temporary and localized. Details of the mitigation measures identified to address impacts related to construction are discussed in **Table 7-5**.

**Table 7-5: Construction Impacts: Potential Impacts, Mitigation and Monitoring for Socio-Economic Environment**

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Environmental Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
Land Use	Land uses within the study area impacted by construction activities.	Construction activities are not anticipated to impact land uses within the study area as most of the transitway is located within the PBWP lands.  <b>Property requirements are discussed in Table 7-2.</b>		
<b>Noise and Vibration</b>	<b>Potential noise and vibration impacts to nearby residents during construction.</b>	<b>Temporary noise and vibration impacts.</b>	<ul style="list-style-type: none"> <li>All construction equipment will be properly maintained to limit noise emissions and comply with the noise limits outlined in the MOE's Noise Pollution Control Publication (NPC) NPC-115 'Construction Equipment' and NPC-118 'Motorized Conveyance' guidelines.</li> <li>Provincial guidelines with regard to construction sound levels that place specific restrictions on source sound levels will be followed.</li> <li>If construction activities outside the prohibited times are required, an application of municipal noise by-law exemptions will be submitted.</li> </ul>	<b>The public will be provided with contact information on how to raise issues/concerns regarding noise and vibration. Any complaints will be investigated and resolved in an effective and efficient manner.</b>  <b>Vibration levels will be monitored throughout the construction phase.</b>
Built Heritage and Cultural Heritage Landscapes	Potential impacts to built heritage and/or cultural heritage landscapes from construction activities.	Access to the Rives-Wolfe Residence located at 99 YMCA Boulevard may be disrupted due to the construction of the 407 Transitway.	Access to this building will be maintained. The building will be protected from construction activities and potential vibration effects resulting from the project. The Town of Markham will be consulted on the need and preparation of a Heritage Impact Assessment as part of the site plan approval process for the Kennedy Road – Kennedy Station.	A pre-construction survey of the building will be carried out to document its structural integrity. Monitoring will be carried out during construction to record and correct any damage that may result.

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Environmental Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
Archaeological Features	Potential loss/displacement of archaeological resources within the study area.	See <b>Table 7-2.</b>	See <b>Table 7-2.</b>	<p>A Stage 2 Archaeological Assessment study will be conducted prior to construction on undisturbed areas located within the zone of construction.</p> <p>The following monitoring and contingency measures are recommended by the Ministry of Tourism and Culture:</p> <ul style="list-style-type: none"> <li>• Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, 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 archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the <i>Ontario Heritage Act</i>. <b>The Culture Programs Unit, Ministry of Tourism and Culture</b> (416-314-7146) should be contacted immediately.</li> <li>• Any person discovering human remains must immediately notify <b>the Culture Programs Unit, Ministry of Tourism and Culture</b> (416-314-7146), the police or coroner, and the Registrar of Cemeteries, Cemeteries Regulation Unit, Ministry of Government Services (416-326-8404).</li> <li>• Consultation with stakeholders, including First Nations, will be initiated in the event that archaeological resources or human remains are discovered.</li> </ul>

### 7.3.3 Transportation

During the construction of the 407 Transitway, the potential for transportation related impacts to arise exists. 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 accidents potential.

The management of traffic during the construction of the transitway will be a particular challenge during the construction 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 Highway 407 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 Highway 407 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 7-6** will be carried out during the Detailed Design Stage of the study. During this future stage, a Traffic Management Plan will be developed to address the congestion and delays in which the 407 Transitway construction activities could potentially cause. Also, during the Detailed Design Stage, consultation with the corresponding Municipal and Provincial Authorities (York Region, local Municipalities 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 7-6: Construction Impacts: Transportation System Effects and Mitigation

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Environment Effects	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigation Measures and Significance of any Potential Residual Effects	Monitoring and Recommendation
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.	Construction activities could cause congestion or delays and increase the potential for accidents.	Vehicle and pedestrian traffic on existing arterial roads could be delayed or potentially involved in an accident due to the need for temporary diversion or lane closure to allow construction of transitway works under arterial roads crossing the transitway ROW.	<p>During the Detailed Design Stage, a Traffic Management Plan will be developed to define all temporary works and procedures necessary to accommodate vehicular and pedestrian traffic on the following arterials during construction of the transitway underpasses:</p> <ul style="list-style-type: none"> <li>- Jane Street</li> <li>- Keele Street</li> <li>- Dufferin Street</li> <li>- Bathurst Street</li> <li>- Highway 7</li> <li>- Bayview Avenue</li> <li>- Leslie Street</li> <li>- Rodick Road</li> <li>- Warden Avenue</li> </ul> <p>The plan will describe all measures to allow safe passage of three lanes of traffic in the peak direction as well as two lanes available in the off-peak direction. In addition to temporary pedestrian circulation measures, the plan will detail all barriers, lane marking and signing for the temporary roadwork. While traffic capacity will be maintained, minor delays will occur due to the need to reduce speed during construction zones to ensure public and worker safety.</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.
The vicinity of the proposed south-north and north-south crossings of the 407 ETR by the transitway. The vicinity of the proposed east-west crossing of Highway 404.	Construction activities could cause congestion or delays and increase the potential for accidents.	Vehicle traffic on the 407 ETR and Highway 404 could be required to reduce speed or diverted for short periods to make shoulders available for equipment during erection of steel box-girders for the three bridges carrying the transitway over the highway.	During detailed design, the requirements to maintain safe operations of traffic on the ETR and Highway 404 without reduction in capacity during transitway bridge construction will be developed in consultation with the Highway Authorities. When approved, the permissible construction methods, associated clearances to traffic lanes and protection and other safety measures will be mandatory requirements within the Construction Contract documents for the ETR and Highway 404 bridge construction.	

## 7.4 Operations and Maintenance Impacts

The impacts resulting from the operations 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 urban centres 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 by reducing climate changing emissions.

### 7.4.1 Natural Environment

In general, the operations and maintenance activities associated with the 407 Transitway will not significantly impact the natural environment provided best management practices are implemented.

#### 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 in Section 7.3.1.

#### Surface Water, Drainage and Stormwater

Future maintenance activities are not expected to involve any in-water works. The intent and targets of the "Black Creek Stormwater Optimization Master Plan Class Environmental Assessment" will be included during the preparation of the detail design of the 407 Transitway.

Road salt application for the safe operations of the 407 Transitway may pose impacts to the surface water and groundwater quality of the study area. To mitigate this impact MTO's Code of Practice and Salt Management Plan will be followed.

#### Groundwater

Water table conditions are not expected to be impacted once conditions equilibrate around the new structures. If required, enhanced infiltration techniques will be considered to mitigate against any measurable 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 the Detailed Design Stage of this project.



**Fish and Aquatic Habitat**

During detail design, opportunities to reduce thermal impacts to watercourses during the summer period will be explored when developing SWMF. This could include enhanced infiltration measures, shading of outfalls and ponds, drawing water from deep portions of the ponds or other treatment options (bio-retention units, grassed swales, etc.).

**Vegetation and Vegetation Communities**

All impacts to vegetation are transient and relate to the footprint and construction impacts. It is expected that post-construction, new wetland areas will be created due to changes in drainage related to the construction of the transitway and its related components. Detailed site-specific mitigation measures will be developed at the Detailed Design Stage of the project.

**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 including the existence of two major highway corridors, 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 approximately 12 metres 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 operations 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 behaviours. 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 407 Transitway will not impact any designated natural areas found in the study area. The 407 Transitway will be located away from these areas.

**Air Quality**

In the future, when the 407 Transitway is built, air quality will slightly improve for most gaseous pollutants (e.g. CO, NO<sub>x</sub>) due to newer engine technologies and fuels, despite predicted increases in traffic due to population growth. The pollutant burden of carbon dioxide (CO<sub>2</sub>) is expected to increase in the future due to increased traffic volumes from population growth. Without mitigation, air quality is predicted to degrade for particulate based compounds (i.e. PM<sub>2.5</sub>, PM<sub>10</sub> and TSP) due to increased traffic flow on Highway 407 resulting from population growth in the future.

The air quality study predicts a negligible increase in gaseous pollutant concentrations resulting from the operations activities of the 407 Transitway. The study also predicts that implementation of the 407 Transitway will result in an increase in particulate matter concentrations, however, when recommended mitigation measures (planting of vegetation or where planned for safety and/or noise issues solid barriers) are considered, it is expected that particulate matter concentrations at sensitive receptor locations will be within MOE standards.

Table 7-7 presents in more detail the mitigation measures proposed for the impacts associated with the operations and maintenance of the 407 Transitway.

**Table 7-7: Operations and Maintenance Impacts: Potential Impacts, Mitigation and Monitoring for Natural Environment**

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Environmental Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
Physiography and Soils	Change in the local terrain Management of excess soil.	Soils will not be disturbed by the operations and maintenance activities of the 407 Transitway.		
Surface Water, Drainage and Stormwater	Potential for impacts to surface water quality and quantity within the study area.	Impacts to surface water quality from increased impervious areas; erosion and sedimentation at water crossings; stormwater runoff quality and quantity including thermal impacts to coldwater streams; road salt applications on the 407 Transitway.  It is unlikely that the potential reduction in groundwater recharge would produce a measurable effect on baseflow of surface water.	During detail design, the design of SWMF will further address the treatment of water quantity and quality of stormwater runoff. Opportunities to reduce thermal impacts to watercourses during the summer period will be explored when developing SWMF. This could include enhanced infiltration measures, shading of outfalls and ponds, drawing water from deep portions of the ponds or other treatment options (bio-retention units, grassed swales, etc.).  SWMF will receive proper maintenance to function properly as treatment systems of both water quality and quantity control.  Salt applications are conducted by MTO or its agent. Road salt has been listed as a deleterious substance under the <i>Canadian Environmental Protection Act</i> due to its effect on surface water, groundwater, soils and organisms in high concentrations. MTO was a member of the Road Salts Working Group and participated in the	A pre-construction and post-construction surface water quality assessment will be developed during the Detailed Design Stage to document the environmental impacts/changes caused by the road widening, road salt application, assess the effectiveness of the proposed mitigation measures, identify existing SWM and identify further measures for improvement.  Provision of monitoring of SWMF at Jane Station, GO Barrie (Concord) Station, Bathurst Station, Leslie Station, Woodbine/Rodick Station will developed

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Environmental Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
			<p>preparation of the Code of Practice for the Environmental Management of Road Salts (Environment Canada, 2004) (see <b>Appendix N</b>). As a result, MTO has adopted the Code of Practice and prepared a Salt Management Plan including:</p> <ul style="list-style-type: none"> <li>• careful monitoring of weather conditions, judicious use of road salt;</li> <li>• use of alternatives to sodium chloride;</li> <li>• stationary automated anti-icing systems that control the application of road salt; and,</li> <li>• electronic control equipment for spreading salt and sand to ensure the correct amount is distributed; and, restricted use of road salt in environmentally sensitive areas.</li> </ul> <p>Due to the mobility of road salt constituents, mitigation of road salt impacts is difficult. However, road salt application within the ROW will be at the minimum levels allowed within the MTO's standard road salt application procedures.</p> <p>See below for recommended groundwater recharge mitigation measure to be further studied during the Detailed Design Stage of this project if measurable effect on surface water baseflow is perceived.</p>	<p>during the Detailed Design Stage. Parameters of monitoring will include TSS, BOD5, Oil/grease and heavy metals.</p>
Groundwater	Potential impact to water table and contamination of groundwater from operations.	New bridge structures, extension or widening over watercourses is not expected to impact the water table once water table conditions equilibrate around the new structures.	<p>If required, enhanced infiltration techniques will be considered to mitigate against any measurable loss of recharge.</p> <p>Due to the mobility of road salt constituents, mitigation of road salt impacts is difficult. However, road salt application within the ROW will be at the minimum levels allowed within the MTO's standard road salt application procedures</p>	If required, a site-specific testing to assess the need for and the suitability of the areas for enhanced techniques will be further conducted during the Detailed Design Stage of this project.
Fish and Aquatic Habitat	Potential to result in a harmful alteration, disruption or destruction of fish and fish habitat through changes to water quality and quantity, alterations to base flow and changes in water temperature.	Impacts to fish and fish habitat post construction of the transitway.	SWMF proposed to outlet to these systems should explore opportunities to reduce thermal impacts during the summer period. This could include enhanced infiltration measures, shading of outfalls and ponds, drawing water from deep portions of the ponds or other treatment options (bio-retention units, grassed swales, etc.).	
Vegetation and Vegetation Communities	Loss and disturbance of vegetation and vegetation communities	All impacts to vegetation are transient and relate to the footprint and construction impacts. It is expected that post-construction, new wetland areas will be created due to changes in drainage related to the construction of the transitway and its related components. Detailed site-specific mitigation measures will be developed at the Detailed Design Stage of the project.		
Wildlife and Wildlife Habitat	<p>Barriers to wildlife passage.</p> <p>Increased risk of mortality for selected wildlife species crossing the 407 Transitway. Noise, light and visual intrusion may alter wildlife activities, patterns and behaviours.</p>	<p>Given the urban nature of the study area, 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.</p> <p>The addition of approximately 12 metres 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</p>	All 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.	

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Environmental Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations and Significance of any Potential Residual Effects	Monitoring and Recommendation
		<p>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 operations of the transitway is expected to be minor.</p> <p>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.</p>		
Air Quality	Potential for the deterioration of air quality within the study area from operation activities of the 407 Transitway.	The air quality study predicts a negligible difference in gaseous pollutant concentrations between the future with and future without the 407 Transitway scenarios. The study does predict that implementation of the 407 Transitway will result in an increase in particulate matter concentrations, however, when recommended mitigation measures (planting of vegetation or where planned for safety and/or noise issues solid barriers) are considered it is expected that particulate matter concentrations at sensitive receptor locations will be within MOE standards.	Mitigation measures are recommended to reduce future particulate based (TSP and PM10) air quality impacts from the 407 Transitway which includes increased tree planting or constructing other solid barriers for noise and/or safety purposes adjacent to the Transitway which are at least 2 metres tall where possible. Trees/shrubs or solid barriers for noise and/or safety purposes located along the Transitway will act as screens and significantly reduce the particulate matter emission rate for material flowing horizontally from the roadways. In particular, it is recommended that trees be planted (or a solid barriers for noise and/or safety purposes be constructed) adjacent to the Transitway near St. Robert Catholic High School and existing/planned residential areas anticipated to be impacted. <b>Where trees and shrubs are planted a combination of species including coniferous trees will be considered such that there is control throughout the year.</b>	

**7.4.2 Socio-Economic and Cultural Environment**

Adverse impacts to the land uses within the study area are not anticipated from the operation activities of the 407 Transitway. No impacts to archaeological and built heritage features are anticipated to be impacted by the operation of the 407 Transitway at this stage of the project.

**Land Use**

The operation of the 407 Transitway conforms with the adjacent land uses. Provincial planning documents and municipal Official Plans support the implementation of the 407 Transitway within the study area. 407 Transitway will directly travel through the Richmond Hill-Langstaff Gateway Centre and the Markham Centre, which are envisioned to be transit-oriented communities with a mix of land uses and opportunity to transfer to other transit services such as the GO Transit, TTC and YRT. Consultation with the municipalities will continue during the Detailed Design Stage of this project regarding the integration of the 407 Transitway within the urban centres.

**Noise and Vibration**

The future noise levels without the transitway within the study area are expected to be greater than 65 dBA at **three noise sensitive receptors**. The noise levels from the operations of the 407 Transitway will not exceed 5 dBA. **Please see Appendix H for more details.**

**The feasibility to install noise mitigation measures at the three noise sensitive receptor was carried out. The first two noise sensitive receptors (R2 and R3) are located on the northeast quadrant of Highway 7 and Dufferin Street. The third noise sensitive receptor (R9) is located on east of Warden Avenue and north of Highway 407.**

**R2**

**Highway 7 is the dominant noise source at this location. This is not surprising given the proximity of Highway 7 to the receptors and the higher traffic volume relative to the next closest road, being the 407 Transitway. As such, the noise contribution from Highway 7 is predicted to be approximately 66.3 dBA, followed by Highway 407 and the 407 Transitway at 61.6 dBA and 60.9 dBA, respectively. This totals to 68.5 dBA.**

**By adding a 5 metre high noise barrier adjacent to the 407 Transitway, and accounting for its effect on Highway 407 as best as possible given the limitations discussed above, the overall sound level with no barrier of 68.5 dBA is reduced to 66.9 dBA, or -1.6 dBA. As the barrier is located beyond Highway 7 from the perspective of the receptor, Highway 7 remains as the dominant source at this location.**

**At this feasibility assessment stage, it appears that a noise barrier along the 407 Transitway will not achieve a 5 dB reduction in noise at R2.**

**R3**

**Highway 407 is much closer to this location than it is to the R2 location, but Highway 7 still remains the closest noise source. At this location, Highway 407 takes over as the dominant noise source, followed closely by**

Highway 7. Locating a 5 metre high noise barrier on the north side of the 407 Transitway would not effectively reduce the impact of Highway 7 noise at R3, as the 407 Transitway is still beyond Highway 7 from the perspective of R3, and Highway 7 simply becomes the dominant noise source. With no noise barrier in place on the 407 Transitway, the sound level at R3 is approximately 70.7 dBA.

By adding a barrier adjacent to the 407 Transitway on the north side, the overall sound level with no barrier of 70.7 dBA is reduced to 70.3 dBA, or -0.4 dBA. .

At this feasibility assessment stage, it appears that a noise barrier along the 407 Transitway would not achieve a 5 dB reduction in noise at R3.

**R9**

The effect of the 407 Transitway relative to Highway 407 is quite low at this location, due to the proximity of the receptor to Highway 407 and the fact that the receptors are not directly exposed to the 407 Transitway as it is above grade. It is therefore not anticipated that a barrier will have a significant effect, as the 407 Transitway noise is predicated to be more than 10 dBA lower than the contribution from Highway 407.

With no noise barrier in place on the 407 Transitway, the sound level at R9 is approximately 66.1 dBA. By adding a 5 m high barrier adjacent to the 407 Transitway on the north side, the overall sound level with no barrier of 66.1 dBA is predicted to be reduced to 65.7 dBA, or -0.4 dBA. As the 407 Transitway is above grade at this location, the 5 m barrier is not shielding Highway 407 at the receptor and it remains the most dominant source of noise.

At this feasibility assessment stage, it appears that a noise barrier along the 407 Transitway would not achieve a 5 dB reduction in noise at R9.

As the buses to be operated on the 407 Transitway will be rubber-tire vehicles travelling on a smooth surface, it is not anticipated that their operations will contribute significantly to existing vibration levels in the study area.

**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 7-8: Operations and Maintenance Impacts: Potential Impacts, Mitigation and Monitoring for Socio-Economic and Cultural Environment**

Environmental Value/ Criterion	Environmental Issues/Concerns	Potential Environmental Impact	Proposed Mitigation Measures Built-In Positive Attributes and/or Mitigations 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 Detailed Design Stage of this project regarding the integration of the 407 Transitway within the urban centres.	
Noise and Vibration	Potential increase of noise levels from the operation of the 407 Transitway.	Although the operations of the 407 Transitway is not forecasted to contribute perceivable levels of noise (less than 5 dBA), the future conditions without the 407 Transitway is expected to be greater than 65 dBA at two locations within the study area.  As the buses to be operated on the 407 Transitway will be rubberized-tire vehicles travelling on a smooth surface, it is not anticipated that their operation will contribute significantly to existing vibration levels in the study area.	During the Detailed Design Stage, any changes to the design of the 407 Transitway will be assessed to determine if additional noise impact assessment is necessary.	Should a Certificate of Approval be required for this facility is required, it will be obtained during the Detailed Design Stage.
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.		