

## 10. ASSESSMENT OF THE UNDERTAKING

### 10.1 ASSESSMENT METHODOLOGY

An impact analysis was undertaken to identify the potential effects, both positive and negative of the pre-construction, construction and operational activities required for project implementation. In the case of negative effects, mitigation opportunities and methods were also identified. The evaluation criteria and indicators established during the alternatives evaluation process were used as the basis for assessing the effects of the preferred design on the social, physical and natural environments. The effects analysis involved applying the following steps:

- Step 1:** Identify and analyze activities where the project, as described in **Chapter 9**, may interact with the existing environmental conditions described in **Chapter 6**.
- Step 2:** Acknowledge predetermined project activities that act as built-in positive attributes and/or propose mitigation measures that can be implemented during construction or operation of the undertaking, as outlined in **Section 9.4**.
- Step 3:** Identify the residual environmental effects, if any.
- Step 4:** Identify opportunities for further mitigation of residual effects, if possible/practical, including monitoring.
- Step 5:** Determine the significance of the residual environmental effects, after further mitigation. The potential effects of project implementation were described based on their level of significance.
- Step 6:** Recommend monitoring activities during the construction or operation of the undertaking.

Professional experience, analysis, simulation and judgement formed the basis for identifying environmental effects and mitigation measures. The analysis was based primarily on comparing the existing environment condition with the anticipated future environment, prior to, during, and after construction. The prediction of effects considered:

- The interaction between a project activity and the valued environmental components;
- The effects of the project activities on the environmental values; and
- The combined effects of multiple activities and/or multiple effects.

Within this context, consideration was given to:

- The magnitude, spatial extent, and duration of effects;
- The proportion of a population or community affected;
- Direct or indirect effects;
- The degree to which the effect responds to mitigation.

In this assessment, “residual” environmental effects 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 effects were assessed as to their significance, including spatial and temporal considerations, and were categorized according to the following definitions:

**“Positive effect”** means an effect that will contribute to the well-being or health of a valued environmental component.

**“Negligible”** means an effect that may exhibit one or more of the following characteristics:

- nearly-zero or hardly discernible effect; or
- affecting a population or a specific group of individuals at a localized area and/or over a short period in such a way that the effect is similar to random small changes but would have no measurable effect on the population as a whole.

**“Insignificant”** means an effect that may exhibit one or more of the following characteristics:

- not widespread;
- temporary or short-term duration (i.e., only during construction phase);
- recurring effect lasting for short periods of time during or after project implementation;
- affecting a specific group of individuals in a population or community at a localized area or over a short period, but not affecting the integrity of the population or community; or
- not permanent, so that after the stimulus (i.e., project activity) is removed, the integrity of the environmental component would be resumed.

**“Moderately Significant”** means an effect that may exhibit one or more of the following characteristics:

- not widespread with mostly local effects;
- requires further investigation;
- permanent reduction in species diversity or population of a species, but not in sufficient magnitude to cause a decline in abundance and/or

- change in distribution beyond which natural reproduction or immigration would not return that population, or any species dependent on it, to its former level within several generations; and
- could be alleviated with additional detailed design.

**“Significant”** means an effect that may exhibit one or more of the following characteristics:

- widespread;
- permanent transgression or contravention of legislation, standards, or environmental guidelines or objectives;
- permanent reduction in species diversity or population of a species in sufficient magnitude to cause a decline in abundance and/or change in distribution beyond which natural reproduction or immigration would not return that population, or any species dependent on it, to its former level within several generations (including the consequences of a short-term construction effect);
- permanent loss of critical/productive habitat; and
- permanent alteration to community characteristics or services, established land use patterns, which is severe and undesirable to the community as a whole.

The definitions of significance were adopted for use in this assessment because many of the impacts cannot be quantified in absolute terms, although changes and trends can be predicted. The definitions provide guidance and were intended to minimize personal bias. This is important because the analyses are sometimes based on professional judgement and limited information.

Once the potential effects were predicted, additional mitigation measures were identified. Often these mitigation measures were sufficient to reduce potential negative effects to an insignificant or negligible status.

Monitoring is important to verify the accuracy of predicting effects. Monitoring measures were recommended to determine what effects would actually occur with project implementation, and may result in the modification of mitigation measures to improve their effectiveness. Identified monitoring measures included inspection, surveillance and compliance monitoring.

### 10.2 ASSESSMENT RESULTS

An environmental effect requires consideration of all project activities and their interaction with the environment. Pre-construction, construction and operational activities were assessed. **Section 10.4** describes these project

activities for the surface rapid transit components of the undertaking and their interaction with the environment and location, the potential effects, mitigation measures, residual effects and their significance, and monitoring recommendations. Project stages are coded as follows:

- P – Pre-construction
- C – Construction
- O – Operation

A similar assessment of the above effects for the ultimate phase of the Vaughan North-South Link, subway technology, is presented in **Chapter 12**.

### 10.3 PROJECT-RELATED EFFECTS AND MITIGATION

The evaluation of project-related effects was performed using the primary Rapid Transit Plan objectives and related goals developed for the evaluation of alternatives in selecting the preferred alignment. These objectives are:

- To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service
- To protect and enhance the social environment in the corridor
- To protect and enhance the natural environment in the corridor
- To promote smart growth and economic development in the corridor

Goals defined by professionals on the study team are subsets of these objectives and refer to an environmental value or criterion. The effect of the proposed undertaking in terms of each environmental value was rated using a qualitative scale ranging from a positive or beneficial effect through negligible to a potentially significant negative effect as described in the above methodology.

## 10.4 ANALYSIS OF ENVIRONMENTAL EFFECTS AND MITIGATION

### 10.4.1 OBJECTIVE A: To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service

The analysis relative to Objective A is tabulated in **Table 10.4-1**. Generally, the undertaking has the ability to improve mobility within the region and provide good connectivity with inter-regional transit services. It features connections between the City of Toronto via York University and via the Richmond Hill Centre Intermodal Station at Yonge Street. It connects to GO Transit's Richmond Hill Line at the Langstaff GO Station, their Stouffville Line at Unionville GO Station, and potentially their Bradford Line as GO finalizes new station locations for this service. The undertaking is also capable of connecting to future 400 series highway rapid transit services. From this point of view, the proposed transitway will have an overall positive effect on transit ridership and accessibility in the region. The planned alignment characteristics and geometry will provide a fast, convenient and reliable service in most respects. Although grades at some stations exceed LRT standards, the BRT technology proposed for initial implementation will be accommodated in every case. The recommended mitigation, to provide for future LRT technology when needed, will be local modifications to the running way and station platform configuration at the stations where standards are not met. Stations are located in areas with high residential density, high employment numbers or a mixture of the two to capitalize on the effectiveness of implementing the improved public transit system. The strategic locations of stations generally achieve the goal of increasing the attractiveness of the rapid transit service and make a positive contribution towards maximizing ridership. In order for all members of society to have access to the system, all stations, shelters and the transit system itself will be accessible for the mobility impaired by providing ramps, elevators, etc. Attractiveness of the rapid transit service is implicit in the design of the Undertaking, however, achieving the desired transit speed may affect the capacity for general traffic movements at certain intersections. In this respect, the effect on traffic may be moderately significant.

Table 10.4-1  
Effects and Mitigation for Mobility

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE A: To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service</b>												
A1	Maximize Inter-regional and local transit connectivity	Connections to inter-regional services and future gateways	✓		✓	Highway 7 & Highway 50	Opportunity to connect to a Brampton Rapid Transit Initiative "AcceleRide" to improve the inter-regional transit network.	Highway 7 transitway will provide a direct connection from western York Region to the Region of Peel. It also provides a direct connection from York University to the Region of Peel.	Increased potential for infill development around the regional boundary.	None	Positive effect	Monitor the ridership and the performance of the connection to the Region of Peel.
		Connections to inter-regional services and future gateways	✓		✓	At 400 series highways, e.g. Highways 427, 400, 404 & 407	Opportunity to connect to MTO's future rapid transit services on the 400 series highways to improve the inter-regional transit network.	Highway 7 transitway will provide additional stations for transfers.	Increased potential for infill development around these transfer points.	None	Positive effect	Monitor the ridership and the needs to provide additional stations as warranted by the future rapid transit services.
		Connections to inter-regional services and future gateways	✓		✓	York University	Opportunity to connect to the City of Toronto and improve ridership on these transit services.	Vaughan North-South Link will provide a direct connection to the York University and to the future TTC rapid transit connecting the Toronto system prior the implementation of subway extension.	Increased potential for infill development around this transfer point.	None	Positive effect	Monitor the ridership and the performance of the connection to Toronto.
		Connections to inter-regional services and future gateways	✓		✓	Proposed Richmond Hill Centre Intermodal Station	Better connection to GO Stations and future provincial inter-regional 407 Transitway station will improve ridership on all transit services	Highway 7 transitway will provide a direct connection to GO Rail's Richmond Hill Line at the proposed Richmond Hill Centre Intermodal Station. It will also have a connection to York's Yonge Street transitway and the future provincial transit corridor along Highway 407.	Increased potential for infill development around Richmond Hill Centre Intermodal Station	None	Positive effect	Monitor ridership and the performance of the connection to GO Langstaff Station
		Connections to inter-regional services and future gateways	✓		✓	Unionville GO Station	Connection to Unionville GO Station will improve York's transit network.	A pedestrian walkway will be provided to transfer the transitway passengers to the Unionville GO Station. This will provide a fast and reliable service from the future Markham Centre to the City of Toronto or northern York Region via the GO Rail's Stouffville Line.	Increased potential for infill development around this transfer point.	None	Positive effect	Monitor the ridership and the performance of the connection to Unionville GO Station.
		Compatibility with proposed local network	✓		✓	Entire Corridor	Inconvenient transfer between local transit and Highway 7 Rapid Transit may discourage transit ridership.	Stations generally located on north-south local transit routes ensuring convenient transfers between services. Integrated fare system proposed.	Project may change the configuration of local transit.	Local services configured as grid where practical, to provide both community coverage and feeder roles	Positive effect	Regular review of effectiveness of local service plans.

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			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE A: To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service</b>												
A2	Maximizes speed and ride comfort and minimizes safety risks and maintenance costs with an optimized alignment geometry.	Grade at station in excess of LRT standard of max. 1.0%.	✓		✓	Eastbound platform on Highway 7 at Chalmers Rd./ South Park Rd.	Running way grade at platforms is 2.49%. LRT should have the minimum climbing grade after stopping to load/unload passengers.	Grade through station will have to be modified locally resulting in a vertical separation from adjacent traffic lanes if LRT technology is introduced.	Minor retaining walls through station.	Incorporate safety barriers where required.	Significant	
		Grade at station in excess of LRT standard of max. 1.0%.	✓		✓	Westbound platform on Highway 7 at West Beaver Creek Rd./ Commerce Valley Dr. W	Running way grade at platforms is 2.13%. LRT should have the minimum climbing grade after stopping to load/unload passengers.	Grade through station will have to be modified locally resulting in a vertical separation from adjacent traffic lanes if LRT technology is introduced.	Minor retaining walls through station.	Incorporate safety barriers where required.	Significant	
		Grade at station in excess of LRT standard of max. 1.0%.	✓		✓	Both platforms on Highway 7 at East Beaver Creek Rd./ Commerce Valley Dr. E	Running way grade at platforms is 2.97%. LRT should have the minimum climbing grade after stopping to load/unload passengers.	Grade through station cannot be modified due to the close proximity of the next intersection.	Station grade exceeding desirable LRT maximum will remain.	None practical	Significant – LRT operation speed reduced.	Speed impact will be analysed during LRT system design.
		Grade at station in excess of LRT standard of max. 1.0%.	✓		✓	Both platforms on Highway 7 at McCowan Road	Running way grade at platforms is 2.56%. LRT should have the minimum climbing grade after stopping to load/unload passengers.	Grade through station will have to be modified locally resulting in a vertical separation from adjacent traffic lanes if LRT technology is introduced.	Minor retaining walls through station.	Incorporate safety barriers where required.	Significant	
A3	Maximize operational efficiency of maintenance and storage facility	N/A - Maintenance & storage facility included in Yonge St. Corridor EA Undertaking.				N/A	N/A	N/A	N/A	N/A	N/A	
A4	Increase attractiveness of rapid transit service	Travel time and service reliability	✓		✓	Entire Corridor	Adjustments to signal timing to achieve progression and minimize delay to rapid transit.	Micro-simulation of rapid transit operation and general traffic movements during detailed design will be used to optimize signal timing. Transit speed will be increased to maximum achievable with reasonable intersection operation.	Delay to transit or intersecting traffic may be unacceptable. May affect intersection capacity for general traffic movements.	Modification of intersection signal timing.	Moderately significant	Pursue an on-going intersection performance monitoring program
A5	Locate stations to maximize ridership potential and convenience of access for all users	Residents/Employees within walking distance of station locations. Accessibility of stations/transit system.			✓	Entire Corridor	Stations at locations with automobile-oriented land use could discourage rapid transit use.	Station locations selected to serve supportive land use. Facilities designed with weather protection, direct barrier-free access and attractive streetscapes within surrounding residential neighbourhoods.	Continued dependence on automobile if land use objectives not achieved	Greater emphasis on supportive land use	Positive effect	Regular review of land use and new or infill development potential during detailed design phases for transitway and stations.

**Notes:**  
P – Pre construction, C – Construction, O – Operation

#### 10.4.2 OBJECTIVE B: To protect and enhance the social environment in the corridor

Overall, the various goals set to protect and enhance the social environment are largely achieved. The assessment in terms of the related environmental values indicates that most adverse effects are generally mitigated by the built-in attributes of the design and benefits for the communities within the corridor can be maximized. The assessment for Objective B is tabulated in **Table 10.4-2**.

In particular, the undertaking will very likely improve community cohesion as well as access to municipal and community facilities within the corridor. In general, overall intersection capacity for vehicular traffic in the Study Area will be reduced due to the required operational changes and the effects of traffic using modified access to adjacent properties. Offsetting somewhat is an anticipated reduction in vehicular demand over time. As a result, the intersections in the Study Area can continue to serve a high volume of vehicular traffic, the needs of a broad range of pedestrians and adjacent businesses with the implementation of the rapid transit. While some improvements to road traffic and pedestrian circulation safety are anticipated, the removal of random left turn access inherent in the adoption of a median location for the transitway requires road users to modify their travel patterns. This transitway configuration, although preferable to curb-side options, will restrict left turn access to regularly spaced signalized intersections for vehicles and widen the roadway for pedestrians. In both cases, these effects are significantly mitigated by permitting U-turns at the signalized intersections for general traffic and by the introduction of a centre median refuge to allow for a two-stage pedestrian crossing where necessary. Ultimately, the implementation of a median transitway will increase the person carrying capacity along the corridor.

Preserving and improving public safety and security in the corridor was an important consideration in the development of the design concept. Again, several features of the median transitway design were able to, not only allow frequent access across the median for Emergency Response Vehicles, but also provide pedestrians with a safer environment.

In addition, noise and vibration studies at representative sensitive receptors have demonstrated that the combined effect of median transitway operation and general traffic on the widened Highway 7 Corridor roadways will not result in a noticeable increase in noise or vibration levels for residents, except that in the future Markham Centre area the BRT and LRT are predicted to exceed the background noise levels that can be mitigated with the use of noise control features.

Station shelters should be consistent in design throughout YRTP corridors. In Heritage Conservation Districts consideration to enhance design with traditional motifs may be considered. This may include the etching of glass with the name of the HCD district or alternate light for individual station platforms.

A Stage 1 Archaeological Assessment, conducted during the study, indicated the absence of archaeological sites within the project impact area. As is usually the case, a Stage 2 archaeological study will be conducted during the construction phase for the transitway.

Finally, the introduction of a transitway, even in a highly developed urban context, has the potential to worsen the visual aesthetics of the road. In consultation with the municipalities and the public, a concerted effort was made to establish landscaping and streetscaping principles to be followed in transitway insertion design for the entire corridor, offering the potential for a significantly enhanced street environment.

Table 10.4-2  
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B1	Minimize adverse effects on and maximize benefits for communities in corridor	Potential displacement of community features		✓	✓	Entire Corridor	Potential displacement or loss of unique features.	Avoid known distinct community features to minimize impact; incorporate landscaping and furniture into streetscape to enhance corridor and community environment.	None expected	None expected	Negligible	Future community consultation
		Effect on community cohesion			✓	Entire corridor	Highway 7 may be perceived as a 'highway-like road, which in turn with the introduction of transit service vehicles, could create an unfriendly environment for pedestrians.	Design transitway to facilitate safe pedestrian road crossings with median refuge. Improved streetscaping in order to create a friendlier pedestrian environment.	During initial operation, vehicle/pedestrian incidents may occur due to the introduction of new traffic facilities and patterns.	Emphasis on education programs, signage, and stricter enforcement.	Negligible	Continue to monitor traffic behaviour and causes of incidents involving pedestrians.
		Community facility utilization			✓	Entire corridor	Improved transit access could increase demand on facilities and services within the corridor.	Municipality can expand services and facilities through the increased development charge revenue.	Community facility expansion could impact stable existing communities.	Include mitigation measures in community facility expansion.	Positive effect	Monitoring of registration levels at the various facilities.

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			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2	Maintain or improve road traffic and pedestrian circulation	Reduction in main street intersection capacities due to rapid transit operations			✓	Highway 50	Implementation of rapid transit reduces the intersection capacity after future growth.	A dedicated WB transit phase of 10s and a WB transit left turn have been introduced.	Under 2021 considerations, EBL, WBT & SBT will operate at capacity in the AM peak hour, and; EBL, WBT, NBT & SBL will operate at capacity in the PM peak hour.  The impact of the RT system on the intersection will be negligible as the transit vehicle will operate in conjunction with the WBL.	Under 2021 considerations, the addition of a WB protected left turn phase should be considered.	Significant	Monitoring required for WB protected left turn phase.
					✓	New Mid-block Road	Under 2021 considerations, EBL, EBT & WBT will operate at capacity in the AM peak hour. The SBL will operate at capacity in the PM peak hour.	Pedestrian split phasing should be considered in detailed design phase.	None expected	None required.	Significant	Monitoring required for pedestrian split phasing.
					✓	Hwy 427 N-E/W Off-Ramp	Under 2021 considerations, WBT will approach capacity in AM peak hour, and; no capacity constraints are expected in the PM peak hour.	None required.	None expected	None required.	Insignificant	None required.
					✓	Hwy 427 S-E/W Off-Ramp	Transit vehicles will experience delay due to heavy ramp traffic volumes.	Cycle length has been increased from 90 seconds to 120 seconds to accommodate the heavy volumes on the off ramp.	The ramp movements require more green time to maintain acceptable operating conditions.	Transit signal priority could be considered during the detailed design phase.	Moderately Significant	Monitoring required for active transit signal priority.
					✓	Roybridge Road/ Vaughan Valley Boulevard	Implementation of RT reduces the intersection capacity.	N-S main phase has been increased to accommodate pedestrian crossing time.	The time for E-W main street movements will be reduced. WBT movements will operate at or near capacity.	Future pedestrian volumes should be monitored over time to determine the opportunity to provide a 2-stage crossing for pedestrians & thus allocate additional green time to the E-W main phase.	Moderately Significant	Monitoring required for 2-stage crossing.
					✓	Highway 27	Implementation of RT reduces the intersection capacity.	N-S green time has been increased to accommodate the minimum pedestrian crossing time.	WBL will operate at capacity in the AM peak hour. This capacity issue currently exists today.	None required	Moderately Significant	None required
						Kipling Avenue	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit advance phase will be provided to facilitate the access/ egress of the transit vehicle to/from the transit lanes. WBR is permitted during the transit advance phase.	The additional transit phase will operate at capacity. WBT, SBT, EBL & EBT will operate at capacity or approach capacity in AM/ PM peak hour.	Split phasing should be considered to allocate additional green time to the E-W phase as the N-S phase will operate at a minimum split of 38s. Alternatively, implementation of exclusive lanes in the SB approach for example an exclusive left, through & right turn lane should be considered.	Moderately Significant	Monitoring required for implementation of split phasing or exclusive lanes in the SB approach.

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			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Reduction in main street intersection capacities due to rapid transit operations (cont'd)			✓	Islington Avenue	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit advance phase will be provided to facilitate the access/ egress of the transit vehicle to/from the transit lanes. EBR is permitted during the transit advance phase.	EBT, WBT, NBL & SBL will operate at capacity in AM/PM peak hour.  Surrounding lands prevent road network improvements.	Pedestrian split phasing should be considered on the N-S phase to generate additional green time for the E-W movements.  Improvements are not possible due to land/ grade constraints or would not improve operating conditions due to excessively high volumes. Minor remedial measures are not possible such as dual left turn lanes or signal modifications.	Significant	Monitoring required for implementation of split phasing or exclusive lanes in the SB approach.  When the time comes to widen this section of the Highway 7 to 6 lanes, dual left turn lanes should be considered.
					✓	Pine Valley Drive	Implementation of RT reduces the intersection capacity.	N-S pedestrian crossing times have been increased. Protected-only EBL & WBL have been introduced. Due to property constraints, dual left turn lanes cannot be provided.	The number of permissive left turns will be limited due to the heavy E-W through volumes. WBL, EBL & NBL will approach capacity or operate at capacity during peak hours.	Review property impact during Preliminary Design Phase to assess the opportunities to provide a dual left turn lanes.	Moderately Significant	Review property impact during Preliminary Design Phase.
					✓	Weston Road	Under 2021 considerations, the intersection is expected to operate at capacity during both peak hours.	None required.	Intersection will continue to operate at capacity.	None required.	Significant	None required.
					✓	Famous Avenue	Under 2021 considerations, WB will approach capacity during both AM and PM peak hours.	None required.	Intersection will continue to operate at capacity.	None required.	Significant	None required.
					✓	Highway 400 S-EW off- ramp	Under 2021 considerations, NB dual left will approach capacity in the AM peak hour, and; no capacity constraints are expected during the PM peak hour.	None required.	Intersection will continue to operate at capacity.	None required.	Significant	None required.
					✓	Highway 400 Interchange	As the area generates a significant amount of traffic, the interchange will operate at capacity conditions between Weston Road to Jane Street during the peak period.	None required initially. However, monitoring for active signal priority is required to confirm if active signal priority is necessary in the future.	None expected	None required.	Moderately Significant	Monitoring for active signal priority required
					✓	Interchange Way	EBL, WBT & SBR will approach capacity or operate at capacity. Dual EBL could not be incorporated due to property constraints.	None required.	Intersection will continue to operate at capacity.	Review property impact during Preliminary Design Phase to assess the opportunity for dual eastbound left turn lanes.	Moderately Significant	Review property impact during Preliminary Design Phase

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<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Reduction in main street intersection capacities due to rapid transit operations (cont'd)			✓	Jane Street	Some transit vehicles are required to turn south to reach the York University.  Review opportunities for road network improvements to improve left turn lane capacity issues.	A ten second transit phase will be provided to facilitate the movements. The NB exclusive right turn lane will be permitted during the transit phase.  The protected left turn restrictions resulting from the RT system will result in the eastbound and westbound left turns operating at capacity.	The intersection of Highway 7 and Jane Street will operate at capacity during both peak periods.	Split phasing should be considered during the detailed design phase to provide a minimum split for the N-S pedestrian movement.  Review opportunities for road network improvements to improve left turn lane capacity issues.	Moderately Significant	Monitoring required for implementation of split phasing. Review opportunities for road network improvements to improve left turn lane capacity issues.
					✓	Interchange Way (Jane Street)	East approach is operating as a shared left-through and shared through-right. Heavy left turn volumes suggest an exclusive or dual westbound left turn lane is required.	Monitor east approach for widening	Intersection will continue to operate at capacity.	None expected	Moderately Significant	Recommend further intersection analysis during Preliminary Design Phase to determine if exclusive WB left turn widening is warranted.
					✓	Proposed East-West Road (Jane Street)	Under 2021 Considerations, SBL will operate at capacity and NBT will approach capacity during the AM peak hour. The opposing WBR will approach capacity during the PM peak hour.	Traffic volume should be monitored to determine if a SB dual left turn lane will be required to facility the heavy volume during the morning period.	Intersection will continue to operate at capacity.	None expected	Moderately Significant	Monitoring required for SB dual left turn lane.
					✓	Northwest Gate (Steeles Avenue)	Under 2021 Considerations, the intersection will operate at capacity during the AM peak hour.	None required.	Intersection will continue to operate at capacity.	None expected	Moderately Significant	None required.
					✓	Keele Street	Transit vehicles are required to turn onto Highway 7.	A ten second transit phase will be provided to facilitate the movements. The WB general traffic will be permitted during the transit phase.	Both peak periods show the left turn movements operating at capacity.	Additional green time to the critical movements should be considered in the detailed design phase; or road network improvements should be considered in the preliminary design phase.	Moderately Significant	Review opportunities to provide additional capacity for the left turn movements during detailed design phase/preliminary design phase.
					✓	Creditstone Road	WBT, NBL & EBT will operate at capacity in the PM peak hour.	None required.	Intersection will continue to operate at capacity.	A 2-stage pedestrian crossing should be considered during the detailed design stage.	Significant	None required.
					✓	Bowes Road/ Baldwin Avenue	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit phase will be provided.	The intersection is expected to operate at good level-of-service with the RT system.	None expected	Positive effect	None required.
					✓	Centre Street/ North Rivermede	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	EB transit vehicle will utilize the existing channelized right turn lane and diverge into the transitway downstream of the intersection to avoid delay.	The intersection will operate at a satisfactory LOS. NBT & EBT will approach capacity. Minimal delays or queues are expected between the two transitional intersections.	None expected	Insignificant	None required.

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<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 Cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Reduction in main street intersection capacities due to rapid transit operations (cont'd)			✓	Centre/ Bathurst Streets	Transit vehicles are required to negotiate an EBL or SBR in the dedicated transit ROW.	EBL/SBR for transit, & EBL/EBT for general traffic has been permitted during a 10-second transit phase. All the left turn lanes operate under protected-permissive phases as the transit phase operate under an exclusive phase.	EBL, NBL & SBT will approach capacity in the PM peak hour.	None expected	Moderately Significant	None required.
					✓	Worth Boulevard/Flamingo Road (Bathurst Street)	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit phase will be provided. SBT will be permitted during this transit phase.	NBT will operate at capacity and SBT will approach capacity. Addition green time is required in the N-S direction.	Split phasing should be considered during the detailed design stage.	Significant	Monitoring required for split phasing.
					✓	Bathurst Street Connection Road	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	Three SB left turn lanes will be provided: one for an exclusive SB transit left turn lane; two for SB general left turn traffic. A dual EB left turn lane will be provided.	No capacity constraints.	None expected	Positive effect	None required.
					✓	Hunter's Point Drive	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit phase will be provided. EBT will be permitted during this transit phase.	No capacity constraints.	None expected	Positive effect	None required.
					✓	Yonge Street Connection Road	Accessing the Richmond Hill Centre Intermodal Station complicates the intersection operation.	WB & SB right transit movements will operate in mixed traffic utilizing the existing channelized right turn lanes. EB & SB left transit movements will remain in the dedicated transit lanes. EB left transit & general traffic movements will operate together. Similarly, SB left transit & general traffic movements will operate together. Signal priority will likely be implemented to detect buses in the transitway & activate the appropriate phases to avoid long delays & prevent the buses from doubling up.				
					✓	Red Maple Road	Requirement of mixed-traffic transition complicates the intersection operation.  Under 2021 Considerations, volumes from Bayview Glen Development show the eastbound left to operate at capacity during the PM peak hour.	An advance EB through phase will be implemented into the signal timing to permit the WB transit vehicle to transition to mixed traffic. The EB left will operate as protected only.	The intersection will operate at an acceptable LOS during the AM peak hour with the WB through approaching capacity. The WBT will operate at capacity in the PM peak hour.	None expected	Moderately Significant	Review potential to provide a dual eastbound left turn lane during the Preliminary & Detailed Design Phases.
					✓	Silver Linden Drive	EBL and WBT will operate at capacity or approach capacity in the PM peak hour.	None required.	Intersection will continue to operate at capacity.	None required.	Moderately Significant	None required.
					✓	Bayview Avenue Connection Ramp	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit phase will be provided.	EBT will approach capacity in the AM peak hour.	The implementation of a dual EB left turn and/or split phasing for pedestrians should be considered during detailed design phase.	Moderately Significant	Evaluate option of implementing a dual eastbound left turn lane and/or review opportunity to provide split phasing for pedestrian.
					✓	South Park Drive/Chalmers Road	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit phase will be provided.	E-W phase will operate at capacity during the PM peak hour. The EBL & WBT will operate a capacity.	Pedestrian split phasing should be considered.	Moderately Significant	Monitoring required for pedestrian split phasing.

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Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Reduction in main street intersection capacities due to rapid transit operations (cont'd)			✓	Leslie Street	WBL, SBL, EBL, EBT & NBL will operate at capacity or approach capacity in the AM & PM peak hours. The N-S movements will require a minimum split of 49 s to serve pedestrian crossing times. Long-term conditions expect high vehicular volumes in all approaches. Additional road improvements are insignificant due to high traffic demands from Highway 404 and surrounding future development.	Improvements are not possible due to land/ grade constraints or would not improve operating conditions due to excessively high volumes. Minor remedial measures are not possible such as dual left turn lanes or signal modifications.	Intersection will continue to operate at capacity.	Opportunities to reduce the minimum N-S split, such as a 2-stage pedestrian crossing, should be pursued as other critical phases require the additional green time.	Moderately Significant	None required.
					✓	East Beaver Creek/ Commerce Valley Drive East	EBL & WBL will operate at capacity due to the protected-only phases.  The reduction in east-west capacity is mainly attributed to the additional north-south green time required to accommodate pedestrians.  Heavy volumes and proximity to the Highway 404 interchange result in capacity conditions with minimal improvement from minor remedial measures.	Improvements are not possible due to land/ grade constraints or would not improve operating conditions due to excessively high volumes. Minor remedial measures are not possible such as dual left turn lanes or signal modifications.	Intersection will continue to operate at capacity.	None expected	Significant	A two-stage pedestrian crossing should be considered at the Commerce Valley Drive intersection to reduce side street green time demands.
					✓	Highway 404 N-E/W Ramp	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	The WB transit vehicles will be given a green indication in conjunction with the WB traffic. A ten second EB transit phase will be provided. The WBT will be permitted during this phase. Upstream & stop bar detection of the transit vehicle will be provided to allow the controller with advance warning and confirmation that a transit vehicle requires the advance transit phase.	Overall peak hour operations are not impacted. Transit delay between the two transition intersections is expected.	Should the resultant delays to transit vehicles be considered excessive, transit vehicle priority could be employed at both the transition intersections to advance the traffic signal display in anticipation of the arrival of the transit vehicle.	Moderately Significant	Review the need to provide transit vehicle priority.
					✓	Highway 404 Interchange	Heavy volumes on off-ramps and through Highway 7 Corridor suggest major mitigative measures will be required in future.	Major mitigative measures should be considered in future.	Congestion within the interchange will remain.	None required.	Significant	Monitor queuing on off-ramps and on Highway 7 to assess need for improvements. Monitoring required for active signal priority.
					✓	Highway 404 S-E/W Ramp	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	The EB transit vehicles will be given a green indication in conjunction with the EB traffic. A ten second WB transit phase will be provided. The EBT will be permitted during this phase. Upstream & stop bar detection of the transit vehicle will be provided to allow the controller with advance warning and confirmation that a transit vehicle requires the advance transit phase.	Overall peak hour operations are not impacted. Transit delay between the two transition intersections is expected.	Should the resultant delays to transit vehicles be considered excessive, transit vehicle priority could be employed at both the transition intersections to advance the traffic signal display in anticipation of the arrival of the transit vehicle.	Moderately Significant	Review the need to provide transit vehicle priority.

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Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Reduction in main street intersection capacities due to rapid transit operations (cont'd)			✓	Allstate Parkway/East Valhalla	EBL, WBT & SBR will operate at or above capacity in the AM & PM peak hours due to heavy volumes generated from the high- density office area and future Seneca College. An extended advance phase is required, which impacts the E-W available green time in the AM peak hour.	Extended EB advance phase should be considered. The implementation of a channelized SB right turn lane should be examined as well as a dual EB left turn lane during the detailed design stage.	Intersection will continue to operate at capacity.	None required.	Moderately Significant	Review potential to provide a channelized right turn lane in the southbound direction and a dual eastbound left turn lane.
					✓	Town Centre Boulevard (Town Centre Blvd. Alignment)	Transit vehicles are required to negotiate an EBR or NBL in the dedicated transit ROW.	EBR/NBL for transit, & WBT for general traffic has been permitted during a dedicated 10-second transit phase. The WBL will operate as protected- only in order to prohibit WBL vehicles from operating with the WBT volumes during the transit phase.	EBT will operate at capacity in the PM peak hour.	None required.	Significant	None required.
					✓	Clegg Road	WBT, SBL, EBL & NBL will approach capacity in AM/PM peak hour.	None required.	Intersection will continue to operate at capacity.	None required.	Significant	None required.
					✓	Helen Avenue/ future North-South Connection Road	Transit vehicles are required to enter/exit the dedicated median transitway lanes.	An exclusive transit only phase will be provided.	Under 2021 Considerations, EBL & SBL will approach capacity in the AM/PM peak hour.	None required.	Significant	None required.
					✓	Helen Avenue (Kennedy Road)	Transit vehicles are required to negotiate an EBL or SBR in the dedicated transit ROW.  Under 2021 Considerations, heavy volumes generated from Markham Centre West and GO Unionville Station will result in capacity constraints on NBL, SBT & WBL during AM/PM peak hour.	A transit phase of 10 s has been incorporated into the signal timings to operate in conjunction with the EBL & EBT movements.  Under 2021 Considerations, a dual northbound left and channelized right turn should be considered.	Intersection will continue to operate at capacity.	None required.	Significant	Follow-up monitoring during full buildout conditions to examine the possibility of implementing a dual northbound left and channelized eastbound right turn lane.
					✓	Avoca Drive(Kennedy Road)	Implementation of RT will reduce the intersection capacity.  The proposed Markham Centre West developments at this intersection show heavy north-south volumes on Kennedy Road. WBL, NBL & EBL will approach capacity in AM/PM peak hour.	NBL & SBL will operate as protected left phases.  to reduce the northbound advance phase, improvements such as implementing a dual northbound left turn lane should be considered in the detailed design phase.	Intersection will continue to operate at capacity.	None required	Significant	Follow-up monitoring to assess capacity issues during the PM peak hour with NB/SB through movements and the NB left.
					✓	Kennedy Road	Transit vehicles are required to negotiate a NBR or WBL in the dedicated transit ROW.	A transit phase of 10 s has been incorporated into the signal timings to operate in conjunction with the WBT movements.	None expected.	A 2-stage pedestrian crossing should be considered during detailed design phase to meet the minimum split requirements in both directions.	Moderately significant	A 2-stage pedestrian crossing should be considered during detailed design phase.
					✓	Bullock Drive/ Commercial Access	EBL will operate at capacity as a protected left turn phase in PM peak hour.	None required	Intersection will continue to operate at capacity.	None required	Moderately significant	None required

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Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation	
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation			
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>													
B2 Cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Reduction in main street intersection capacities due to rapid transit operations (cont'd)			✓	McCowan Road	WBL & NBL will operate above capacity.	None required initially.  Based on future operations, improvements to the westbound left and northbound left may be required to improve operations at the intersections during the AM peak hour.  To improve operating conditions, a two-stage pedestrian crossing should be investigated in both directions during the detailed design stage.	Intersection will continue to operate at capacity.	None required	Significant	Investigated the need to provide a two-stage pedestrian crossing in both directions during the detailed design stage.  Review special needs for the westbound left and northbound left during the AM peak hour.	
					✓	Grandview Boulevard/ Galsworthy Drive	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit phase will be provided.	The intersection is expected to operate at an acceptable LOS.	None required	Positive Effect	None required.	
					✓	Main Street Markham	E-W main phase is reduced significantly due to the pedestrian crossing time requirements to cross Highway 7.	WBL will operate at capacity in the AM peak hour and WBL & NBL will approach capacity in the PM peak hour.	Intersection will continue to operate at capacity.	None required	Significant	None required	
					✓	Wooten Way	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit phase will be provided.	The intersection is expected to operate at an acceptable LOS.	None required	Positive Effect	None required.	
					✓	Ninth Line	Under 2021 considerations, EBL, SBT, NBL, NBT & WBT will approach capacity or operate at capacity in the AM/PM peak hour.	None required	Intersection will continue to operate at capacity.	None required	Significant	None required	
					✓	Bur Oak Avenue	Requirement for transit to transition to mixed-traffic complicates the intersection operation in the initial phase.	EBL transit and general traffic will operate together. Similarly, SB transit and general traffic will operate together. WBR transit vehicles will operate in conjunction with the SB phase.	The intersection is expected to operate without any capacity constraints.	None required	Positive Effect	None required.	
					✓	Future Markham By-Pass Extension	Under 2021 considerations, SBL will operate at capacity in the AM/PM peak hours.	Exclusive right turn lanes in all approaches should be considered in detailed design phase.	Intersection will continue to operate at capacity.	None required	Significant	Monitoring required for Exclusive right turn lanes.	
					✓	Reesor Road	Requirement for transit to transition to mixed-traffic complicates the intersection operation.	A ten second transit phase will be provided for EB transit vehicle in conjunction with the WB through general traffic.	The intersection will not be significantly impacted.	None required	Insignificant	None required.	
				Need to divert from main street at various locations, as required for the preferred alignment.		✓	▪ TTC BRT Entrance/ Steeles Ave. ▪ IBM Entrance/ Town Centre Blvd.	New traffic signal will be required to facilitate a safe transit movement among the general traffic.	New traffic signal is introduced.	None expected.	None Expected	Insignificant	None required.
				Potential conflict at transition points between mixed-traffic operations and median transitway operations		✓	▪ Proposed signalized Beechwood Cemetery Entrance SB	Rapid transit may have to wait for opportunity to merge with the general through traffic resulting in service delay. New traffic signal will be required to facilitate a safe transit movement among the general traffic.	New traffic signal is introduced to accommodate transit movements. Also, this new intersection provides a better access for the cemetery.	None expected.	None Expected	Positive	None required.

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GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 Cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Critical left turn storage lengths			✓	Westbound dual left at Famous Avenue	High left turn volumes at this cinema's only access will deteriorate the intersection operation.	The dual left turn storage lengths have been maximized.	Due to the constraint of the intersection spacing (306 m), the maximized left turn storage lengths still cannot provide the required capacity. The left turn vehicles may spill out onto the adjacent through lane blocking the through traffic.	None Expected	Moderately Significant	None
					✓	Eastbound and Westbound at Millway Avenue	High left turn volumes resulted from future Vaughan Corporate Centre development will deteriorate the intersection operation.	The left turn storage lengths have been maximized.	Due to the constraint of the intersection spacing (260 m in EB; 172 m in WB) and platform locations, the maximized left turn storage lengths still cannot provide the required capacity. The left turn vehicles may spill out onto the adjacent through lane blocking the through traffic.	None Expected	Moderately Significant	None
					✓	Eastbound and Westbound left at Chalmers Road/ South Park Drive	High left turn volumes resulted from the business park will deteriorate the intersection operation.	The left turn storage lengths have been maximized.	Due to the constraint of the intersection spacing (220m in WB), the maximized left turn storage lengths still cannot provide the required capacity. The left turn vehicles may spill out onto the adjacent through lane blocking the through traffic.	None Expected	Moderately Significant	None
					✓	Westbound left at Saddlecreek Drive	High left turn volumes resulted from new development will deteriorate the intersection operation.	The left turn storage lengths have been maximized.	Due to the constraint of the intersection spacing (250 m), the maximized left turn storage lengths still cannot provide the required capacity. The left turn vehicles may spill out onto the adjacent through lane blocking the through traffic.	None Expected	Moderately Significant	None
					✓	Eastbound and Westbound left at Times Avenue/ Valleymede Drive	High left turn volumes resulted from the business park will deteriorate the intersection operation.	The left turn storage lengths have been maximized.	Due to the constraint of the intersection spacing (250 m in EB; 405 m in WB) and the platform location, the maximized left turn storage lengths still cannot provide the required capacity. The left turn vehicles may spill out onto the adjacent through lane blocking the through traffic.	None Expected	Moderately Significant	None

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GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 Cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Critical left turn storage lengths (cont'd)			✓	Northbound left on Jane Street at Highway 407 north ramp	High left turn volumes accessing the Highway 407 will deteriorate the intersection operation.	The left turn storage length has been maximized.	Due to the constraint of the intersection spacing (230 m), the maximized left turn storage lengths still cannot provide the required capacity. The left turn vehicles may spill out onto the adjacent through lane blocking the through traffic.	None Expected	Moderately Significant	None
					✓	Eastbound and Northbound left at Kennedy Road and Helen Avenue	High left turn volumes accessing the GO Unionville Station will deteriorate the intersection operation.	The eastbound left turn storage length has been maximized and the northbound left turn storage length remains as existing.	Due to the constraint of the intersection spacing (245 m in EB), the maximized left turn storage lengths still cannot provide the required capacity. The left turn vehicles may spill out onto the adjacent through lane blocking the through traffic.	None Expected	Moderately Significant	None
		Widening or construction of new structures resulting in major temporary disruption to highway or railway traffic during construction		✓	<ul style="list-style-type: none"> <li>▪ Hwy 427</li> <li>▪ CP Mactier</li> <li>▪ Hwy 400</li> <li>▪ McMillian Yard</li> <li>▪ Hwy 407/ Jane St.</li> <li>▪ CN Halton</li> <li>▪ CN Bradford</li> <li>▪ Hwy 407/ Bathurst St.</li> <li>▪ Yonge St.</li> <li>▪ CN Bala</li> <li>▪ Future Cedar Ave.</li> <li>▪ Bayview Ave.</li> <li>▪ Hwy 404</li> <li>▪ CP Havelock</li> </ul>	Construction staging at busy highway interchanges, such as at Hwy 404, could cause additional delay to general traffic. Temporary relocation of railway lines could cause delay to railway traffic.	<p>Mitigation in the form of traffic accommodation plans and temporary works will be developed for all structures where disruption is unavoidable.</p> <p>Mixed traffic operation is introduced in the area of CP Mactier, CN Halton, CN Bradford, Hwy 407/ Bathurst St., Bayview Ave., CN Bala, Hwy 404 and CP Havelock to avoid widening of structures.</p> <p>Lane reduction is used at Hwy 400 to minimize the widening of the structure.</p> <p>The widening of the rest of the structures is considered unavoidable.</p>	Reduction in transit and general traffic operation speed. Some delays likely during construction period.	None	Moderately significant	Monitor traffic operation to confirm whether dedicated transit lanes are required in the future.	
		Access to minor side streets and properties along the Highway 7 Corridor transit routes	✓	✓	✓	Entire Corridor	Median transitway will eliminate random left turns into minor side streets and properties thereby requiring an alternative access route	<p>In many cases, alternative access can be obtained to a site via another site access or an adjacent roadway with signalized access to Highway 7. The travel patterns for the major traffic generators will be changed.</p> <p>U-turns provided at major intersections for safe manoeuvres into side streets and to properties. Random permissive left turns eliminated thus increasing safety. Develop traffic management plans for construction.</p>	Conflict with U-turns and Right may decrease safety.	None necessary	Moderately significant	Monitor traffic and prohibit Right Turns On Red movements from the side street at these locations if necessary

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GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 Cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	U-turn movements and the corresponding side street right-turn-on-red (RTOR) movements			✓	<ul style="list-style-type: none"> <li>▪ Highway 7/ Helen St.;</li> <li>▪ Highway 7/ Town Centre Blvd.;</li> <li>▪ Town Centre Blvd/ Cedarland Dr.;</li> <li>▪ Kennedy Rd./ Avoca Dr.;</li> <li>▪ Highway 7/ Robinson St./ St. Patrick School Entrance;</li> <li>▪ Highway 7/ Grandview/ Galsworthy Dr.;</li> <li>▪ Highway 7/ McCowan Rd.;</li> <li>▪ Highway 7/ Laidlaw Blvd./ Conservation;</li> <li>▪ Highway 7/ Wooten Way;</li> <li>▪ Highway 7/ Ninth Line</li> </ul>	The permitted U-turn movements at these locations may cause conflicts with RTOR movements.	Follow-up monitoring should be undertaken to review the interaction between the U-turn movement and any opposing cross-street RTOR movement. A RTOR prohibition may need to be enacted to reduce conflicts at these intersections.	None Expected	None Expected	Moderately Significant	Further monitoring should be undertaken to ensure the conflicts been reduced.
		Potential for Traffic Infiltration			✓	<ul style="list-style-type: none"> <li>▪ Monsheen Drive Neighbourhood;</li> <li>▪ Willis Rd./ Chancellor Dr.;</li> <li>▪ Westminster Dr.;</li> <li>▪ Beverley Glen Blvd;</li> <li>▪ South Park Dr./ Commerce Valley Dr. E &amp; W;</li> <li>▪ Kennedy Rd. from Avoca Dr. to Swansea Rd.</li> </ul>	In many neighbourhoods, traffic infiltration has already been occurring to circumvent Highway 7. With future constraints placed on Highway 7, it may prove more beneficial for traffic to utilize these local roadways.	Future traffic volumes through these neighbourhoods should be monitored before and after the implementation of the preferred transitway alternative to determine if additional measures are required to reduce traffic infiltration.	Infiltration may still require mitigation	Measures to reduce traffic infiltration could be implemented.	Insignificant	None

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			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B2 Cont'd	Maintain or improve road traffic and pedestrian circulation (cont'd)	Pedestrian Crossings			✓	<ul style="list-style-type: none"> <li>▪ Vaughan Valley Blvd./ Roybridge Gate;</li> <li>▪ Hwy 427;</li> <li>▪ Jane St./ Hwy 7;</li> <li>▪ Creditstone Rd.;</li> <li>▪ Keele St.;</li> <li>▪ Islington Ave.;</li> <li>▪ Aberdeen Ave./ Marycroft Ave.;</li> <li>▪ Worth Blvd./ Flamingo Rd./ Bathurst St.;</li> <li>▪ South Park/ Chalmers Rd.;</li> <li>▪ Leslie St.;</li> <li>▪ Commerce Valley Dr. E./ E. Beaver Creek;</li> <li>▪ Town Centre Blvd./ Hwy 7;</li> <li>▪ Kennedy Rd./ Avoca Dr.</li> <li>▪ Kennedy Rd./ Hwy 7;</li> <li>▪ McCowan Rd.</li> </ul>	Due to the width of the main street at intersection, pedestrians may not be able to cross the intersection in one signal phase based on the standard pedestrian crossing times of 7 seconds.	Transitway median facilities generally provide a pedestrian refuge at mid-crossing.	These intersections may require two-stage crossing in the future to accommodate heavy main street traffic.	The decision to implement these special provisions should be deferred until post-operation conditions are monitored and the need is identified	Moderately Significant	Monitoring is required to determine if the implementation of two-stage is a necessity.
B3	Maintain a high level of public safety and security in corridor	Access for emergency vehicles	✓	✓	✓	Highway 7, Jane Street, Town Centre Boulevard, Kennedy Road, future Burr Oak Avenue	Incorporation of median and construction will have adverse effects on Emergency Response Services (ERS) access and time	Provided U-Turns at intersections. Meet with emergency representatives. Median breaks to be provided to allow access to Emergency Response Vehicles only.	Some risk may remain as access type will change after implementation of mitigation	Address during detail design in conjunction with ERS	Insignificant	Obtain feedback from ERS
B4	Minimize adverse noise and vibration effects	Noise effect for BRT and LRT due to widening of Highway 7 Corridor			✓	Entire corridor in proximity of residential uses	Combined effect of median transitway operation and general traffic on the widened Highway 7 Corridor roadways may result in increased noise levels for residents.	Modeling of future traffic activities indicated that expected noise increases in all, but one road segment, will not exceed the 5dB threshold at which mitigation measures are required. BRT and LRT sound level increases are expected to be marginal to none. However, at the future Markham Centre location, the BRT and LRT are predicted to exceed the background noise levels by as much as 8 dBA.	Transitway noise above likely background levels in Civic Mall at future Markham Centre location.	Depending on lower floor building uses, may require noise screening along transitway and/or noise control features in residential design along Civic Mall segment in Markham Centre area.	Insignificant	Undertake confirmation monitoring to verify compliance once the transitway is fully operational. In the event that the future noise level warrants mitigation, appropriate noise reduction measures will be put in place.
		Vibration effect for BRT and LRT due to widening of Highway 7 Corridor			✓	Entire corridor in proximity of residential uses	Combined effect of median transitway operation and general traffic on the widened Highway 7 Corridor roadways may result in increased vibration levels for residents.	Modeling of future traffic activities indicated that expected vibration increases will not exceed the protocol limit of 0.1 mm/sec for LRT. BRT vibration levels are expected to be negligible.	None expected	None necessary	Negligible	Undertake confirmation monitoring to verify compliance once the transitway is fully operational.
B5	Minimize adverse effects on cultural resources	Displacement of Built Heritage Features (BHF)	✓	✓	✓	Brown's Corners United Church (Markham)	Widened roadway could displace some of the cemetery's graves, unless alignment is modified.	Alignment is shifted up to 5.5 m to the south	Displacement of cemetery property is completely avoided.	None required	Negligible	None required.
		Displacement of Cultural Landscape Units (CLU)	✓	✓	✓	None Expected	None Expected	None required	None expected	None necessary	Positive	None required

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			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B5 cont'd	Minimize adverse effects on cultural resources (cont'd)	Disruption of Built Heritage Features (BHF)		✓		Residences in Vaughan: ▪ 5298 Hwy 7 (#2 CLU); ▪ 5263 Hwy 7 (#2 CLU); ▪ 1423, 1445, 1453 & 1139 Centre Street (1453 may have been demolished since survey)(#8 BHF);	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
						Residences in Markham: ▪ 4592 Hwy 7; ▪ 5429 Hwy 7 (#10 BHF); ▪ 6881 Hwy 7 (#12 BHF); ▪ 7170 Hwy 7 (#13 BHF); ▪ 7265 Hwy 7 (#14 BHF); ▪ 7482 Hwy 7 (#15 BHF).	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
				✓		Brown's Corners United Church (Markham)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
		Disruption of Built Heritage Features (BHF) (cont'd)		✓		Sabiston house (Markham) - 5110 Hwy 7 in shopping plaza (Markham) (#9 BHF)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
				✓		Individual designated building within Markham HCD now Tim Hortons (#11 BHF)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
				✓		Historic Plaque: Reesor Cairn (Markham)(#16 BHF)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
			Disruption of Cultural Landscape Units (CLU)		✓		Farm complex in Vaughan: ▪ 6701 Hwy 7 (#1 CLU)	There is potential encroachment through widening to the CLU.	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant

Table 10.4-2  
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B5 cont'd	Minimize adverse effects on cultural resources (cont'd)	Disruption of Cultural Landscape Units (CLU) (cont'd)		✓		Residences in Vaughan: ▪ 4976, 4908, 4902 & 4855 Hwy 7 (#2 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural heritage features in the Cultural Landscape – former centre of settlement. (Brownsville)	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
				✓		Residences in Vaughan: ▪ 2060, 2063, 1985 & 1929 Hwy 7 (#3 – #6 BHF) ▪ Southeast of Hwy 7 & GO Bradford (no street address)(#7 BHF) GO Bradford railway overpass	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
				✓		Farm complex in Vaughan: ▪ Stong Farm in York U. – 3105 Steeles Avenue (#6 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	Complete photo documentation of site context prior to construction.	None expected	None necessary	Insignificant	None required
				✓		Farm complex in Markham: ▪ 7996 Helen Avenue (#6 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	Complete photo documentation of site context prior to construction.	None expected	None necessary	Insignificant	None required
				✓		Brown's Corners United Church Cemetery (Markham) (#8 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
				✓		Centre of settlement: ▪ Markham Village Heritage Conser- vation District designated under Part V OHA (#11 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
				✓		Elmwood Cemetery (Markham)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	Transitway will operate in mixed traffic to avoid widening adjacent to the cemetery.	None expected	None necessary	Insignificant	None required
				✓		St. Andrews Cemetery (Markham)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	Transitway will operate in mixed traffic to avoid widening adjacent to the cemetery.	None expected	None necessary	Insignificant	None required

Table 10.4-2  
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
B5 cont'd	Minimize adverse effects on cultural resources (cont'd)	Disruption of Cultural Landscape Units (CLU) (cont'd)		✓		Farm complex in Markham: ▪ 6937 Hwy 7 (#12 CLU) ▪ 7323 Hwy. 7 (Likely demolished)(#13 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
				✓		Locust Hill – historical centre of settlement (#15 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	Transitway development will not extend eastward beyond Reesor Road. Any rapid transit through Locust Hill to Pickering will operate in mixed traffic.	None expected	None necessary	Insignificant	None required
				✓		At grade historic railway corridor: ▪ CP Havelock rail line (#16 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	Transitway development will not extend eastward beyond Reesor Road. Any rapid transit through Locust Hill to Pickering will operate in mixed traffic.	None expected	None necessary	Insignificant	None required
				✓		Roadscape: ▪ Reesor Road landscape north side. (#14 CLU)	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural landscape feature	None required – transitway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
			✓		Entire Corridor	Possible impacts to areas with potential for identification of archaeological sites	There is potential for identification of archaeological sites within the project impact area.	<ul style="list-style-type: none"> <li>Stage 1 Archaeological Assessment has been conducted.</li> <li>Stage 2 Archaeological Assessment will be performed in detailed design: field survey in accordance with Ministry of Culture Stage 1-3 Archaeological Assessment Technical Guidelines to identify any sites that may be present within the proposed impact area.</li> <li>If areas of further archaeological concern are identified during Stage 2 assessment, such areas must be avoided until any additional work required by the Ministry of Culture has been completed. Mitigation options, including avoidance, protection, or salvage excavation must be determined on a site-by-site basis.</li> <li>If no potentially significant archaeological sites are identified during Stage 2, it will be recommended to the Ministry of Culture that the areas assessed be considered free of further archaeological concern.</li> </ul>	<ul style="list-style-type: none"> <li>Archaeological sites may be identified during the course of Stage 2 Archaeological Assessment.</li> <li>In the event that deeply buried archaeological remains are encountered during construction activities, the office of the Regulatory and Operations Group, Ministry of Culture should be notified immediately.</li> <li>In the event that human remains are encountered during construction, both the Ministry of Culture and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit, Ministry of Consumer and Commercial Relations should be notified immediately.</li> </ul>	Needs for further mitigation, possibly including Stage 3 Archaeological Assessment (test excavation) and Stage 4 Archaeological Assessment (further mitigative work, including mitigative excavation), must be determined following Stage 2 Archaeological Assessment, if archaeological resources are identified during survey.	Negligible for stage 1 Archaeological Assessment	No requirement for monitoring has been identified as a result of Stage 1 Archaeological Assessment. Monitoring may be required, depending on the result of Stage 2 Archaeological Assessment.
B6	Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	Visual Effects	✓		✓	Entire Corridor	Introduction of transit may reduce visual aesthetics of road	Introduction of a comprehensive landscaping and streetscaping plan for the corridor.	Narrow sections of ROW where property cannot be acquired may limit incorporation of streetscaping		Significant	Monitor redevelopment and acquire property through redevelopment applications

Table 10.4-2  
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE B: To protect and enhance the social environment in the corridor</b>												
		Visual Effects	✓		✓	Hwy 404 interchange	If necessary in the future, achieving a dedicated transitway through the interchange by adopting an elevated solution, could have an adverse effect on vistas in the area.	Initially, the option of lengthening the span of the existing interchange bridges will be analyzed and only if found impractical under traffic operations, will an elevated solution be developed. This design can be made visually acceptable given the surrounding highway interchange environment and the remoteness of adjacent land uses from which vistas may be degraded.	The overall height of the interchange works would be increased to that of the neighbouring Highway 407 interchange.	None	Insignificant if span lengthening is adopted. Moderately significant if elevated design is required.	Monitor the level of traffic congestion affecting the reliability of the preferred mixed traffic operation to assess the effectiveness of the planned new Hwy 404 road overpass north of the interchange.
B6 Cont'd	Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics (cont'd)	Landscaping	✓		✓	Entire Corridor	Landscaping species may not survive in winter months	Choose appropriate species for both winter and other months to maintain greenery throughout corridor. Place landscaping in planters and incorporate buried irrigation systems.	Species may still not survive	Change species, irrigation patterns, etc	Insignificant	Monitor health of landscaping continuously
		Encroachment on sites of existing buildings		✓	✓	Immediately west of Leisure Lane, south side	Modification of alignment is required to avoid the south building	Alignment shifted up to 2.3 m to the north	South building setback restored; internal parking required rearranging.	None	Insignificant	None Required
		Encroachment on sites of existing retaining walls		✓	✓	Between Islington Ave. and Bruce Street, north side	Relocation of existing retaining walls holding up residential properties would be required with the existing alignment.	Alignment shifted up to 2.8 m to the south	North retaining walls remain intact.	None	Negligible	None Required
		Encroachment on sites of existing property		✓	✓	In the proximity of Whitmore/ Ansley Grove Roads	Additional road width required accommodate station platforms would result in property encroachment solely on the south side.	Alignment shifted up to 3.8 m to the north	Property impact on both sides becomes similar.	None	Insignificant	None Required
		Encroachment on sites of existing buildings		✓	✓	Northwest of Weston Rd. & Hwy 7	Additional road width required accommodate station platforms would result in removal of NW building. Modification of alignment is required.	Alignment shifted up to 4.7 m to the south	Encroachment to the NW building is avoided.	None	Negligible	None Required
		Encroachment on sites of existing property		✓	✓	Northwest of Town Centre Boulevard & Hwy 7	The NW is being developed and the future buildings will be constructed very close to the existing north ROW such that property negotiation is not feasible. Modification of alignment is required.	Alignment shifted up to 7.0 m to the south. Agreement has been made with the developer that they will grade YRTP's proposed sidewalk at the limit of ROW.	Property impact on the north side is avoided.	None	Insignificant	None Required
		Encroachment on sites of existing building		✓	✓	Southwest of Clegg Rd. & Town Centre Boulevard	Encroachment to the existing SW building would be required.	Alignment shifted up to 4.1 m to the east.	Encroachment to the SW building is avoided.	None	Negligible	None Required
		Encroachment on sites of existing property		✓	✓	Between Bullock Dr. and McCowan Rd., north side	North property would be subjected to greater property impact than the south.	Alignment shifted up to 1.2 m to the south.	Property impact on the north side is minimized.	None	Moderately significant	None Required
		Encroachment on sites of existing property		✓	✓	Northeast of Robinson Street/ Jolyn Road and Hwy 7	Encroachment to existing fenced residential property would be required.	Alignment shifted up to 3.5 m to the south and retaining walls along the limit of north ROW are introduced.	Property impact on the north side is avoided.	None	Insignificant	None Required
		Encroachment on sites of existing buildings		✓	✓	Galsworth Dr./ Grandview Blvd., south side	Encroachment on sites of existing buildings would be required.	Alignment shifted up to 1.5 m to the north.	Encroachment of new boulevard on sites of existing buildings is minimized.	None	Moderately significant	None Required

Notes:  
P – Pre construction, C – Construction, O – Operation

### 10.4.3 OBJECTIVE C: To protect and enhance the natural environment in the corridor

The protection and enhancement of the natural environment within the corridor has been entirely achieved. By definition, the undertaking along the Highway 7 and local arterial rights-of-way is set in a highly developed urban environment, where natural features have mostly been disturbed by previous development. Nevertheless, there are watercourses crossing Highway 7 within the Humber, Don, Rouge and Petticoat Creek watersheds. Similarly, nearby urban green spaces still exist and must be protected. In terms of all valued environmental components to be considered, effects on aquatic and terrestrial ecosystems are either negligible or insignificant when built-in mitigation measures are implemented or construction and operation methods required for sensitive areas are respected. The widening of existing bridges, lengthening of existing culverts or installation of new bridges and culverts along the transitway will incorporate mitigation measures where required to preserve or enhance the aquatic habitat.

Future air quality, except for PM, is expected to be better than current air quality mainly due to improvements in engine technology and fuels but there will be a minor contribution from the diversion of trips to rapid transit. The forecast increase in PM10 from 2001 to 2021 can be attributed to the increase in fugitive emissions from traffic due to population and employment growth built into the traffic forecasting model. As noted in **Appendix L**, future 2021 air quality was forecasted both with and without the proposed rapid transit alternative. In the case of all pollutants assessed (PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO), implementation of rapid transit is expected to have a small net positive effect in 2021 (refer to Tables 3.2, 3.3 and 3.4 in **Appendix L**). Greenhouse gas emission (CO<sub>2</sub>) is also forecasted to be reduced due to the energy efficiency of the overall vehicle fleet plus the implementation of an improved public transit alternative. (Refer to Section 3.2 of **Appendix L**).

The assessment in terms of Objective C is tabulated in **Table 10.4-3**.

Table 10.4-3  
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE C: To protect and enhance the natural environment in the corridor</b>												
C1	Minimize adverse effects on Aquatic Ecosystems	Fuel spills, due to accidents during construction refuelling and accidents during operation, entering the watercourses		✓	✓	Entire Corridor	Fish kills due to chemical spills resulting in short term population decline.	<ul style="list-style-type: none"> <li>No refuelling within 10 m of a watercourse.</li> <li>Emergency Response Plan.</li> </ul>	<ul style="list-style-type: none"> <li>Short term population decline.</li> <li>Some contaminants within storm-water system.</li> </ul>	None practical	Insignificant	None required
		Sediment laden stormwater entering watercourses during construction		✓		Entire Corridor	Fish kills and loss of aquatic habitat resulting in short term population decline.	<ul style="list-style-type: none"> <li>Construction fencing at work areas near watercourses limiting area of disturbance.</li> <li>Erosion and Sedimentation Control Plan.</li> </ul>	Short term population decline.	None practical	Insignificant	None required
		Sediment laden stormwater entering watercourses during operation			✓	Entire Corridor	Loss of aquatic habitat resulting in population decline.	<ul style="list-style-type: none"> <li>Stormwater management facilities such as grassed swales, oil and grit separators, stormwater ponds.</li> <li>Detailed Storm Water Management Plan will be prepared during the detailed design stage.</li> </ul>	Short term population decline.	Clean-out facilities as required.	Insignificant	Monitor sediment accumulation in stormwater management facilities.
		Loss of site-specific habitat.		✓		All watercourses within entire corridor.	Potential loss of fish habitat as a result of new culverts/bridges, culvert/bridge extensions and/or culvert/bridge replacements or repairs.	<ul style="list-style-type: none"> <li>Design transitway cross-sections to avoid modifications at culverts/bridges.</li> <li>Span meander belt or 100-year erosion limit of the watercourse.</li> <li>Avoid in-water work to the extent possible.</li> <li>Minimize the area of in-water alteration to the extent possible.</li> <li>Follow in-water construction timing restriction.</li> <li>Perform all in-water work in the dry using a temporary flow bypass system.</li> </ul>	A harmful alteration of fish habitat will likely result from culvert modifications at approximately 25 culverts that convey watercourses that support fish habitat.	Negotiations with regulatory agencies during detail design. Compensate for the harmful alteration of fish habitat.	Insignificant	On-site environmental inspection during in-water work.  Post-construction monitoring of fish habitat compensation measures.

Table 10.4-3  
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE C: To protect and enhance the natural environment in the corridor</b>												
C1 cont'd	Minimize adverse effects on Aquatic Ecosystems (cont'd)	Fish mortality		✓		All watercourses within entire corridor.	Fish may be injured or killed by dewatering.	<ul style="list-style-type: none"> <li>Design transitway cross-sections to avoid modifications at culverts/bridges.</li> <li>Avoid in-water work to the extent possible.</li> <li>Perform all in-water work in the dry using a temporary flow bypass system.</li> <li>Capture fish trapped during dewatering of the work zone and safely release upstream.</li> <li>Prohibit the entry of heavy equipment into the watercourse.</li> </ul>	None expected.	None	Negligible	On-site environmental inspection during in-water work.
		Barriers to fish movement.		✓	✓	All watercourses within entire corridor.	Culvert/bridge extension, repair or replacement may create a barrier to fish movement.	<ul style="list-style-type: none"> <li>Use open footing culverts or countersink closed culverts a minimum of 20% of culvert diameter.</li> <li>Span the watercourse, meander belt or floodplain with new structures where warranted by site conditions.</li> </ul>	Culvert extensions will be designed to avoid the creation of a barrier to fish movement.	Negotiations with regulatory agencies during detail design.	Negligible	On-site environmental inspection during in-water work.
		Baseflow alterations		✓	✓	All watercourses within entire corridor.	New impervious surfaces can lead to changes in the frequency, magnitude and duration of flows.	<ul style="list-style-type: none"> <li>Reduce the area of impervious surfaces to the extent possible.</li> <li>Use stormwater management practices that encourage infiltration and recharge of groundwater.</li> </ul>	None expected.	None	Negligible	<ul style="list-style-type: none"> <li>Post-construction inspection of stormwater management facilities to evaluate their effectiveness.</li> <li>On-going maintenance as required.</li> </ul>
		Increased temperature		✓	✓	All watercourses within entire corridor	Clearing of riparian vegetation and stormwater management practices can impact temperature regimes.	<ul style="list-style-type: none"> <li>Minimize the area of stream bank alteration to the extent possible.</li> <li>Use stormwater management practices that encourage infiltration and recharge of groundwater.</li> </ul>	Shading provided by culvert/bridge offsets shading lost through removal of riparian vegetation.	Restore riparian areas disturbed during construction with native vegetation.	Negligible	<ul style="list-style-type: none"> <li>Post-construction inspection of stormwater management facilities to evaluate their effectiveness.</li> <li>On-going maintenance as required.</li> <li>Post-construction inspection of riparian plantings to confirm survival.</li> </ul>
		Disturbance to rare, threatened or endangered species		✓	✓	All watersheds within entire corridor.	<ul style="list-style-type: none"> <li>Humber River watershed known to support reddsides dace, American brook lamprey, and central stoneroller.</li> <li>Don River watershed known to support reddsides dace and American brook lamprey.</li> <li>Rouge River watershed known to support reddsides dace, American brook lamprey, and central stoneroller.</li> </ul>	<ul style="list-style-type: none"> <li>Design transitway cross-sections to avoid modifications at culverts/bridges.</li> <li>Mixed traffic operation has been introduced at the Humber River, West Don River, East Don River and Little Rouge Creek bridges to avoid widening and disturbance to rare, threatened and endangered species.</li> <li>Avoid in-water work to the extent possible.</li> <li>Perform all in-water work in the dry using a temporary flow bypass system.</li> <li>Capture fish trapped during dewatering of the work zone and safely release upstream.</li> <li>Prohibit the entry of heavy equipment into the watercourse.</li> </ul>	None expected.	None required.	Negligible	None required.

Table 10.4-3  
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE C: To protect and enhance the natural environment in the corridor</b>												
C2	Minimize adverse effects on Terrestrial Ecosystems	Loss of wildlife habitat and ecological functions		✓	✓	Entire corridor.	Construction of the transitway and associated facilities may result in the removal of vegetation and ecological functions it supports.	<ul style="list-style-type: none"> <li>Minimize the area of vegetation removals to the extent possible.</li> <li>Minimize grade changes to the extent possible.</li> <li>Use close cut clearing and trimming to minimize the number of trees to be removed.</li> <li>Delineate work zones using construction fencing/tree protection barrier.</li> <li>Protect trees within the clear zone using guiderail, curbs, etc. to prevent removal.</li> </ul>	None expected.	Restore natural areas disturbed using construction with native vegetation, where feasible. Replace ornamental vegetation as part of landscaping.	Negligible	None required.
		Wildlife mortality		✓	✓	Entire corridor.	Removal of wildlife habitat may result in wildlife mortality.	<ul style="list-style-type: none"> <li>Perform vegetation removals outside of wildlife breeding seasons (typically April 1 to July 31).</li> <li>Perform culvert/bridge extension, repair and replacement outside of wildlife breeding season.</li> </ul>	None expected.	None required.	Negligible	None required.
		Barriers to wildlife movement and wildlife/vehicle conflicts		✓	✓	Entire corridor	<ul style="list-style-type: none"> <li>Culvert/bridge extension, repair or replacement may create a barrier to wildlife movement.</li> <li>Increase in width of Highway 7 to accommodate transitway and associated facilities may create an additional impediment to wildlife movement and increase the potential for wildlife/vehicle conflicts.</li> <li>New crossings at Upper Rouge River &amp; Rouge River Tributary 4 may create a barrier to wildlife movement.</li> </ul>	<p>Maintain or enhance riparian corridors and terrestrial wildlife passage under new/ realigned bridges.</p> <p>New or modified culverts and bridges will be investigated during preliminary and detail design to identify opportunities to promote wildlife passage. Methods to enhance wildlife passage such as increasing vertical and horizontal clearances, drift fence, dry benches, etc. will be taken into consideration.</p>	Transitway represents an incremental increase in road width compared to existing barrier created by Highway 7. Required culvert extensions will not impede wildlife passage under Highway 7.	Use of existing culverts/bridges maintains wildlife passage under transitway and does not offer opportunities to enhance wildlife passage.	Insignificant at new/ realigned bridges with appropriate mitigations	None required.
		Wildlife/vehicle conflicts			✓	Entire corridor.	Increase in width of Highway 7 to accommodate transitway and associated facilities may increase the potential for wildlife/vehicle conflicts.	<ul style="list-style-type: none"> <li>Span bridges across the meander belt.</li> <li>Use oversized culverts to promote wildlife passage under the road.</li> <li>Stagger culvert inverts to create wet and dry culverts.</li> </ul>	Transitway represents an incremental increase in road width compared to existing hazard to wildlife created by Highway 7.	None required.	Insignificant	None required.
		Disturbance to rare, threatened, or endangered wildlife		✓	✓	Entire corridor.	Three rare species were identified within the study area: rough-legged hawk (non-breeding migrant/vagrant, extremely rare breeding occurrence by MNR); northern shrike (non-breeding migrant/vagrant, very rare to uncommon breeding occurrence by MNR); and, milk snake ('special concern' by COSEWIC, and 'rare to uncommon' by MNR)	<ul style="list-style-type: none"> <li>Prevent the harassment of eastern milk snake if encountered during construction.</li> <li>Perform vegetation removals outside of wildlife breeding seasons (typically April 1 to July 31).</li> <li>Perform culvert/bridge extension, repair and replacement outside of wildlife breeding season.</li> </ul>	None expected.	None required.	Negligible	None required.

Table 10.4-3  
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE C: To protect and enhance the natural environment in the corridor</b>												
C2 Cont'd	Minimize adverse effects on Terrestrial Ecosystems (cont'd)	Disturbance to vegetation through edge effects, drainage modifications and road salt		✓	✓	Entire corridor.	<ul style="list-style-type: none"> <li>Clearing of new forest edges may result in sunscald, windthrow, and invasion of exotic species.</li> <li>Ditching, grading and other drainage modifications may alter local soil moisture regimes.</li> <li>Road salt may result in vegetation mortality and die back.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize the area of vegetation removals to the extent possible.</li> <li>Minimize the grade changes and cut/fill requirements to the extent possible.</li> <li>Use close cut clearing and trimming to minimize encroachment on remaining vegetation.</li> <li>Delineate work zones using construction fencing/ tree protection barrier.</li> <li>Manage the application of road salt to the extent possible.</li> <li>TRCA guidelines for Forest Edge Management Plans &amp; Post-Construction Restoration will be followed.</li> <li>All valley lands disturbed will require restoration with native herbaceous &amp; woody species.</li> </ul>	<ul style="list-style-type: none"> <li>Vegetation communities within the study area are primarily cultural in origin and have been impacted by Highway 7.</li> <li>The transitway represents an incremental encroachment into these already disturbed communities.</li> </ul>	Landscape treatments.	Insignificant	None required.
		Disturbance to rare, threatened or endangered flora		✓		Entire Corridor.	<ul style="list-style-type: none"> <li>Twenty-two regionally rare or uncommon species are located within the study limits including: Black Walnut, Common Evening Primrose, Cut-leaved Toothwort, Groundnut</li> <li>Hitchcock's Sedge, Michigan Lily, Ninebark,</li> <li>Purple-stemmed Angelica, Red Cedar, Red Pine, Red-sheathed Bulrush, Sandbar Willow</li> <li>Shining Willow, Showy Tick-trefoil, Spike-rush</li> <li>Spotted Water Hemlock, Spring-beauty, Stickseed, Tall Beggar-ticks, Three-square</li> <li>Turtlehead, and Virginia Wild-rye.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize the area of vegetation removals to the extent possible.</li> <li>Minimize grade changes to the extent possible.</li> <li>Use close cut clearing and trimming to minimize the number of trees to be removed.</li> <li>Delineate work zones using construction fencing/ tree protection barrier.</li> <li>Protect trees within the clear zone using guiderail, curbs, etc. to prevent removal.</li> <li>Transplant rare species to safe areas prior to construction.</li> </ul>	Trees may be removed by the transitway and its associated facilities.	None required.	Insignificant	Monitor clearing activities to ensure that minimum work zones are used to avoid any unnecessary tree removal.
C3	Improve regional air quality and minimize adverse local effects	Degradation of existing local and regional air quality when compared to MOE standards			✓	York Region	Situation expected to be unchanged or marginally better than 2001	The fleet average emissions will drop significantly due to technological improvements balancing the increase in traffic volumes. The BRT will divert commuters from individual highly polluting sources (single passenger automobiles)	Forecast improvement in all pollutants assessed (PM <sub>10</sub> , NO <sub>x</sub> , SO <sub>2</sub> , CO) when comparing 2021 forecasts with and without the proposed Rapid Transit (see Tables 4.3 & 4.4 of <b>Appendix L</b> , 3.6% decrease in PM <sub>10</sub> & CO, 4.4% in SO <sub>2</sub> )	None required	Positive Effect	None recommended
		Increase in emissions of Greenhouse Gases (GhG)			✓	York Region	Fewer GhGs are expected to be emitted	Compared to the status quo (no additional transit) there will be far less GhGs emitted per commuting person	Reduction per capita emissions of GhGs (overall annual reduction of 54 kilotonnes of CO <sub>2</sub> forecast in 2021)	None required	Positive Effect	None recommended
		Degradation of air quality during construction		✓		Highway 7 Corridor	Some dust is expected during the construction period.	The law requires that all possible pollutant emission mitigation steps possible be taken during construction activities	Some PM emissions locally.	None required.	Negligible	Regular inspection of site dust and construction vehicle exhaust emissions during construction in compliance with MOE's standards and municipal by-laws.

Table 10.4-3  
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE C: To protect and enhance the natural environment in the corridor</b>												
C4	Minimize adverse effects on corridor hydro-geological, geological, hydrological and geomorphic conditions	Water quality in shallow groundwater that can affect quality in surface watercourses			✓	Areas located hydraulically down gradient of transit alignment, where receiving surface watercourses are present.	Transitways will require de-icing salt and also will accumulate various chemical substances that can impact water quality of runoff. Impacted runoff that infiltrates can increase concentrations in shallow groundwater. Potential to affect shallow groundwater that discharges to surface watercourses.	Dilution and other natural processes will attenuate elevated parameters in groundwater.	<ul style="list-style-type: none"> <li>Potential effects to water quality of surface water courses.</li> <li>Groundwater quality effects are anticipated to be detectable.</li> </ul>	Reduce application of road salt, where possible. Curbs and gutters to convey impacted runoff away from permeable soil areas.	Moderately Significant	None required. Water quality effects are anticipated to remain acceptable.
		Water quality in shallow groundwater that can affect quality in water supply wells			✓	Areas located hydraulically down gradient of transit alignment, where shallow dug wells in active use are present.	Transitways will require de-icing salt and also will accumulate various chemical substances that can impact water quality of runoff. Impacted runoff that infiltrates can increase concentrations in shallow groundwater. Potential to affect shallow groundwater that is extracted by down gradient supply wells.	Dilution and other natural processes will attenuate elevated parameters in groundwater.	<ul style="list-style-type: none"> <li>Potential effects to groundwater quality used as drinking water.</li> <li>Groundwater quality effects in water wells may be detectable.</li> </ul>	Reduce application of road salt, where possible. Curbs and gutters to convey impacted runoff away from permeable soil areas.	Moderately Significant	None required. Water quality effects are anticipated to remain acceptable within Ontario Drinking Water Standards. Well inspection will be performed during the detailed design phase to confirm the relationship of the widened roadway to existing active water well will not have an adverse affect on water quality. If it does or domestic well use is confirmed, a contingency plan will be developed.
		Baseflow in surface water courses		✓	✓	Recharge areas within proposed alignment, particularly in areas of Newmarket Till and sand textured glacial lake deposits.	Increase of pavement area decreases the pervious area that existed prior to construction, resulting in proportionally decreased recharge to shallow groundwater.	N/A	<ul style="list-style-type: none"> <li>Decreases in recharge can decrease baseflow in surface water course(s).</li> <li>Reduced baseflow in surface watercourses.</li> </ul>	Construction of pervious surfaces where practical, including grassed areas and permeable pavements.	Negligible	None required. The degree of impact is anticipated to be undetectable.
		Increased pavement; decreased infiltration			✓	Entire corridor	Minor increase in quantity of surface runoff. Minor decrease in quantity of groundwater.	Storm water management facilities such as grassed swales and storm water ponds.	<ul style="list-style-type: none"> <li>Minor increase in peak streamflows.</li> <li>Minor decrease in groundwater.</li> </ul>	None practical	Negligible	None required
		Changes in flood levels from the widening of existing bridges and culverts		✓		Beaver Creek crossing at Sta 37+790	HEC-RAS model provided by TRCA was used to assess changes in flood level due to widening the existing culvert by 10 m.	No increase in Regional storm or return period flood levels upstream of the crossing. See <b>Appendix G</b> for results of the analysis.	N/A	N/A	Negligible	None required.
				✓		Rouge River (Apple Creek) crossing at Sta 38+695	HEC-RAS model provided by TRCA was used to assess changes in flood level due to widening the existing bridge by 18 m.	Regional storm flood level upstream of the bridge would increase by up to 50 mm. No increase in return period flood levels upstream of the crossing. See <b>Appendix G</b> for results of the analysis.	Minor increase in Regional storm flood level. Widening will not adversely impact upstream water levels.	N/A	Negligible	None required.
				✓		Rouge River crossing at Sta 43+256	HEC-RAS model provided by TRCA was used to assess changes in flood level due to widening the existing bridge by 8 m.	No increase in Regional storm flood levels. Return period flood levels upstream of the crossing would increase by up to 30 mm. See <b>Appendix G</b> for results of the analysis.	Minor increase in return period flood levels. Widening will not adversely impact upstream water levels.	N/A	Negligible	None required.
		Changes in flood levels from the construction of a new bridge.		✓		Proposed Rouge River crossing at Sta 540+190	HEC-RAS model provided by TRCA was used to assess changes in flood level due to a proposed bridge with a width of 10 m and a span of 30 m.	Regional storm flood level upstream of the bridge would increase by up to 20 mm. The 100 year return period flood level would increase by 110 mm just upstream of the crossing. The increase for the 25 and 2 year events would be 50 mm and 0 mm respectively. See <b>Appendix G</b> for results of the analysis.	Minor increase in Regional storm flood level. Increase in 100 year flood level. The 100 year flood level is over 2 m below the Regional storm flood. No change in existing regulatory floodline or developable area.	N/A	Negligible. The 100 year flood level is contained within the Regional storm flood plain and the increase is not significant.	None required.

Notes: P – Pre construction, C – Construction, O – Operation

#### 10.4.4 OBJECTIVE D: To promote smart growth and economic development in the corridor

One of the main purposes of the Rapid Transit System is to support the smart growth policies of the Provincial and Regional Governments and simultaneously encourage economic development. From this perspective, the Highway 7 Transitway strongly supports Regional and Municipal planning policies, such as the Centres and Corridors urban form. In many respects, the undertaking will contribute to the intensification of underutilized sites within the corridor and encourage transit-oriented development at infill locations and vacant land along the routes. At the same time, several built-in design characteristics are aimed at reducing the potential for adverse effects on business or access to residential neighbourhoods and community facilities.

The transit system will support the overall objective of the Region's Planning Policies to ensure that form follows function. The transit system must contribute to a sustainable environment by improving access to new and existing development leading to increased business and economic activity along the corridor. Through this increase in business activity, infill locations and vacant land is more likely to be developed, maximizing the desired concentration of development within municipal zoning controls and leading to a more viable alternative of rapid transit in York Region. The assessment in terms of Objective D is tabulated in **Table 10.4-4**.

Table 10.4-4  
Effects and Mitigation for Smart Growth and Economic Development

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE D: To promote smart growth and economic development in the corridor</b>												
D1	Support Regional and Municipal Planning Policies and approved urban structure	Need for pedestrian-friendly streets and walkways for access to stations		✓	✓	Entire corridor	Streetscape will create a more pedestrian-friendly atmosphere.	<ul style="list-style-type: none"> <li>Signalized pedestrian crosswalks will be provided at all station locations and an appropriate number of intersections; Pedestrian safety will be considered in the design of station precincts and road signage will be highly visible to both pedestrians and automobiles.</li> </ul>	Potential for jaywalking in vicinity of stations, which could lead to increased in number of vehicle/pedestrian incidents.	Platform edge treatment will discourage illegal access	Negligible	Monitor traffic accidents involving pedestrians to establish whether cause is transit related.
		Locating higher density and transit-oriented development where it can be served by transitway			✓	New and redevelopment/infill locations	Current landowners could object to implementation of existing land use pattern changes along transit corridor.	<ul style="list-style-type: none"> <li>Regional/Municipal land use controls and approval processes to encourage transit-oriented development or re-development in support of OP objectives.</li> </ul>	Redevelopment pressure on surrounding areas	Apply Municipal Site Plan approval process	Insignificant	Monitor re-development activity to control overall increase in development density
		Reflection of historical districts through urban design and built form.			✓	Main Street Markham	Station aesthetics may not be compatible with the character of heritage districts along the corridor.	<ul style="list-style-type: none"> <li>In the area of Main Street, the rapid transit is discontinued with rapid transit operating in mixed traffic.</li> <li>Incorporate station designs and features that reflect the surrounding historical districts where further redevelopment is limited through consultation with community and heritage groups.</li> </ul>	Historical district is generally north of Highway 7.	Apply Municipal Site plan approval process	Insignificant	Municipalities to monitor nature of re-development in sensitive districts
D2	Provide convenient access to social and community facilities in corridor	Potential barrier effects during construction and operation		✓	✓	Entire corridor	Transitway could be perceived as a barrier in access to future community centres, hospital(s), malls, parks, etc.	<ul style="list-style-type: none"> <li>Construction Traffic and Pedestrian Management Plan will avoid wherever possible, barriers to entrances/exits to large attractors along Highway 7.</li> <li>Transitway median design will recognize pedestrian access requirements, particularly in proximity to community facilities.</li> </ul>	Alternative access routes to facilities may affect adjacent properties	Mark detours and alternative access points clearly	Insignificant	Monitor congestion levels during construction and traffic patterns during operations.
D3	Minimize adverse effects on business activities in corridor	The potential for an increase in business activity.	✓	✓	✓	Entire corridor	Increased pedestrian traffic via the implementation of a rapid transit system will increase the potential for business activity.	<ul style="list-style-type: none"> <li>A higher density of development on underutilized sites, infill locations and on vacant land should increase the market for some business activity.</li> </ul>	Increase in vehicular traffic; increase in workforce/ population.	Encourage intensification meeting urban form objectives.	Insignificant and positive	Monitor building applications/ permits, economic influences (employment rate, etc.)
		The potential for a decrease in business activity.		✓	✓	Entire corridor	Modification of road access could lead to displacement and/or business loss.	<ul style="list-style-type: none"> <li>Implement procedures to address requests of affected businesses; Incorporate design solutions and construction methods to minimize number of businesses affected.</li> </ul>	Decrease in traffic; decrease in workforce/population	Encourage alternative compatible development	Moderately significant	Cooperative response to business loss concerns addressed to municipalities.

Table 10.4-4  
Effects and Mitigation for Smart Growth and Economic Development

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase <sup>1</sup>			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
<b>OBJECTIVE D: To promote smart growth and economic development in the corridor</b>												
D4	Protect provisions for goods movement in corridor	Ease of Truck Movement			✓	Entire Corridor	Median transitway will restrict truck movement in corridor	<ul style="list-style-type: none"> <li>Provided U-turns at major intersections to allow for truck access to side streets and properties. Traffic analysis at intersections indicated sufficient capacity for trucks using U-turns.</li> </ul>	In areas of 4-lane cross-section, intersections with no station or landscaping in median do not allow sufficient turning width for WB 17 (articulated trucks).	Traffic signs prohibit large truck at these intersections (see next entries). Designate truck routes.	Insignificant	Monitor and widen Highway 7 with right turn tapers at side streets to allow for movement
				✓		Entire Corridor	Construction may limit access for trucks	<ul style="list-style-type: none"> <li>Traffic management plan to ensure truck access at all times</li> </ul>	May not be possible in some areas	Designate alternative truck routes	Negligible	None required
		Truck U-turn Movement Prohibited			✓	Westbound at Kipling Ave. intersection	The effect is not anticipated to be critical because: <ul style="list-style-type: none"> <li>the gas station at the SE corner also has an access on Kipling Ave.;</li> <li>there is no other commercial property on the south side between Kipling Ave. and Islington Ave.</li> </ul>	None required.	None expected.	None required.	Insignificant	Monitor and widen Highway 7 with right turn tapers at side streets to allow for movement, or widen Highway 7 from 4 lanes to 6 lanes.
					✓	Eastbound at Kipling Ave. intersection	There is a need for trucks to access to the many commercial properties on the north side between Kipling Ave. and Parkfield Crt/ Woodstream Blvd. The next U-turn permitted intersection, i.e. Islington Ave. is approximately 600m away and trucks will have to travel additional 120m to access these north side properties.	Truck U-turn Movement at this intersection cannot be prohibited.	Trucks making U-turn will have to negotiate with the EB through traffic as they will need to move out of the left-turn lane in order to make the U-turn.	Traffic signs required to warn EB through traffic of the truck U-turn movements.	Moderately significant	Monitor the truck u-turn operation to confirm if this operation will impede EB through traffic operation severely.  Widen Highway 7 with right turn tapers at side streets to allow for movement, or widen Highway 7 from 4 lanes to 6 lanes.
					✓	Westbound at Bruce St. intersection	The effect is not anticipated to be critical because: <ul style="list-style-type: none"> <li>the commercial property on the SE corner has no access on Highway 7;</li> <li>there is no other commercial properties on the south side between Bruce St. and Helen St./ Wigwoss Dr.; and</li> <li>the next U-turn permitted intersection is only approximately 400m away at Islington Ave.</li> </ul>	None required.	None expected.	None required.	Insignificant	Monitor and widen Highway 7 with right turn tapers at side streets to allow for movement, or widen Highway 7 from 4 lanes to 6 lanes.
		Truck U-turn Movement Prohibited (cont'd)			✓	Westbound at Swansea Rd. intersection	The effect is not anticipated to be critical because: <ul style="list-style-type: none"> <li>the commercial property opposite Bullock Dr. can be accessed at the signalized Bullock intersection;</li> <li>there is no other commercial properties on the south side between Swansea Rd. and Bullock Dr.; and</li> <li>the next U-turn permitted intersection is only approximately 450m away at Kennedy Rd.</li> </ul>	None required.	None expected.	None required.	Insignificant	Monitor and widen Highway 7 with right turn tapers at side streets to allow for movement, or widen Highway 7 from 4 lanes to 6 lanes.

**Notes:**  
P – Pre construction, C – Construction, O – Operation

## 10.5 ENVIRONMENTAL EFFECTS ASSESSED FOR CEAA REQUIREMENTS

### 10.5.1 Cumulative Effects

Cumulative environmental effects are defined as, "... the effects on the environment caused by an action in combination with other past, present and future human actions" (CEAA, 1999). They occur when two or more project-related environmental effects, or two or more independent projects, combine to produce a different effect. The effects may be positive or negative, and may have regional as well as site-specific implications. They can be assessed on the basis of their spatial and temporal boundaries.

#### 10.5.1.1 Spatial Cumulative Effects

Spatial cumulative effects may be experienced by:

- crowding of more than one project or activity within a single space;
- compounding of effects from a localized activity with other activities or conditions over a broader (i.e., regional) area;
- indirect consequence of an activity's effect on a seemingly unrelated activity of condition; and
- fragmenting the value of a larger environmental component by small incremental changes (i.e., nibbling).

The facilities planned for the Highway 7 Corridor transitway have been sited in locations and designed in configurations such that there will be no spatial cumulative effects during the construction and operation of the rapid transit service.

During project implementation, staging of the construction of elements of the Undertaking will ensure that temporary construction disruption does not present a risk of reaching an unacceptable level of adverse effect on community and business access and mobility. Traffic accommodation, noise and dust control measures will be planned and designed to mitigate the overall level of construction activity at any one time and location. Monitoring programs will be followed to verify that the level of construction activity is not accumulating to a level with potential for adverse effects on the social and natural environment.

Similarly, operation of the rapid transit service in the Highway 7 Corridor simultaneously with the proposed service in the Yonge Street Corridor will not produce any adverse cumulative effects. The services will use separate transitways and the size and configuration of the intermodal terminal at Richmond Hill Centre will accommodate both services. The commercial land uses surrounding the station are not sensitive to the noise levels projected for the combined operations in the future. If re-development of

the lands around the facility takes place in the future, it will very likely remain commercial due to the proximity of the Hydro right-of-way and the role of the area as a transportation hub.

#### 10.5.1.2 Temporal Cumulative Effects

Temporal cumulative effects may be experienced by:

- accumulation of repetitive yet insignificant effects, reaching a significant level (i.e., crossing a threshold) over a long period of time.

### 10.5.2 Timelags Whereby the Effects of Short-term Activities are not Experienced until the Future

The one potential temporal cumulative effect has been identified and discussed in **Chapter 5** under the evolution of technologies on the proposed rapid transit network. This relates to the potential loss of BRT service reliability in heavily congested portions of the route. As indicated, this future condition may require extension of the TTC subway system in the case of the Vaughan North-South Link or the introduction of an LRT based service on these portions in York Region. The growth in transit ridership and its effect on the frequency of BRT vehicles required in this portion of the corridor will be monitored during the first 10 years of operation of the system.

### 10.5.3 Effects of a Project Malfunction or Accident

Rapid transit service will be operated mostly on dedicated lanes within the Highway 7 Corridor road rights-of-way. All transit vehicle movements will be subject to the *Ontario Highway Traffic Act* and general traffic will only be permitted to cross the dedicated lanes at signalized intersections. These measures will reduce the probability of a system malfunction due to collisions with other vehicles. In the event such as a collision occurs, rapid transit vehicle operators will be able to obtain instant assistance from the transit control centre. If required, the centre will request emergency response services that will be able to reach the site of the incident using the general traffic lanes and, when necessary, the median crossings for emergency vehicles provided at regular intervals along the routes. This will permit management of any environmental hazards at incidents by the appropriate emergency service.

The maintenance and storage of rapid transit vehicles will be carried out at the Region's maintenance facility proposed in the Langstaff industrial area of Markham. The effects of a project malfunction or accident at this facility have been described in the Yonge Street Corridor Public Transit Improvements Environmental Assessment.

### 10.5.4 Effects of the Environment on the Undertaking

All infrastructure required for the Undertaking will be designed to function satisfactorily and safely in the range of environmental conditions stipulated in the applicable Ontario design codes and standards. Since the infrastructure and systems anticipated comprise typical road and rail transit facilities, proven in service in the transportation industry in Canadian urban environments, no adverse effects of normal environmental conditions are expected.

The service will be operated mostly in existing road rights-of-way where drainage systems and snow or ice clearing measures will mitigate the effects of severe weather conditions on operations in both summer and winter. Where exclusive rights-of-way are used for rapid transit, the Region will provide all necessary transitway maintenance services to enable safe operation in all normal weather conditions. In the event that extreme conditions (e.g. blizzards or hurricanes), make rapid transit operation unsafe, services will be halted and reinstated under direction from the Region's Transit System Control Centre.

### 10.5.5 Full Life-cycle Effects

The assessment described in **Chapter 10** considers the potential environmental effects during both construction and operation of the undertaking. In accordance with the requirements of the CEAA, the effects during the remaining phase of the project life-cycle, the Decommissioning phase are discussed below.

York Region's rapid transit service is planned as a permanent public service with facilities designed for a service life of 30 – 50 years. Consequently, most of the infrastructure will be maintained or replaced to support the service for the foreseeable future. The only instance where a component may be decommissioned would be if the Region decided to replace all or part of the Maintenance Centre with another facility at another site. If this were to occur, the Region would decommission the facility in accordance with all requirements of the relevant.