

5. Impacts, Mitigation Measures and Monitoring

5.1 Introduction

The implementation of the Scarborough Subway Extension (SSE) may result in both positive and negative effects. Avoidance of negative effects (hereafter referred to as “impacts”) has been a key consideration through the course of this Project, particularly during the preliminary screening of the corridor alternatives and the identification of the preferred alignment and station location. However, given that in some cases impacts cannot be fully avoided, mitigation measures will be required during construction, operation and maintenance of the SSE.

The Transit Projects Regulation (Ontario Regulation 231/08) Section 9 (2) requires the preparation of an Environmental Project Report (EPR) that contains the following information, among other requirements:

- *An assessment and evaluation of the impacts that the preferred method of carrying out the transit project and other methods might have on the environment and criteria for assessing and evaluating these impacts;*
- *A description of any measures proposed by the proponent for mitigating any negative impacts that the preferred method of carrying out the transit project might have on the environment; and,*
- *A description of the means the proponent proposes to use to monitor or verify their effectiveness.*

The purpose of this Chapter is to document the above requirements for the SSE.

5.1.1 Interactions between Project Activities / Facilities and the Environment

The environmental impacts for the SSE are divided into the following categories:

- **Displacement of Existing Features by SSE Facilities:**
Permanent impacts to existing features located within the footprint of the SSE as they are physically altered to accommodate the Project.
- **Construction Impacts:**
Temporary impacts, occurring only during construction activities.
- **Operations and Maintenance Impacts:**
Ongoing and long-term impacts occurring during operations and maintenance activities.

Table 5-1 is an “Interactions Matrix” developed to identify the interactions, and thereby potential impacts, between the proposed Project components / activities and key environmental features. The purpose of the

Interactions Matrix was to establish the scope of the environmental assessment (EA) so that priority could be given to understanding those Project components / activities that have the potential to impact the following key environmental features:

- Natural Environment, including Terrain and Soils, Groundwater, Drainage and Hydrology, Fish and Fish Habitat and Terrestrial Ecosystems;
- Emissions, including Air Quality, Noise and Vibration, Electromagnetic Interference and Climate Change;
- Socio-Economic Environment, including Utilities, Buildings and Properties, Business and Recreational Disruption, Urban Design and Waste Management;
- Cultural Environment, including Archaeology, Built Heritage Resources and Cultural Heritage Landscapes; and,
- Transportation, including Automobile Traffic and Transit Services, Pedestrians, Cyclists and Rail.

The Interaction Matrix presented in **Table 5-1** was completed based on the professional judgement of the Study Team and associated specialists and their experience on similar past projects. **Table 5-1** categorizes potential impacts as follows:

- None (blank) = No potential for impacts to occur. As a result, no additional discussion and documentation is required in support of this EPR.
- Weak (○) = Low potential impacts. Given that potential impacts are anticipated to be minimal to none, no additional mitigation, commitments or follow-up actions are required.
- Moderate (◐) = Potential for moderate impacts. A more detailed discussion accompanied with supporting supplemental analysis and possible mitigating measures and commitments are provided.
- Strong (●) = Potential for major impacts. These issues are usually regulated or closely monitored by government agencies and will require detailed analysis to quantify the potential impact and the anticipated effect of mitigation measures.

For activities associated with potential impacts, the following information is provided for each environmental feature:

- Description of the impacts;
- Identification of mitigation measures;
- Description of monitoring programs; and,
- Recommendation for contingency measures, as required.

The results of these sections are summarized at the end of this Chapter in **Table 5-5** through **Table 5-7**.

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Table 5-1: Interactions Matrix

Facilities / Activities		Natural					Emissions					Socio-Economic				Cultural		Transportation				
		Terrain and Soils	Groundwater	Drainage & Hydrology	Fish and Fish Habitat	Terrestrial Ecosystems	Air Quality	Noise	Vibration	Electromagnetic Interference	Climate Change	Utilities	Buildings & Property	Business & Recreation Disruption	Urban Design	Waste Management	Archaeology	Built Heritage Resources & Cultural Heritage Landscapes	Automobile Traffic & Transit Services	Pedestrians & Cyclists	Rail	
Displacement of Existing Features due to Project Facilities	Scarborough Centre Station (platform, concourse, entrances, ventilation shaft & other associated facilities)		○	●		○						○	●		●				○	○	●	
	Scarborough Centre Station – Bus Terminal		○	●		○						○	●		●				○	○	●	
	Tunnel alignment (Eglinton – Danforth – McCowan)		○	○	●								●									
	Tailtrack East of Kennedy Station		○	○								○	●		○							
	Emergency Exit Buildings (EEBs) & Ventilation Shafts		○	●		●						○	●		●		●					
	Traction Power Substations (TPSS)		○	●		○						○	●		●							
	Borough Drive											○	●						○	○	●	
Construction Impacts	Building Demolition	○		●			●	●	●			●			○		○					
	Contaminated Site Clean Up	●	●	●			○															
	Above Ground Utility Relocation										●								●	●		
	Subsurface Utility Relocation	○	●	●				●	●			●							●	●		
	Cut-and-Cover Construction (station, EEBs, ventilation shafts & Kennedy tailtracks)	●	●	●	●	●		●	●			●		●	○	●	○		●	●	●	
	Construction Work Sites (Bus Terminal, TPSS, work shafts & laydown areas)	●	●	●		●	●	●	●			●		●		○	●	○	●	●	●	
	Tunnelling	●	○					●	●													
	Soil Removal and Disposal	●																	○			
	Dewatering	●	●	●								○										
	Reinforcement of Existing Buildings & Structures	○						○	○				●								●	
	Heavy Equipment Operations & Maintenance	●	●	●		●	●	●	●												○	
	Material Import / Storage / Stockpiling	●		●			●	●	●							○						
Operations and Maintenance	Subway Operations						●	●	●	●												
	Track & Structure Maintenance						○	○														
	Stormwater Management	○		●						●				○								
	Bus Operations						●	●	●	●									○	○		
	Scarborough Centre Station Maintenance (cleaning, deliveries, state of good repair)						○	○														
	Testing of Emergency Equipment			○				●					●									
	Ancillary Facilities Maintenance (cleaning, deliveries, state of good repair)						○	○														

Legend: Blank = no probability of an interaction; ○ = Weak; ● = Moderate; ● = Strong; TPSS = Traction Power Substation; EEB = Emergency Exit Building

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5.2 Permanent Displacement of Existing Features

5.2.1 Natural Environment

5.2.1.1 Terrain and Soils

Tunnelling activities and ancillary facilities will cause displacement of soil, resulting in ground movement and settlement. These impacts are described in further detail in **Section 5.3.1.1**.

5.2.1.2 Groundwater

Impacts to groundwater due to the Project are transient and related to construction activities. Therefore, permanent issues related to the displacement of existing features are not anticipated.

5.2.1.3 Drainage and Hydrology

Impacts

Watercourses

The tunnel for the preferred alignment will be crossing under tributaries of the West Highland Creek. Since the running structure will be underground and advanced tunnelling technologies will be utilized in its construction, the Project is anticipated to have insignificant impacts to the watercourses above the SSE. Advanced waterproofing measures should, however, be considered in these areas to mitigate potential water leakage under the crossing.

Bus Terminal, Station and Tunnel Facilities

As the proposed SSE is anticipated to be primarily sub-surface, the areas with cut-and-cover construction, namely the Bus Terminal, station and ancillary tunnel facilities (EEBs, TPSSs) will be the primary locations where the SSE will interact with surface drainage and storm sewers.

The proposed Scarborough Centre Station, Bus Terminal and associated facilities will discharge to existing McCowan Road and Progress Avenue storm sewers which ultimately discharge to the East Highland Creek. The proposed driveways, bus bays and access roads are subject to pollutant loading, thus resulting in poor storm runoff water quality.

The proposed Scarborough Centre Station and Bus Terminal facilities will be constructed in areas that have already been developed resulting in a minor increase in impervious areas. **Table 5-2** shows a summary of the potential increase in impervious areas, assuming the proposed facility block will be all impervious. As noted, a slight increase in imperviousness of 0.24 hectares is anticipated; however, discharge criteria to municipal sewer limits the allowable flow to the predevelopment flow or existing capacity of the receiving storm sewer, whichever is less. In addition, when the percent-imperviousness of a development site under pre-development condition is higher than 50 % (regardless of what the post-development condition is), the maximum value of the Runoff Coefficient used in calculating the pre-development peak runoff rate is limited to 0.5, thus over-controlling the proposed condition peak flow.

Table 5-2: Imperviousness Impact of the Proposed Station and Bus Terminal

Location	Facility	Approx. Area (ha)	Existing Condition			Proposed Condition			New Imp. Area (ha)
			Impervious Area	Pervious Area	% Imp.	Impervious Area	Pervious Area	% Imp.	
Scarborough Town Centre	Station, Bus Terminal, Roads / Entrances	2.1	1.84	0.24	88 %	2.1	0.00	100 %	0.24

The construction of the EEBs and TPSS structures are not expected to have a significant impact on the storm sewers due to their small above-ground footprint. This will be confirmed after future development of the structures during the subsequent Detailed Design Phase of the Project.

Mitigation – Stormwater Management Strategy

Lot level controls will be implemented for the proposed Scarborough Centre Station, Bus Terminal, tunnel and associated ancillary facilities, to address potential impacts to surface water quality, quantity, water balance and erosion. The recommended approach to stormwater management is summarized in **Table 5-3**. The Stormwater Management Strategy will be further developed during the Detailed Design Phase of the Project.

Table 5-3: Recommended Stormwater Management Strategy

Location	Facility	Potential Outlet	Water Balance	Water Quality	Water Quantity
Scarborough Centre	Station, Bus Terminal, Roads / Entrances	McCowan Road and Progress Avenue Storm Sewers	Rooftop garden; Landscape areas with absorbent soil.	Oil / grit separators (OGS) as part of a "treatment train" approach to stormwater management	Roof Control Drains on all above ground buildings; Lot level conveyance controls such as underground storage and parking lot storage.
Tunnel Alignment	Tunnel Running/ Ancillary Structures	Various storm sewers along the alignment	N/A	OGS and/or other Low Impact Developments (LIDs)	N/A
Various along Alignment	EEBs	Various storm sewers along the alignment	LID including permeable pavement, perforated pipe, infiltration trenches, enhanced swale, etc., according to the site condition.	OGS and/or other LIDs	Roof Control Drains on all above ground buildings
Two along Alignment	Traction Power Substation	Various storm sewers along the alignment	LID including permeable pavement, perforated pipe, infiltration trenches, enhanced swale, etc., according to the site condition.	OGS and/or other LIDs	Roof Control Drains on all above ground buildings

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5.2.1.4 Fish and Fish Habitat

The SSE will cross a total of three watercourses including:

- Tributary of Dorset Park Branch of West Highland Creek;
- Dorset Park Branch of West Highland Creek; and,
- Bendale Branch of West Highland Creek.

At each of these locations, the SSE will be tunnelled at least 10 metres below the stream bed; therefore, no serious harm to fish or fish habitat will occur. The Project is not exempt from review under Fisheries and Oceans Canada's self-assessment criteria; as such a Request for Review by Fisheries and Oceans Canada will be required during the Detailed Design phase of the Project.

5.2.1.5 Terrestrial Ecosystems

Impacts – Displacement of Vegetation and Vegetation Communities

No Ecological Land Classification (ELC) vegetation communities will be cleared to develop the Project. All areas to be excavated for SSE facilities such as station boxes, tunnel boring machine (TBM) launch and extraction sites, EEBs, etc., have been previously developed or consist of manicured lawns and streetscapes.

Impacts – Disturbance to Vegetation and Vegetation Communities

One deciduous forest (FOD7a) is located approximately 15 metres from EEB 5. The deciduous forest is located in the Bendale Branch of the West Highland Creek valleyland north of Lawrence Avenue and south of the Bendale Branch of West Highland Creek. Based on the distance of the deciduous forest from EEB 5, no negative impact on the deciduous forest will occur.

The SSE will be tunnelled under the easternmost woodlot associated with the Frank Faubert Woods at the northwest corner of Ellesmere Road and McCowan Road (FOD5a) and adjacent to the woodlot north of Borough Drive (FOD5b). The SSE tunnel will be approximately 15 metres below ground level at this location, which is a sufficient depth to avoid all root structures as well as the surface drainage regime. The SSE tunnel will also be lined, so there will be no long-term loss of groundwater to the tunnel or migration laterally along the tunnel. The TBM will advance at a rate of approximately 10-12 metres per day. As a result, tunnelling will only occur in the vicinity of the woodlots for several weeks.

Toronto Transit Commission (TTC) proposes to use earth pressure balanced (EPB) tunnelling technology so that the face of the TBM remains pressurized at all times and no dewatering will be required. Given the depth of the tunnel, the short duration of tunnelling activities in the vicinity of the woodlots and the use of an EPB TBM, potential effects on the woodlots as a result of tunnelling activities are considered negligible.

Impacts – Displacement of Rare, Threatened or Endangered Vegetation and Vegetation Communities

All of the vegetation communities identified along the SSE are considered to be widespread and common in Ontario and are secure globally. As noted in **Section 2.1.5.3**, two tree species regulated by the Ontario *Endangered Species Act (ESA)* and the Canada *Species at Risk Act (SARA)* were identified within the Study Area. No impacts are anticipated to the butternuts or the Kentucky coffee tree identified during LGL Limited's

botanical investigation as these trees are located at least 100 metres from the tunnelled segment of the SSE. In addition, no plant species that are provincially ranked as "critically imperiled" to "vulnerable" (S1 to S3) were observed within the Study Area. As a result, there will be no impacts on rare, threatened or endangered vegetation and vegetation communities.

A total of nine Toronto and Region Conservation Authority (TRCA) species of concern were identified within the Study Area. None of these species of concern are located within or adjacent to areas of excavation.

Impacts – Ornamental Trees and Shrubs

During the Detailed Design phase of the Project a tree inventory will be undertaken to document impacts to trees within construction areas in accordance with the City of Toronto Urban Forestry requirements. In addition, a tree preservation plan will be prepared to document tree protection and mitigation measures. Tree protection measures will follow the City of Toronto Tree Protection Policy and Specifications for Construction Near Trees Guidelines (2013) and will include:

- Creation of a Tree Protection Zone (TPZ) delineated by tree protection fencing in accordance with City of Toronto specifications;
- Any area inside the TPZ must be left undisturbed (including overhead), no altering of grade, excavating, trenching, scraping, dumping or disturbance of any kind shall occur within the this zone;
- If extensive soil compaction has occurred, the contractor will be responsible for aerating the area once construction is completed and fertilizing in the following year;
- Construction materials, equipment, soil, construction waste or debris are not to be stored within the TPZ or dripline of the trees identified for protection;
- There should be no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ; and,
- If the TPZ needs to be reduced to facilitate construction access, the tree protection barrier must be maintained at a lesser distance and the exposed TPZ protected with plywood and wood chips.

Impacts – Displacement of Wildlife and Wildlife Habitat

No wildlife habitat will be removed to develop the SSE. All areas to be excavated for SSE facilities have been previously developed or consist of manicured lawns and streetscapes, which provide limited habitat capability.

Impacts – Barrier Effects on Wildlife Passage

No new barriers to wildlife passage will be created as a result of development of the SSE.

Impacts – Wildlife / Vehicle Conflicts

No wildlife / vehicle conflicts are anticipated as a result of development of the SSE.

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Impacts – Disturbance to Wildlife from Noise, Light and Visual Intrusion

Noise, light and visual intrusion may alter wildlife activities and patterns. In residential / urban, commercial, industrial and institutional settings, such as the Study Area, wildlife has become acclimatized to the surrounding conditions and only those fauna that are tolerant of human activities remain. Given that wildlife are acclimatized to the presence of the network of City of Toronto streets in the Study Area, the tolerance of the wildlife assemblage to human activities and the limited zone of influence of the SSE, disturbance to wildlife from noise, light and visual intrusion will have no negative effects.

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

No significant wildlife habitat is found in areas to be excavated for SSE facilities; therefore, there will be no displacement of significant wildlife habitat.

The Study Area has been screened for potential wildlife species at risk. Two wildlife species that are listed / regulated under the Ontario *ESA* were confirmed to be present along the SSE during LGL Limited's 2015 field investigations, including Barn Swallow and Wood Thrush. The Barn Swallow is regulated as 'Threatened' under the Ontario *ESA* but is not regulated under the Canada *SARA*. The Wood Thrush is ranked Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) but not listed under *SARA*; it is listed as Special Concern under the *ESA* (i.e., not regulated under the *ESA*). None of the excavation activities associated with the SSE will affect habitat for these two species; therefore, there will be no negative impacts on species at risk.

None of the remaining six wildlife species at risk historically recorded within the vicinity of the SSE (i.e., Spiny Softshell, Eastern Musk Turtle, Queen Snake, Eastern Meadowlark, Bank Swallow and Blanding's Turtle) were documented by LGL Limited during field investigations. Furthermore, by comparing the natural heritage features found in the Study Area with secondary source information that describes wildlife previously recorded within this region, no habitat suitable to support these six species was identified. As a result, there will be no impacts to the six species identified above.

Impacts – Designated Natural Areas

No Areas of Natural and Scientific Interest (ANSIs), Provincially Significant Wetlands (PSWs) or Environmentally Sensitive Areas (ESAs) are located within 120 metres of the SSE; therefore, no negative impacts to these designated natural heritage areas will occur.

The valleylands associated with Highland Creek and its tributaries are protected by the City of Toronto Ravine and Natural Feature Protection By-law and TRCA Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario Regulation 166/06). Given that the SSE will be tunnelled in areas regulated by the City of Toronto and TRCA, it is unlikely that these designated natural areas will be affected; however, EEB 5 is proposed to be located within TRCA regulated area. Discussions with the City of Toronto and TRCA will occur during the Detailed Design Phase of the Project to determine if permits are required.

5.2.2 Emissions

5.2.2.1 Air Quality

There are no anticipated impacts to air quality due to the permanent displacement of existing features as a result of Project facilities / activities. There are transient impacts that relate to the construction of the Project and localized impacts associated with the vehicular activity linked to bus and automobile operations at Scarborough Centre Station (see **Section 5.3.2.1** and **5.4.2.1** for relevant discussions on both).

5.2.2.2 Noise and Vibration

There are no anticipated noise or vibration impacts due to the permanent displacement of existing features as a result of Project facilities / activities. There are transient impacts that relate to the construction of the Project and localized impacts associated with the vehicular activity linked to bus and automobile operations at Scarborough Centre Station (see **Sections 5.3.2.2** and **5.4.2.2** for relevant discussions on both).

5.2.2.3 Electromagnetic Interference

There are no anticipated electromagnetic impacts due to the permanent displacement of existing features as a result of Project facilities / activities. There is potential for some localized impacts associated with the operation of the subway (see **Section 5.4.2.3** for relevant discussion).

5.2.3 Socio-Economic Environment

5.2.3.1 Utilities

Impacts

The impact to utilities is related to the construction of Project facilities. Some utilities will be supported during construction while others may have to be permanently relocated. As impacts to the utilities are related to construction activities, discussion of impacts, mitigation and monitoring for utilities are described in **Section 5.3.3.1**.

5.2.3.2 Building and Property

Impacts

Approximately 80 % of the SSE is located within municipal and provincial road allowances. However, certain sections of the SSE preferred alignment cross under private property. In addition, portions of private properties will need to be acquired along the preferred alignment in order to accommodate the Bus Terminal, station entrances, TPSSs and EEBs. All property needs identified in this Section are for the permanent requirements associated with the Project.

Property acquisition will be necessary in order to obtain the parcels of land required to construct the system and may include the following:

- **Full Property Interest** – The acquisition of an entire parcel of land. This may be required where a surface facility, such as a TPSS, will occupy all of the affected property.

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- **Partial Property Interest** – The acquisition of only a part of a parcel of land. This may occur where a surface feature, such as a station entrance building, occupies only a small portion of the overall property, or where an underground corridor through a property is required in order to accommodate the tunnel structure. Such subsurface acquisition may not preclude the construction of buildings and structures over and adjacent to the acquired lands, but would be subject to TTC review and approval. This would apply for all tunnelled sections of the SSE crossing private property and may also apply where a 3-metre tunnel buffer area is proposed under private property.

Table 5-4 illustrates the property acquisition requirements that have currently been identified.

Table 5-4: Permanent Property Requirements

#	Address	Property Interest (Full or Partial)	Reason	Public or Private
1	2467 Eglinton Avenue East	Partial	Tunnel and Tunnel Ventilation	Public
2	110 Town Haven Place	Partial	3 Metre Buffer	Private
3	2583 Eglinton Avenue East	Partial	Emergency Exit 1	Private
4	2693-2697 Eglinton Avenue East	Partial	3 Metre Buffer	Private
5	2699-2703 Eglinton Avenue East	Partial	3 Metre Buffer	Private
6	2705 Eglinton Avenue East	Partial	3 Metre Buffer	Private
7	2730/2742 Eglinton Avenue East	Partial	Emergency Exit 2 and Tunnel	Private
8	1250 Danforth Road	Partial	3 Metre Buffer	Private
9	1252 Danforth Road	Partial	3 Metre Buffer	Private
10	1254 Danforth Road	Partial	3 Metre Buffer	Private
11	1256 Danforth Road	Partial	3 Metre Buffer	Private
12	1258 Danforth Road	Partial	3 Metre Buffer	Private
13	1260 Danforth Road	Partial	3 Metre Buffer	Private
14	1262 Danforth Road	Partial	3 Metre Buffer	Private
15	1269 Danforth Road	Full	TPSS	Private
16	1299 Danforth Road	Partial	3 Metre Buffer	Private
17	10-20 Trudelle Street	Partial	Tunnel	Private
18	1346 Danforth Road	Partial	Emergency Exit 3	Private
19	1515 Danforth Road	Partial	Emergency Exit 4	Public
20	3030/3040/3050/3060 Lawrence Avenue East	Partial	Emergency Exit 5 and Tunnel and Tunnel Ventilation	Public
21	Gatineau Hydro Corridor Thompson Memorial Park	Partial	Tunnel	Public
22	1 Bellechasse Street	Full	TPSS	Private
23	3 Bellechasse Street	Full	TPSS	Private
24	25 Durrington Crescent	Partial	Emergency Exit 6	Private
25	1072 McCowan Road	Partial	Emergency Exit 7	Private
26	1082 McCowan Road	Partial	3 Metre Buffer	Private
27	43 Stanwell Drive	Partial	3 Metre Buffer	Private
28	45 Stanwell Drive	Partial	Tunnel	Private
29	47 Stanwell Drive	Partial	Tunnel	Private
30	49 Stanwell Drive	Partial	Tunnel	Private
31	51 Stanwell Drive	Partial	Tunnel	Private
32	53 Stanwell Drive	Partial	Tunnel	Private
33	55 Stanwell Drive	Partial	Tunnel	Private
34	57 Stanwell Drive	Partial	Tunnel	Private
35	59 Stanwell Drive	Partial	Tunnel	Private

Table 5-4: Permanent Property Requirements

#	Address	Property Interest (Full or Partial)	Reason	Public or Private
36	61 Stanwell Drive	Partial	Tunnel	Private
37	63 Stanwell Drive	Partial	Tunnel	Private
38	1615 Ellesmere Road	Partial	Tunnel	Private
39	185 Borough Drive	Partial	Tunnel	Public
40	61 Town Centre Court	Partial	Tunnel	Private
41	200 Town Centre Court	Partial	Scarborough Centre Station	Public
42	300 Borough Drive	Partial	Scarborough Centre Station	Private
43	530 Progress Avenue	Partial	Emergency Exit 8	Private
44	580 Progress Avenue	Partial	Tunnel and Tunnel Ventilation	Private

A total of 44 properties are anticipated to be impacted. Acquisitions for these properties are broken down as follows:

- Three full properties (full acquisition of a retail plaza and two private residences)
- 41 partial properties, of which:
 - Six are publicly owned properties
 - City of Toronto (Don Montgomery Community Recreation Centre, Bendale Toronto Public Library, Frank Faubert Woodlot)
 - Government of Ontario (Scarborough and Rouge Hospital, Gatineau Hydro Corridor Thompson Memorial Park)
 - Government of Canada (Service Canada Office Building)
 - 38 of the total properties impacted are privately owned properties

These property requirements are based on the assumption that ventilation structures will be co-located with EEBs.

All property acquisitions required for the Project will be conducted by the City of Toronto on behalf of the TTC.

Mitigation

By locating approximately 80 % of the preferred SSE alignment within municipal and provincial road allowances, the need for acquiring private property interests is reduced. Property requirements will be carefully determined and refined during the Detailed Design Phase of the Project, in order to minimize the amount of private land required for the Project.

In acquiring property, the City of Toronto balances community needs with the rights of individual property owners, including tenants and business owners. The City’s objective is to ensure that the individual’s rights are respected and protected, and to provide fair compensation within the framework of the *Expropriations Act* for any property interest acquired or affected by civic projects. The acquisition process emphasizes negotiation and the achievement of a mutually satisfactory agreement between the City and the owner. Only when negotiation has not produced an agreement and the property is required for construction to begin, will the City of Toronto initiate expropriation.

The property acquisition process and resulting compensation is intended to leave the affected owner “whole”, thereby mitigating any negative impacts.

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5.2.3.3 Business and Recreational Disruption

The majority of business disruption impacts relate to the construction of the Project and are temporary in nature. The issue of business disruption for those businesses is discussed in **Section 5.3.3.3**.

5.2.3.4 Urban Design

Impacts

The addition of SSE facilities to communities will alter the visual setting where they are located. The changes brought about by the construction of a station (including entrances, the Bus Terminal, ventilation shafts and other ancillary structures) and the tunnel at-grade structures (EEBs, TPSSs and ventilation structures) can either enhance or impair the visual setting of a community.

Mitigation

Particular attention will be paid to locating and screening of non-public station and tunnel elements such as EEBs, electrical substations and ventilation structures during the Detailed Design Phase of the Project to minimize impact on residential or commercial areas, and to not preclude future development potential or planned street network improvements as envisaged by the Scarborough Centre Transportation Master Plan (SCTMP).

Site Plan Control is a process by which development is controlled as authorized by Section 41 of the *Planning Act* and is implemented through the City of Toronto. Furthermore, Site Plan Control is a public process through which businesses and residents in the immediate area of Scarborough Centre Station will be notified and will have opportunity to review and comment on the proposed site plan. The Site Plan approval process for Scarborough Centre Station will include all at-grade station facilities; it will provide the public with information on: overall site layout, grading and service plan, landscape plan and details, and elevations and floor plans for buildings.

The Site Plan approval process for Scarborough Centre Station will also include review by the City of Toronto's Design Review Panel – The Design Review Panel advises City Planning staff on site plan issues within a framework developed by City Planning staff. The Design Review Panel is comprised of private sector design professionals – architects, landscape architects, urban designers and engineers – who provide independent, objective advice to City staff aimed at improving matters of design that affect the public realm. This includes matters such as preserving the uniqueness of place, maintaining vitality, ensuring comfort and safety, and making new development compatible with its surroundings. Advice is based on professional judgment, understanding of good design principles, conformance with the City of Toronto Official Plan (OP) and other related documents (design guidelines, Secondary Plans, etc.), and the design quality of the subject project.

TTC will undertake additional public consultation during the Detailed Design Phase of the Project to allow the public and key stakeholders to provide additional input to the design of Scarborough Centre Station and the tunnel at-grade structures.

5.2.3.5 Waste Management

The waste management impacts of the Project are transient and related to the construction. Additional details are provided in **Section 5.3.3.5**.

5.2.4 Cultural Environment

5.2.4.1 Archaeology

Impacts

A Stage 1 Archaeological Assessment was completed which documents the geographic, archaeological and land use history of lands identified within the McCowan Corridor of the Study Area in order to assess its potential to contain archaeological resources. The results indicate that, while most of the lands within the existing McCowan Corridor appear to have been disturbed by past development, some areas still retain archaeological potential; in particular:

- Emergency Exit 3 – Danforth Road at Savarin Street;
- Emergency Exit 4 – Danforth Road at Barrymore Road;
- Emergency Exit 5 – McCowan Road at Lawrence Avenue East;
- Emergency Exit 7 – McCowan Road at Hurley Crescent;
- Emergency Exit 8 – Corporate Drive at Progress Avenue; and
- Traction Power Substation 2 – 1 and 3 Bellechasse Street.

There are no potential impacts to archaeological resources as a result of tunnelling activities within the Hydro Corridor as the tunnel depth below surface will be at least 16 metres.

Mitigation

A Stage 2 Archaeological Assessment will be undertaken prior to construction of the Project for the areas identified above during the Stage 1 Archaeology Assessment as having archaeological potential and will be affected by construction.

Further archaeological assessments will be completed as necessary, and corresponding documentation will be registered with the MTCS. All construction areas which were identified as having archaeological potential in the Stage 1 assessment will be cleared of archaeological finds prior to the commencement of construction.

5.2.4.2 Built Heritage Resources and Cultural Heritage Landscapes

A review of the City of Toronto's Inventory of Heritage Properties and the Canadian Register of Historic places suggest that there are no previously identified built heritage resources or cultural heritage landscapes adjacent to the McCowan Corridor. There are two properties that are Designated under Part IV of the *Ontario Heritage Act* in proximity to the Corridor: 520 Progress Drive (85 metres) and 146 St. Andrews Road (120 metres). However, because the two identified resources are separated from the Project footprint by other buildings and landscape features, no indirect impacts are expected. The Scarborough Civic Centre at 140-150 Borough Drive (100 metres) is subject to a Notice of Intention to Designate, and is therefore protected under the *Ontario Heritage Act*. These resources are not at risk for direct impact but should be monitored throughout construction to mitigate any potential indirect impacts.

For details regarding the Cultural Heritage assessment, refer to **Appendix B-7b**.

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5.2.5 Transportation

5.2.5.1 Automobile Traffic and Transit Service

There are no anticipated automobile traffic and transit service impacts due to the permanent displacement of existing features as a result of Project facilities / activities. There are transient impacts that relate to the construction of the Project and localized impacts associated with bus and automobile activity for the Scarborough Centre Station (see **Section 5.3.5.1** for details).

5.2.5.2 Pedestrians and Cyclists

Impacts

The informal walkway allowing direct access from the south side of the trench – near the northwest corner of the YMCA building – to the north side of the trench, near the mall loading docks and theatre – will be eliminated. Temporary impacts to pedestrians and cyclists during the construction of the Project are expected (see **Section 5.3.5.2** for details).

It is recognised that the result of the nature of the Project, replacing two rapid transit stations on the SRT (Scarborough Centre Station and McCowan Station) with a single subway station roughly midway between the two, will result in longer walks for the majority of customers now using the two SRT stations.

Mitigation

Subject to approval from adjacent landowners, a pedestrian bridge will be constructed across the new bus terminal in the general area of the western end of the YMCA building, thus providing an additional crossing between the existing mall bridge to the west, and the new Borough Drive to the east.

With respect to customer access for those walking to and from the new subway station, there will continue to be an access point to the bus terminal level from the existing mall bridge on the west and a street entrance at McCowan on the east. A main entrance will be incorporated at the upper level on the east side of Borough Drive and provision will be made for construction of an additional access further north at the Borough Drive level.

5.2.5.3 Rail

There are no anticipated impacts to rail due to the permanent displacement of existing features as a result of Project facilities / activities. All impacts are transient and relate to the construction of the Project (see **Section 5.3.5.3** for details).

5.3 Construction Impacts

5.3.1 Natural Environment

5.3.1.1 Terrain and Soils

Impacts

Settlement

A geotechnical and geo-environmental investigation program will be carried out during the Detailed Design Phase of the Project. Information obtained through the investigation will be used to assess potential ground movement as a result of construction, dewatering and what impact this movement will have on existing facilities, infrastructure, buildings and underground utilities within the preferred corridor and alignment. There is the potential for settlement or change in structural stress due to tunnelling, dewatering and installation of excavation support.

Design and construction strategies to minimize and limit potential impacts will be developed based on the results of the investigations and engineering assessments. The impacts may include cosmetic and / or structural damage to buildings and other types of structures adjacent to the excavation works.

The SSE will be constructed under and adjacent to several buildings and the existing Line 3, which will remain in operation throughout construction. Furthermore, the tunnel edge will be constructed approximately 3 metres from the Hydro One Networks Incorporated (HONI) Tower 41, located in the Gattineau Hydro corridor at McCowan Road and St. Andrews Road. There is potential for settlement or change in structural stress due to tunnelling, dewatering and installation of excavation support. Additional settlement may also be caused by heavy construction traffic, or the stockpiling of excavated material adjacent to existing foundations or support of excavation. Differential settlement of the pier foundations could cause damage and derailment of the existing Line 3.

Soils

The Project will result in the displacement of approximately 1,000,000 cubic metres of surplus excavated material generated by tunnelling and cut-and-cover construction of the tunnel and Scarborough Centre Station. Approximately 200,000 cubic metres of this material will be excavated for the construction of the station box and approximately 77,000 cubic metres will be backfilled upon completion of the station box. Excess soil that is found to be stained, odourous, containing debris or has been analyzed and found to be contaminated will require management as waste.

Mitigation

Settlement

A settlement analysis will be completed during the Detailed Design Phase of the Project. The methodology for settlement and impact assessment is outlined in the TTC Design Standards and has been successfully used and proven on the Toronto-York Spadina Subway Extension and Eglinton Crosstown projects and associated tunnels.

Impacts, Mitigation Measures and Monitoring

Potential ground movement as a result of construction will be mitigated by using various design and construction elements and through proper planning. The features may include, but will not be limited to, additional ground stabilization such as grouting, using groundwater cut-offs, and the installation of underpinning and support for infrastructure, structures and buildings, as required, and the use of stiff excavation support systems such as contiguous caisson walls or slurry walls.

Typical mitigation for cut-and-cover construction, including Scarborough Centre Station consists of: limiting live load surcharges from heavy construction vehicles, material stockpiling, or uneven earth pressures, controlled dewatering of the site, implementing deeper support of excavation wall embedment to cut off groundwater, use of tie-backs and / or internal struts to support excavation, preloading the soil (if the soil is found to be soft), jet grouting (or chemical grouting) around the excavation, using micropiles to prevent any uplift (if a high water table is encountered), or by providing efficient structural design using a raft foundation to spread the loading. Deep lime treatment and vertical wick drains may also be used as methods for mitigation.

Lastly, typical measures for protecting the existing Line 3 structures would include similar practices, such as: limiting live load surcharges from heavy construction vehicles, material stockpiling, or uneven earth pressures, jet grouting under the piers, compensation grouting, applying temporary bracing for the duration of construction, providing additional support / underpinning with micropiles, and the implementation of a monitoring program. Settlement monitoring plates should be installed, monitored and send alerts when significant deviations in readings are found.

Further studies will be conducted during the Detailed Design Phase of the Project to develop mitigation plans to protect existing buildings and structures. These studies may include a detailed understanding of the soil matrix, the soil's compression index, soil type thickness, and sustained building load and foundation aspect ratio.

A Settlement Impact Assessment will be conducted for the tunnelling and Scarborough Centre Station construction based on the results of the geotechnical and geo-environmental investigation program. Specifically, the assessment will address:

- Tunnelling in the vicinity of HONI Tower 41 (Gatineau Hydro Corridor);
- Tunnelling under existing buildings and structures; and,
- Cut-and-cover construction for Scarborough Centre Station and the tunnel construction shaft in the vicinity of the Scarborough Rapid Transit (Line 3).

Soils

A Soil and Groundwater Management Strategy will be prepared during the Detailed Design Phase of the Project for the treatment of all excavated soils. Excess soils will require waste classifications in accordance with regulatory requirements. The Soil and Groundwater Management Strategy will be consistent with past TTC and Metrolinx projects and in accordance with applicable Municipal, Provincial and Federal legislation and regulations. The management of impacted soils will also be outlined in the Soil and Groundwater Management Strategy section of the Geotechnical Baseline Reports which are to be completed during the Detailed Design Phase of the Project. These reports will inform the Soil and Groundwater Management Strategy.

Analytical results of soil samples will be compared to the applicable generic standards as outlined in the Ministry of the Environmental and Climate Change (MOECC) *Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (EPA) Dated April 15, 2011*, as referenced in Ontario Regulation 153/04 as amended. The contractor will be required to dispose excess soil at a site that is approved to accept the material under the regulation. Where environmentally impacted material is encountered it will be handled and disposed at an approved MOECC licenced facility.

Monitoring

Settlement

A Monitoring Program will be established and carried out during the Detailed Design Phase of the Project to determine if construction activities will have any impacts on the existing infrastructure, facilities, structures, etc. The monitoring program will include, but not be limited to:

- A visual pre-construction condition survey of the existing structures and infrastructure along the preferred alignment recording the current state;
- Setting the settlement values (Review and Alert) that trigger pre-determined actions; and,
- Monitoring points that will include:
 - Settlement monitoring points;
 - Utility monitoring points;
 - Building monitoring points;
 - Tilt meters and level beams;
 - Inclinometers;
 - Strain gauges;
 - Monitoring wells, etc.

Baseline reading for all monitoring equipment will be established prior to the start of Project construction. Readings will be taken on a specified frequent basis during construction and these readings will be compared to the established Review and Alert levels. If Review levels are reached or exceeded, TTC and the contractor will jointly review the construction procedures to determine if changes are required. If Alert levels are reached or exceeded, TTC can order the contractor to cease all work until mitigation measures have been implemented.

Soils

The disposal of impacted material will be to a MOECC licenced soil treatment site or waste disposal facility. The monitoring of these facilities is the jurisdiction of the MOECC.

Prior to construction, the contractor will be required to submit the name, location, and Certificate of Approval (as issued by MOECC) of the designated soil disposal sites.

See **Section 5.3.3.5** for further details regarding waste management from construction activities.

5.3.1.2 Groundwater

A geotechnical screening investigation was carried out for the Project to assess the subsurface soil, groundwater and potential hydrogeological conditions. The investigation indicates an upper and lower aquifer of non-cohesive glacial tills and sandy silts / silty sands, separated by an aquitard of cohesive glacial till and clayey silts / silty clays. The groundwater level in the upper aquifer is variable and in the order of about one to

Impacts, Mitigation Measures and Monitoring

10 metres below the ground surface. Based on limited information obtained, artesian conditions were encountered in the lower aquifer in the area of West Highland Creek, north of Lawrence Avenue East. Additional wells to assess the groundwater levels in the lower aquifer have been installed and results are pending at the time this Report was prepared.

Impacts

Based on the information outlined above, and to provide a stable, undisturbed and preferably dry subgrade soils for cut-and-cover sections during construction, it will be necessary for some construction site locations to reduce groundwater hydrostatic head pressure by lowering the groundwater levels using some method of dewatering. The result of dewatering will be:

- Potential impacts to aquifers and recharged / discharge areas;
- Potential settlement of the ground surface and movement / settlement of structures as well as surface and subsurface infrastructure; and,
- Possible changes to the groundwater flow patterns.

Mitigation

To reduce the need for temporary dewatering, approximately 6 kilometres of tunnel will be installed using earth pressure balanced TBMs with the tunnel constructed using precast segmental concrete liners with water tight gaskets. In addition, grout will be injected between the soil and the tunnel liner during construction, which will help minimize the potential for water ingress into the tunnel.

At cut-and-cover sections (i.e., Scarborough Centre Station, launch and excavation shafts, EEBs, ventilation shafts, etc.) temporary dewatering may be minimized using a water tight continuous excavation support system such as a contiguous caisson wall, slurry wall or other watertight support systems, as required. This type of excavation support system will also help minimize and limit potential ground settlement and movement that may occur as a result of dewatering.

Dewatering will produce an excessive amount of water that will need to be handled and discharged. Given the urban environment it will be necessary to discharge the water to the municipal sewer system. Discharge groundwater must meet the City of Toronto Sewer Use By-Law requirements and a permit to discharge water into the sewer system will need to be obtained from the City by the contractor.

There is the potential to encounter groundwater impacted with chemicals from various sources due to the urban environment in which the Project is located. In addition, dewatering may promote movement of various chemicals towards the dewatering process. The contractor will be required to provide additional treatment of groundwater on an as required basis prior to discharge into the municipal sewer system.

Construction dewatering will likely exceed the MOECC limits for water takings; therefore, a Permit to Take Water will be required. The use of a water-tight continuous excavation support system such as a contiguous caisson wall as outlined above will limit the amount of water that will need to be removed. The geotechnical investigation that will be carried out during the Detailed Design Phase of the Project will include a series of pump tests to define and establish potential flow rates and quantities which will be used to determine whether or not dewatering or a Permit to Take Water will be required.

Monitoring

As previously stated, it will be necessary to reduce groundwater hydrostatic head pressure by lowering the groundwater levels using some method of dewatering, which will provide a stable, undisturbed and preferably dry subgrade for cut-and-cover sections during construction. The monitoring program that will be used during construction dewatering will include but not be limited to the following:

- Groundwater Monitoring Wells - to be installed within and around excavations to measure the groundwater levels. Baseline readings will be established prior to excavation and dewatering, with readings taken on a daily basis during excavation and dewatering.

The contractor will be required to monitor the dewatering system and ensure that the flow rates are in line with the MOECC issued Permit To Take Water as well as the City of Toronto issued Construction Dewatering Discharge Permit.

The contractor will also be required to provide any required temporary filtering and treatment facilities and monitor the effluent to ensure that discharge water meets the applicable analytical standards and criteria.

5.3.1.3 Drainage and Hydrology

Source Water Protection

A review of the MOECC Source Water Protection Information Atlas indicates that there are no Wellhead Protection Areas or Intake Protection Zones (IPZ-1 and 2) within the Study Area. However, two branches of West Highland Creek (the Bendale Branch and Markham Branch) are noted as Intake Protection Zone 3 as well as an Event Based Areas.

Impacts

Since the majority of the SSE will be constructed using advanced tunnelling technology, construction impact to existing drainage would be minimal and can be mitigated. Significant impact is anticipated on SSE segments requiring the cut-and-cover construction method. Open cut construction could potentially interfere with existing drainage including, but not limited to, storm sewers and major flow overland flow routes. A detailed assessment of these potential conflicts should be further investigated during the Detailed Design Phase of the Project.

In general, the locations of cut-and-cover construction are not in close proximity to and are not expected to have a significant impact on watercourses. The EEB location (EEB 5) proposed on the north side of the Scarborough and Rouge Hospital may have temporary impacts to the West Highland Creek due to existing stormwater infrastructure within the planned open-excavation footprint.

Further impacts resulting from construction activities are the potential for sediment and stormwater pollutants to enter nearby watercourses. Temporary erosion and sediment control measures during construction will be required to prevent migration of sediment off-site. Finally, no drainage or hydrology impacts to the Hydro Corridor are anticipated as a result of construction.

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Mitigation

Documents related to erosion and sediment control measures have been produced in the form of legislation, guidelines and by-laws. These documents shall be reviewed and consulted in preparation of an Erosion and Sediment Control Plan to be completed during the Detailed Design Phase of the Project and prior to construction. Guidelines used within TRCA's jurisdiction include, but are not limited to, the following:

- Ministry of Natural Resources and Forestry (MNRF) Technical Guideline: Erosion and Sediment Control (ESC);
- The Greater Golden Horseshoe Area Conservation Authorities Erosion and Sediment Control Guidelines for Urban construction;
- City of Toronto Sewer Use By-Law; and,
- Ministry of Transportation (MTO) Drainage Management Manual (1995-1997).

Mitigation measures shall be addressed in contract documents according to TRCA's Erosion and Sedimentation guidelines which explain the design function, installation procedure, maintenance procedure and removal of temporary ESC measures. Measures to be considered may include, but are not limited to, check dams, erosion control blankets, grassed swales, sediment traps and silt fence.

In addition to the ESC Plan, an Environmental Management Plan (EMP) will be needed specifically for the excavation and construction associated with EEB 5. This EMP will assist in addressing spills, erosion control, dewatering impacts on surface features such as fish and fish habitat, nearby terrestrial features, etc. This EMP will need to be reviewed and approved by the TRCA prior to Project construction. Given the Study Area location and the distance to higher level protection zones, Intake Protection Zones 1 and 2, there should be sufficient time to address and minimize potential impacts to municipal water from any potential impacts to the water sources.

Monitoring

The ESC Plan will be developed during the Detailed Design Phase of the Project and will provide the framework for inspection and maintenance, including repair and record keeping procedures, during all stages of construction. As the effectiveness of the ESC Plan depends directly on the frequency of inspection and the actions that are taken to address any failures that may occur with the ESC measures, a regular inspection program should be planned and implemented to determine when ESC measures need maintenance and / or repair.

5.3.1.4 Fish and Fish Habitat

The SSE will cross a total of three watercourses including:

- Tributary of Dorset Park Branch of West Highland Creek;
- Dorset Park Branch of West Highland Creek; and,
- Bendale Branch of West Highland Creek.

At each of these locations, the SSE will be tunnelled at least 10 metres below the stream bed; therefore, no serious harm to fish or fish habitat will occur. The Project is not exempt from review under Fisheries and Oceans Canada's self-assessment criteria; therefore, a Request for Review by Fisheries and Oceans Canada will be required during the Detailed Design Phase of the Project.

EEB 5 is located near the Bendale Branch of Highland Creek. See the Mitigation section of **Section 5.3.1.3** for information on the EMP that will be prepared for construction at this site.

5.3.1.5 Terrestrial Ecosystems

Impacts

Twenty-seven bird species recorded (based on field observations, secondary sources and / or habitats present) are protected under the *Migratory Birds Convention Act (MBCA)*. The *MBCA* prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or damaging, destroying, removing or disturbing of nests. The removal of manicured areas and associated ornamental vegetation has the potential to affect nesting migratory birds. All construction activities associated with the SSE must be in compliance with the *MBCA*.

EEB 5 is located within 15 metres of a deciduous forest community. Using the standard ESC to be employed for this excavation will prevent the escape of sediment from the site. No impact to vegetation communities or wildlife habitat is expected to occur at this location. There will be no terrestrial related impact to the Hydro Corridor as a result of tunnel construction.

Mitigation

The Study Area falls within Environment Canada's Nesting Zone C2 (Nesting Period: end of March to end of August). Consequently, to comply with the requirements of the *MBCA*, clearing or disruption of vegetation where birds may be nesting should be completed outside the window of April 1 to August 31 to avoid the breeding bird season for the majority of the bird species protected under the *MBCA*. In the event that construction activities must be undertaken from April 1 to August 31, a nest screening survey must be conducted by a qualified avian biologist to identify and locate active nests of species covered under the *MBCA*. If an active nest is located, a mitigation plan shall be developed and provided to Environment Canada – Ontario Region for review prior to implementation.

5.3.2 Emissions

5.3.2.1 Air Quality

Impact

Dust is the primary contaminant of concern during construction of SSE infrastructure. Other contaminants including nitrogen oxides (NO_x) and volatile organic compounds (VOC) may also be emitted from equipment used during construction activities.

Mitigation

Due to the temporary nature of construction activities, there are no air quality criteria specific to construction activities. However, the Environment Canada "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" document provides several mitigation measures for reducing emissions during construction activities. Mitigation techniques discussed in the document include material wetting or use of non-chemical suppressants where possible to reduce dust, use of wind barriers and limiting exposed areas

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which may be a source of dust and equipment washing. It is recommended that the best management practices be followed during construction of SSE infrastructure to reduce any air quality impacts that may occur.

5.3.2.2 Noise and Vibration

The sources of noise and vibration during construction may occur above or below ground or within tunnels. Unlike operational noise, construction noise and vibration are temporary in nature and their levels are dependent on the type of work required and its location relative to the sensitive receptors.

Impacts

The primary sources of noise and vibration during construction are general excavation, construction activities, vehicular truck traffic, continuous construction activities (such as tunnelling, power generators and dewatering pumps).

Construction of the tunnel will be by a tunnel boring machine (TBM) and is expected to transmit lower levels of noise and vibration to the adjacent buildings than a cut-and-cover method of construction. However, the cut-and-cover method will be utilized for construction of the Scarborough Centre Station, EEBs, access shafts, and vent structures. The choice between tunnel boring and cut-and-cover method are determined by many other essential engineering factors.

The TBM produces steady state variations in the vibration levels at each receptor location where the levels gradually rise over a period of two weeks; remain steady for approximately two days, following which the levels fade over two weeks. The timing of the boring process at each receptor and the resulting sound levels depend on the depth of the subway tunnel near the receptor, the lateral distance from the tunnel, the type of soil, the operational characteristics of the TBM and in particular, the thrust being applied by the TBM on the area to be excavated. The TBM is expected to advance at rate of 10-12 metres per day. The presence of high ambient noise due to the proximity to major roadways and internally generated noise inside buildings will influence the degree of human audibility of ground-borne noise due to the TBM progressing underground. In general, except for activities at the access shaft(s) serving the tunnel construction, the general public in urban areas are not likely to be aware of the ongoing tunnelling work since TBM excavation does not produce any audible - noise at street level. Community impacts, however, depend on the access shaft(s) locations.

Tunnel construction impacts are concentrated at the shaft(s) and can include noise due to mobile construction equipment (dozers, loaders, dump trucks, etc.) and more-or-less fixed construction equipment at or near the shaft (cranes, generators, pumps, etc.). The noise generated around the shaft(s) can be controlled using several noise control measures which include physical and administrative controls. The physical measures include the use of fixed and / or temporary sound barrier walls / partial enclosures, traffic management and the use of quieter equipment.

Pile drivers used for construction at the Scarborough Centre Station should be of the "quiet" hydraulic type rather than the noisier drop weight type; if operationally feasible.

The significance of the construction noise impact depends on the number of pieces of equipment, their types, time of operation, their inherent sound emission levels and their proximity to the receptors in question. Along the preferred alignment, the existing high ambient sound levels are likely to reduce the significance of the noise during construction although such noise will be clearly audible during peak periods of construction.

The preliminary analysis of the noise during the construction phase indicates the potential for concern in residential and other areas adjacent to possible construction mobilization sites and potential for noise concerns due to the use of the TBM in proximity to a limited number of buildings.

Mitigation

The following is a brief outline of the procedures to be followed in mitigating construction noise and vibration during the Detailed Design and construction phases of the Project:

- Noise and Vibration sensitive receptors to be verified;
- The most up-to-date provisions of the City of Toronto Municipal Noise Code (By-Laws) will be examined. Where timing constraints or any other provisions of the municipal by-law may cause hardship to the TTC and its contractors; an explanation of this will be outlined in a submission to the MOECC and the City and an exemption from such by-law will be sought directly from the City;
- The TTC will also adhere to and monitor noise and vibration during construction in accordance with the City of Toronto Noise By-Law (Chapter 591) and the City of Toronto By-Law No. 514-2008 with respect to regulation of vibrations from construction activity;
- "General noise control measures" (other than sound level criteria) will be referred to, or placed into contract documents. An effective way to mitigate the noise impact due to mobilization sites is to construct effective temporary / portable sound barriers to protect the residences based on knowledge of the expected construction equipment sound levels and the prevailing ambient noise due to vehicular traffic on nearby roads;
- Should the TTC or the contractor receive any complaints from the public, the contractor's staff should verify that the "general noise control measures" agreed to, are in effect. The contractor should investigate any noise concerns and the TTC will warn the contractor of any problems and enforce its contract;
- If the "general noise control measures" are complied with, but the public still complain about noise, the TTC should require the contractor to comply with the MOECC sound level criteria for construction equipment contained in the MOECC's Model Municipal Noise Control By-Law and the applicable provisions in the City Noise Code. Subject to the results of field investigation, alternative noise control measures would be required, where these are reasonably available;
- In selecting the appropriate construction noise control and mitigation measures, the TTC and the contractor should give consideration to the technical, administrative, and economic feasibility of the various alternatives; and,
- All construction activities, and in particular excavation and foundation work below ground that take place within at least 50 metres from other existing structures should be continuously monitored for any potential damage during construction in accordance with the City of Toronto vibration monitoring By-Law and procedures. The contractor and their vibration consultant will be required to follow the City of Toronto's comprehensive technical and administered procedures in accordance with the City of Toronto Noise By-Law (Chapter 591) and the City of Toronto By-Law No. 514-2008 with respect to regulation of vibrations from construction activity.

Impacts, Mitigation Measures and Monitoring

5.3.2.3 Electromagnetic Interference

There are no transient electromagnetic interference (EMI) / stray current impacts related to the construction of the Project. Potential impacts are localized and are associated with the operation of the subway, further discussed in **Section 5.4.2.3**.

5.3.2.4 Climate Change

In general, emissions produced during construction vary significantly depending on numerous factors including:

- Construction material production;
- Energy use at construction sites;
- Movement of people and goods to and from construction locations;
- Distance material and labour travelled to construction sites; and,
- Overall design of the infrastructure.

These variables, among others, will impact the size of the carbon footprint generated from Project activities which will in turn have an impact on climate change. Climate change impacts are further discussed in the operations and maintenance **Section 5.4.2.4**.

5.3.3 Socio-Economic Environment

5.3.3.1 Utilities

Impacts

Impacts on existing aboveground and underground utility infrastructure are expected as a result of the construction of the Scarborough Centre Station, Bus Terminal, tunnel structure and associated facilities. Subsequently, disruptions to end-users / customers of the utilities may occur during relocations. Impacts on existing utilities are also expected due to the construction methodologies and traffic detours implemented for the Project. Other typical construction impacts are expected as a result of utility construction, such as: dust, noise, vibration, traffic / access, etc.

Underground gravity sewers greater than 1,000 millimetres in diameter are typically deeper than other utilities and are indicated on the Project plan drawings (see **Appendix B-5**). The gravity sewers with a diameter greater than 1,000 millimetres that cross the preferred alignment are noted below:

- 1,350 millimetre storm sewer on Gilder Drive / Falmouth Avenue crossing Eglinton Avenue East;
- 1,350 millimetre storm sewer on Triton Road crossing Borough Drive;
- 1,050 millimetre storm sewer on McCowan Road crossing Brimorton Drive;
- 1,500 millimetre, 1,200 millimetre and 1,050 millimetre storm sewer on Progress Avenue between Borough Drive and Corporate Drive;
- 1,050 millimetre storm sewer on Corporate Drive crossing Progress Avenue;
- 1,200 millimetre storm sewer on MTO lands crossing McCowan Road; and,
- 1,050 millimetre sanitary sewer along West Highland Creek crossing McCowan Road.

In addition to the large diameter gravity sewers listed above, there are numerous critical and non-critical underground and aboveground utilities primarily within the existing road right-of-ways (ROW) that may be impacted by the proposed alignment.

Municipal services anticipated to be impacted by cut-and-cover construction are expected to range from 250 millimetres to 300 millimetres for watermains, 250 millimetres to 1,950 millimetres for storm sewers and 250 millimetres to 375 millimetres for sanitary sewers. Smaller municipal services to catch basins and drainage systems as well as connections to properties are anticipated to be impacted by the cut-and-cover construction.

Gas utilities anticipated to be impacted by cut-and-cover construction are expected to range from 32 millimetres to 200 millimetres in diameter.

Toronto Hydro utilities anticipated to be impacted by cut-and-cover construction are expected to range from 2.4 kilovolts and 27.6 kilovolts. Toronto Hydro utilities consist of primarily overhead services but also include significant underground duct structures.

Telecommunications utilities (Bell Canada, Rogers Communications Partnership, Cogeco Data Services, Zayo Group (formerly Allstream Inc.), Telus Communications Company) anticipated to be impacted by cut-and-cover construction consist of primarily overhead utilities as well as underground conduits.

Mitigation

The preferred alignment utilizes deep tunnelling construction which will minimize the majority of the impacts of the running structure on the existing utilities. Despite this assumption the utilities will undergo an evaluation during the Detailed Design Phase of the Project to determine the level of impact, if any. Subsurface Utility Engineering (SUE) investigations will also be conducted during the Detailed Design Phase of the Project to provide further information on the type, size and location of all utilities and to support the impact evaluations.

Large gravity sewers are considered critical and will generally be the first to be evaluated during the future Detailed Design Phase to determine the level of impact, if any, and if subsequent relocation or temporary support and protection are required. Evaluation of other critical and non-critical municipal services (watermains, storm sewers and sanitary sewers) located primarily in the road ROWs will also be conducted along the preferred alignment. Privately owned services located primarily within private properties will also be investigated along the running structure. As noted previously, the deep running structure will not likely impact the typically shallow depth of utilities but will be investigated through further evaluation during the future Detailed Design Phase of the Project.

The preferred alignment crosses underneath high voltage overhead wires in the HONI Corridor north of Lawrence Avenue. There is a potential impact with an existing hydro tower at the north end of the HONI Corridor, west of McCowan Road. Although, the preferred alignment has been adjusted to minimize impact to the hydro tower, if any, further investigation during the Detailed Design Phase of the Project will provide more information.

Impacts, Mitigation Measures and Monitoring

For Project elements that are to be constructed by cut-and cover methods, such as the station box, Bus Terminal, launch and extraction shafts, EEBs, TPSSs and including traffic detour construction, two approaches will generally be used for impacted utilities:

- Temporary support and protection through the construction site; and,
- Relocation of utilities that cannot be temporarily supported (e.g., large utilities).

Municipal services, Toronto Hydro, Enbridge Gas and telecommunications companies have been identified as having utilities with potential impacts from the proposed cut-and-cover construction. The level of impact for each utility will undergo a thorough evaluation to determine the course of action. The SUE investigations will provide further utility information for the impacted and surrounding areas but the following text provides general information on expected utilities based on current information.

- Temporary support and protection or relocation of municipal services are potential options to be utilized and evaluated for each municipal utility;
- Support of gas plant across excavations may be implemented for short sections where possible and will be investigated during the future Detailed Design Phase of the Project. Relocations are anticipated for longer sections in impacted areas;
- Temporary support and protection or relocation of Toronto Hydro services are potential options to be utilized and evaluated for each Toronto Hydro utility; and,
- Temporary support and protection or relocation of telecommunications utilities are potential options to be utilized and evaluated for each utility.

For all utilities that will be relocated, relocation plans will be prepared and construction activities will be undertaken in accordance with the City's Municipal Consent Requirements. Although not preferred, during temporary relocations and detours, utilities may require temporary easements on private property. Also, where possible, it is preferred that utilities be permanently relocated in the road ROWs. During relocation activities it is expected that there will be disruptions to users / customers of the impacted services. Utility relocation staging may be required where temporary utilities are provided during tunnel construction until permanent replacement can be completed. These disruptions will be minimized through discussions with the utility companies and careful planning and considerations for critical clients / customers / services. Disruptions to utility customers are to be expected when switching customer connections to and from temporary services.

5.3.3.2 Buildings and Property

Impacts

Temporary Property

Temporary property will be required during the construction phase to establish work zones, material laydown areas, equipment storage or maintenance areas, construction worker parking, and to obtain access for construction activities.

The planned tunnelling sequence will require tunnel mobilization sites in the vicinity of Scarborough Town Centre (near Highway 401 and on the north side of Town Centre Court) and a TBM extraction shaft at Eglinton Avenue East, east of the Don Montgomery Community Recreation Centre driveway. Scarborough Centre Station construction will require property at Scarborough Town Centre north of Triton Road.

Adjacent Property

Types of impacts that can potentially occur during construction include vibration and ground settlement. Under certain conditions, physical damage to nearby buildings and property may occur as a result of construction activity. See **Section 5.3.1** for further information.

Demolition

The following buildings and structures will need to be demolished during construction:

- One building on Danforth Road at Eglinton Avenue and two buildings on Bellechasse Street;
- Once the subway is operational and half of the Scarborough Centre Station Bus Terminal is complete, a section of the Line 3 structure between McCowan Road and Borough Drive will need to be demolished for construction of the Bus Terminal to proceed; and,
- There may be further structures that are identified during the Detailed Design phase of the Project.

Mitigation

Temporary Property

The City of Toronto will negotiate temporary permission to enter and construction agreements with property owners on a case-by-case basis following the procedures described in **Section 5.2.3.2**. The permission to enter agreements is to access properties during Detailed Design to help enhance the design (for example utility survey to understand extent of utilities in an area). Only when negotiation has not produced an agreement and the property is required for construction to begin, will the City of Toronto initiate expropriation. The City's objective is to provide fair compensation within the framework of the *Expropriations Act*. The acquisition process and resulting compensation is intended to leave the affected owner "whole", thereby mitigating any impacts.

Following construction, the lands will be restored to pre-construction conditions, to the extent possible.

Adjacent Property

A zone of influence will be identified and all property owners within this zone will be approached to have precondition surveys completed.

There will be a precondition survey done on all surrounding buildings within the zone of influence, see **Section 5.3.1** for mitigation proposed for the surrounding buildings.

Demolition

TTC will work with affected property owners to address concerns and ensure that any impacts are mitigated, to the extent possible. Mitigation measures associated with the demolition of Line 3 will be determined during the Detailed Design Phase of the Project. The demolition of the full Line 3 structure is beyond the scope of this Environmental Project Report (EPR).

Impacts, Mitigation Measures and Monitoring

Monitoring

For the properties identified as needing monitoring, monitoring during construction will include ground settlement measurements, inclinometers and surface monitoring points for structures. Monitoring is undertaken on a weekly basis during active excavation. This monitoring schedule is reduced to every three months for up to a year following backfilling.

The monitoring program will include Review and Alert levels. If instrument readings exceed “Review” levels, TTC and its contractor will jointly assess the necessity of altering the method, rate or sequence of construction. At “Alert” levels, TTC can order construction operations to cease until the necessary mitigation measures are undertaken.

Following construction, TTC and its contractor will arrange for a joint post-construction inspection of buildings / structures and utilities with the respective owners. The results of these surveys will be compared with the pre-construction surveys.

TTC will monitor horizontal and vertical movements and tilt of adjacent structures and utilities on a daily basis during active excavation or backfilling. In the event that instrument readings reach “Alert” levels, (as to be defined on a structure specific basis in the construction contract documents), TTC site supervisory staff will order construction operations to cease and take necessary actions to mitigate unacceptable movements, including, but not limited to, alternative construction methods or construction equipment and / or additional support / protection measures.

Contingency

In the event that mitigation efforts are unsuccessful and damage to private property occurs as a result, TTC will conduct further investigations and, if appropriate, will negotiate a settlement with the affected property owner.

5.3.3.3 Business and Recreational Disruption

Impacts

Key locations where construction sites will be located in the vicinity of local businesses and institutions include:

- Emergency Exit 1 - Eglinton Avenue East at Winter Avenue;
- Emergency Exit 2 - Danforth Road at Eglinton Avenue East;
- Emergency Exit 4 - Danforth Road at Barrymore Road;
- Emergency Exit 5 - McCowan Road at Lawrence Avenue East (Scarborough and Rouge Hospital); and,
- Scarborough Centre Station and Tunnels (Scarborough Town Centre, Young Men’s Christian Association (YMCA) and Service Canada).

The impacts to local businesses and recreational facilities can primarily be changes in vehicle and pedestrian movement patterns, but may also include the following:

- Reduced visibility of storefronts and signs;
- Reduced on-street parking;
- Less convenient access and disruption or closures to any off-street parking facilities; and,
- Patron inconvenience due to temporary construction debris, noise and dust.

Mitigation

A number of businesses will be impacted either by tunnelling activities, or general construction activities. These impacts to local businesses will be addressed indirectly through the mitigation efforts noted in other sections of this report (traffic and transit service, pedestrians and cyclists, noise and dust, etc.).

Construction work including utility relocation, excavation, tunnelling and station building will be visible along the corridor as the Project is implemented. TTC’s Community Relations Team will work with and continuously inform communities, residents, business owners and institutions directly impacted by new construction. A Construction Liaison Committee will be established and will act as the community’s advocate, to develop relationships with the affected communities, receive and respond to questions and concerns, and anticipate community issues. They will also inform potentially affected property owners and businesses early in the process and provide appropriate follow through to minimize impacts on owners to the extent possible.

5.3.3.4 Urban Design

Impacts

Construction work visually changes the surrounding environment on a temporary basis as a result of construction activities, creating visual intrusion. These activities could include, but are not limited to, erection, alteration, repair, dismantling, demolition, land clearing, earth-moving, grading, excavating, the laying of pipe and conduit, concrete pouring and lighting of the site to provide for safer working conditions.

Mitigation

Construction sites will be hoarded to minimize visual intrusion of the construction activity.

As well, temporary construction site lighting will be positioned to meet construction safety requirements, while minimizing light infiltration into adjacent residential properties.

5.3.3.5 Waste Management

Impacts

Waste materials will be generated as part of construction activities. Poorly managed waste may contribute to an increase in waste material on the landscape and contamination of the natural environment.

Mitigation

Waste and excess materials will be dealt with in accordance with Ontario Provincial Standard Specification (OPSS) 180, General Specification for the Management and Disposal of Excess Material. Waste generated on-site, which requires off-site removal should be in accordance with Ontario Regulation 347 under the *EPA* which provides for the transportation and processing of hazardous and non-hazardous waste. Additionally, in order to mitigate the potential impacts associated with excess material storage, no stockpiles shall be located closer than 30 metres from water features, in accordance with OPSS 180.

Phase 1 Environmental Site Assessments will be conducted and Phase 2 Environmental Site Assessments as required, prior to property acquisition.

Impacts, Mitigation Measures and Monitoring

5.3.4 Cultural Environment

5.3.4.1 Archaeology

Refer to Section 5.2.4.1.

5.3.4.2 Built Heritage Resources and Cultural Heritage Landscapes

Refer to Section 5.2.4.2.

5.3.5 Transportation

5.3.5.1 Automobile Traffic and Transit Service

Impacts

The planned tunnelling sequence will require tunnel mobilization sites in the vicinity of Scarborough Town Centre (near Highway 401 at Progress Avenue and Corporate Drive; on the north side of Town Centre Court west of McCowan Road) and a TBM extraction shaft at Eglinton Avenue East, east of the Don Montgomery Community Centre driveway. In addition, construction sites will be developed for Scarborough Centre Station, Scarborough Centre Station Bus Terminal, EEB and TPSS locations along the preferred alignment. The roadways of concern for EEBs and TPSS' are mainly the intersections along Eglinton Avenue East, north along Danforth Road, McCowan Road south of Ellesmere Road, and the intersection of Corporate Drive and Progress Avenue.

Impacts to the road network as a result of the tunnel mobilization sites in the vicinity of Scarborough Town Centre will potentially result in temporary lane diversions to prepare for long term construction operations. Temporary construction works consist of road closures and diversions in order to construct support structures for decking of the roadway (i.e., near Highway 401). Due to the proximity of the site to Highway 401 off-ramps on McCowan Road, MTO will be consulted on the queues and operational performance of the highway mainline and ramp terminals on McCowan Road as well as nearby ramps on Brimley Road and Progress Avenue during the Detailed Design Phase of the Project.

Impacts on the north side of Town Centre Court will be more extensive, requiring full closure of the following:

- Borough Drive, north of Town Centre Court; and,
- Triton Road (east connection) at McCowan Road.

Additional impacts to the roadway will occur as a result of EEB and TPSS construction. The construction sites will require cut-and-cover construction in order to access the tunnel shaft below the road. Traffic will be impacted in an adverse way depending on property availability at construction site locations.

The impacts of the Project will require the acquisition of mall parking at Scarborough Town Centre as well as parking near Kennedy Station designated for the Don Montgomery Community Centre. Parking will be impacted by the presence of construction site staging and construction operations. There may be parking impacts associated with the construction of EEBs and TPSS' depending on property requirements. These will be determined through the construction Site Plan process.

The total estimated construction traffic (trucks per hour) passing through the Study Area is to be considered to assess traffic operations during construction once required input is received from the Study Team. During the Detailed Design Phase of the Project, this heavy vehicle traffic will be overlaid on top of the existing base traffic in order to provide an updated assessment of traffic conditions under construction staging.

At no point in the construction should the existing Line 3 operations be impacted by the construction of the SSE. Line 3 is to remain fully functioning and operational until the SSE is completed and provides the necessary replacement and relief to be able to decommission Line 3 in the future.

Mitigation

Encroachment into the Highway 401 corridor with tunnel operations at tunnel mobilization sites will require agreements with the MTO, along with approval and permitting to ensure construction is conducted safely and does not impact Highway 401 operations.

At the tunnel mobilization sites where decking is to be constructed, it is the City's responsibility to maintain traffic in both directions on the affected roadways. Traffic lane reductions are permitted for temporary construction operations and with approval of the TTC. Appropriate signage will be installed to inform users of the construction road works. Upon decking completion, the roadway is to be configured so as to maintain existing Level of Service (LOS) that was in place prior to construction of decking. Existing lane availability is also to be maintained. Any reduction deemed necessary, will need to be approved by TTC and City staff. An appropriate traffic analysis may need to be provided during the Detailed Design Phase of the Project to ensure that a reduction in lane availability is feasible and maintains existing LOS.

The closure of Borough Drive north of Town Centre Court will directly impact connections with Scarborough Town Centre. Detour signing will be provided to direct users to alternative access points through either: Progress Avenue and Corporate Drive to the east; or Borough Drive to the west of Scarborough Town Centre.

The existing bus terminal will be directly impacted by the closure of Triton Road on the east end at McCowan Road for Scarborough Centre Station and tunnel work sites. Detours will be in place to divert existing service through alternate means. As this is a major gateway to and from the terminal with no means to replace it during construction, all access will be diverted to the west end at Triton Road and Borough Drive (west). Potential diversions will exist locally within Scarborough Centre to account for loss of the connection to McCowan Road. This will be accomplished through either Progress Avenue in the north or Borough Drive to the south, with diversion options at Ellesmere Road and Corporate drive as a means to access McCowan Road. Existing transit service is to be maintained and fully operational during construction, with diversion of select bus stops in the immediate surroundings (McCowan Road, Progress Avenue, Corporate Drive) where road side transit stops are impacted.

Additional consideration is to be given to mall delivery and service vehicles cut off by the Triton Road closure. Deliveries are to be accommodated and re-routed to alternative loading bays.

The existing route alignments and transit stop locations will be cross-referenced with the staging plans and temporary route realignments and stop relocation alternatives would be considered as required. Of particular importance, are potential staging impacts on Bus Terminal operations and access to existing Line 3 station entrances at Scarborough Centre Station and McCowan Station. Maintaining ease of transfer between Line 3,

Impacts, Mitigation Measures and Monitoring

GO Bus, and TTC bus route connections will also need to be considered. Considering that the existing bus station is the terminal location for many routes, temporary terminals / stops will have to be appropriately sized in order to accommodate boarding and alighting passenger loads. A communications plan / protocol will be developed to address any changes in TTC, GO Transit, Durham Transit and intercity bus carriers during construction.

The City's goal is to maintain existing LOS at all EEB and TPSS locations, including maintaining existing roadway lane availability to the greatest extent possible. Detailed construction staging and traffic management plans are to be produced and supplied to the TTC and City for review prior to any construction being implemented at all construction sites affecting roadway operations. Reductions to travel lanes are to be reviewed on a site specific basis and to be confirmed and co-ordinated with TTC and City staff.

During the Detailed Design Phase and implementation process, the City and their contractor / consultants will work with the TTC, Scarborough Town Centre and the Don Montgomery Community Centre to determine parking impacts and provide one to one replacement for any parking that is to be taken away as a result of the Project. Parking availability that is impacted as a result of EEB and TPSS construction will also be replaced at a one to one rate. All parking availability impacted is to be provided an equivalent replacement.

Monitoring

All roadways will be monitored during construction. Should any deficiencies occur within the network, appropriate mitigation measures are to be determined and applied in a timely manner so as to mitigate impact to the road network. All concerns are to be brought forward to the TTC in order to co-ordinate a timely resolution to any problems.

Any tracking of vehicle debris / dirt on the surrounding road network is to be kept to a minimum. Where concern is raised and debris is extensive, it is the City's responsibility to remove the debris in order to maintain existing roadway conditions. Tracking of vehicle debris can be minimized by wheel wash stations located at construction site exit points for heavy construction vehicles as well as staff.

5.3.5.2 Pedestrians and Cyclists

Impacts

Impacts will primarily be focused on areas where tunnel mobilization occurs which are located in the eastern half of Scarborough Town Centre between the existing Line 3 and McCowan Road (near Highway 401 at Progress Avenue and Corporate Drive; on the north side of Town Centre Court west of McCowan Road), at Eglinton Avenue East, east of the Don Montgomery Community Centre driveway, and the locations of EEB and TPSS construction sites along the preferred alignment.

The construction operations of the tunnel mobilization sites will result in the closure of Triton Road and Borough Drive. These closures will directly affect north and south crossing patterns in the Scarborough Town Centre area, as the sidewalk along the west side of McCowan Road north of Town Centre Court will be impacted throughout construction, as well as sidewalks along the north side of Town Centre Court up to and including Borough Drive at the north approach to Town Centre Court.

Impacts will also be associated with the closure of parts of Progress Avenue near Corporate Drive for the staging of the tunnel mobilization for launch shaft construction that will impact that intersection, as well as the Kennedy Station tunnel mobilization for the extraction shaft. Sidewalks within construction areas will be directly impacted and will need to be accommodated around the working site areas.

Additional impacts to pedestrian walkways will occur as a result of the EEB, tunnel ventilation structure, and TPSS construction sites. The construction sites may require cut-and-cover construction in order to access the tunnel shaft below the road.

Impacts to cyclists are expected to be limited to potential lane reductions and / or narrowed lanes on McCowan Road and Town Centre Court, as well as along McCowan Road through to Danforth Road and Eglinton Avenue. Cyclists may be encouraged to divert to other alternate routes if construction negatively impacts the space available for cyclists in the vicinity of the construction zone.

Mitigation

Project mitigation efforts during construction will seek to maintain as many pedestrian connections and crossing opportunities throughout the entire Study Area. Sidewalks within construction areas will be directly impacted and will need to be accommodated around the working site areas. Where crossing opportunities are eliminated such as the closure of Borough Drive north of Town Centre Court and closure of Triton Road, providing a crossing alternative is required. Alternate routes should be provided and clearly marked for any sidewalks or pathways that are temporarily closed. A protected pathway should be considered to facilitate connectivity between the north and south of the Study Area through the construction zone for the new Scarborough Centre Station. The protected crossing should be facilitated along the west side of the tunnel mobilization site located at Borough Drive, and run along the YMCA property to the north. This connection will be vital to maintaining pedestrian access between the north and south as the Borough Drive closure directly affects this area. Detour signage and / or a temporary walkway around the construction site are to be considered. It will be important to consider the *Accessibility for Ontarians with Disabilities Act (AODA)* requirements as part of the review of the impacts of proposed construction / traffic staging plans.

The existing bus stops at the bus terminal (where required) are to be maintained in order to minimize the extra distance that pedestrians will have to walk to take a bus and to make connections between transit routes and to/from key activity generators in the Study Area. Additionally, it is important to maintain existing on-street bus stops and provide appropriate relocations should the construction site impact their immediate location. Appropriate signage and notices are to be supplied to inform transit users of these changes. Where bus shelters are present, it will be required to relocate shelters to the new bus stop location during construction.

For cyclists, it is important to maintain curb lane widths to the greatest extent that is possible in order to maintain a comfortable and safe environment. Closure of Borough Drive should not affect current cyclist travel routes as it serves to access the mall property and no clear routes are designated at this location.

It is important that the design team maintain the existing connectivity Line 3 by way of Mall access from the north and the Scarborough Civic Centre to the south through the entire construction process. It is a priority to keep the Line 3 terminal operational. Maintaining pedestrian access ensures the continuity of transit service within the station precinct.

Impacts, Mitigation Measures and Monitoring

5.3.5.3 Rail

Impacts

The SSE will pass under the existing Line 3 guideway to the east of the existing Line 3 Scarborough Centre Station. Any and all construction stages will maintain the current operation of Line 3 through to completion of the SSE. Line 3 will remain in operation until the SSE is deemed fully operational. The preservation of operations for Line 3 is important; disruption to this service is not acceptable.

East of Kennedy Station, the existing tail tracks extend under the GO Transit / Stouffville rail corridor and under the north side of the Don Montgomery Community Recreation Centre's parking lot. The preferred alignment has been designed so that cut-and-cover construction of the SSE only begins east of the GO Transit / Stouffville rail corridor.

Mitigation

In order to mitigate impacts of construction in the vicinity of the rail corridor the existing Kennedy Station subway box under the rail corridor will remain and construction of the new cut-and-cover box connection to existing Bloor-Danforth subway (Line 2) will start 30 metres east of the centreline of the rail corridor. This will reduce the risk to any impacts to the existing GO Transit rail corridor.

Settlement analysis will be done for all structures within the zone of influence, see **Section 5.3.1.1**, and mitigation plans will be drawn up if there is unacceptable settlement of any structures, including Line 3 and GO Transit / Stouffville corridors.

Monitoring

Monitoring during construction will include ground settlement measurements, see **Section 5.3.1.1** for more detail.

5.4 Operations and Maintenance Impacts

5.4.1 Natural Environment

5.4.1.1 Terrain and Soils

No permanent impacts to terrain and soils are anticipated as a result of the operations and maintenance associated with the Project. Impacts to terrain and soils are transient and are related to construction, further discussed in **Sections 5.3.1.1**.

5.4.1.2 Groundwater

Potential impacts to groundwater due to Project activities / facilities are transient and related to construction. In addition, drainage systems, such as geo-composite sheet drains and permanent dewatering, are not used for the running structure or the permanent facilities, i.e., stations, EEBs, vent shafts; therefore, permanent groundwater issues resulting from the operations and maintenance of the Project are not anticipated.

5.4.1.3 Drainage and Hydrology

The operations and maintenance requirements for drainage and hydrology are dependent on the final design approved for implementation. As part of the Stormwater Management Strategy, OGS, green roof and bio-retention features may be required. Regular inspections and periodical removal of sediment and oil will be required for OGS units subject to manufacturer's specification. Periodical removal of filter media and replacement of planting material will be required for green roofs and bio-retention features if implemented as part of the final Stormwater Management Plan. Operations and maintenance requirements will be confirmed during the Detailed Design and construction phases of the Project and will be documented in a detailed Operations and Maintenance Manual to be prepared at the completion of construction.

5.4.1.4 Fish and Fish Habitat

No permanent impacts to fish and fish habitat are anticipated as a result of the operations and maintenance associated with the Project. Impacts to fish and fish habitat are transient and are related to construction, discussed in **Sections 5.3.1.4**.

5.4.1.5 Terrestrial Ecosystems

No permanent impacts to terrestrial ecosystems are anticipated as a result of the operations and maintenance associated with the Project. Impacts to communities and ecosystems are transient and are related to construction, further discussed in **Section 5.3.1.5**.

5.4.2 Emissions

5.4.2.1 Air Quality

Impacts

The results from the modelling of the Future Build Scenario shows that the worst-case cumulative concentration is below the guideline for all contaminants except for annual benzene and all of the particulates (particulate matter (PM)_{2.5}, PM₁₀ and total suspended particles (TSP)). The contribution of the Bus Terminal to the maximum concentration is less than 1 % for all pollutants, showing that existing roadway emissions dominate worst-case predicted concentrations in the Study Area. It is also important to note that the difference between the worst-case concentration between the Future No-Build and Future Build Scenarios is 1 % or less for all contaminants. These results show that the impact of the Bus Terminal is minimal, and overall cumulative impacts between the Future Build and Future No-Build scenarios are similar. During Detailed Design, a Certificate of Approval for Air Quality, in accordance with the EPA (through MOECC), will be obtained, if required, for the Scarborough Centre Station Bus Terminal and ventilation structures.

5.4.2.2 Noise and Vibration

Impacts

The predicted noise and vibration levels for the underground subway (see **Appendix B-4** Noise and Vibration Impact Study), without application of any track vibration isolation measures, at selected receptor locations indicate the potential for exceeding the recommended criteria, thus triggering the need to consider the application of track isolation measures.

Impacts, Mitigation Measures and Monitoring

The recommended criteria for noise and vibration to be used during the design for the permanent facilities are:

Land Use	Recommended Vibration Velocity Level Criteria MOECC / TTC	Recommended Vibration Velocity Level Criteria, Lv in dB reference to 10 ⁻⁶ in/sec	Recommended Indoor Sound Criteria (Not an MOECC criteria)
Houses and Townhouses	0.1 mm/s	≅ 71.9 dB ≈ 72 dB	Not Applicable (SSWA Recommends 35 dBA)
Apartment / Condominium Building	0.1 mm/s	≅ 71.9 dB ≈ 72 dB	Not Applicable (SSWA Recommends 35 dBA)
Institutional	0.1 mm/s	≅ 71.9 dB ≈ 72 dB	Not Applicable (SSWA Recommends 35 dBA)
Commercial	Not Applicable (≅ 0.18 mm/s)	77 dB SSWA standard	Not Applicable (SSWA Recommends 40 dBA)
Industrial	Not Applicable (≅ 0.32 mm/s)	82 dB SSWA standard	Not Applicable (SSWA Recommends 45 dBA)
Sensitive Buildings	Not Applicable (≅ 0.06 mm/s)	67 dB SSWA standard	Not Applicable (SSWA Recommends 30 dBA)

In situations where the ambient vibration is not significant, then the above criteria apply; however, where the ambient vibration levels are higher, then the ambient vibration is taken as the criteria.

The operation and maintenance of the proposed new Scarborough Centre Station Bus Terminal will have no impacts on residential land uses due to a combination of distance setbacks and high ambient noise levels due to existing traffic.

The emergency exit buildings, vent structures and traction power substations (TPSS) are considered stationary sources under the Noise Pollution Control (NPC)-300 guidelines. If the ambient noise due to traffic is higher than the above sound levels, then the ambient sound levels become the applicable criteria. Prediction of transformer noise should follow the International Organization for Standardization (ISO)-9613 procedures during Detailed Design.

The testing of emergency equipment may exceed the noise and vibration criteria, however under the City of Toronto By-Law for noise, operation of such fans, when used in emergency situations, is not subject to the MOECC Environmental Approval Process.

Mitigation

The results of the noise and vibration predictions for the subway (See **Appendix B-4 Table 2**) were adjusted to account for the use of railway vibration isolation, specifically floating slabs throughout the entire system with the application of a typical reduction factor to the vibration levels.

There will be no location where the subway would create an unacceptable noise / vibration impact. For the Scarborough General Hospital and dwelling units located directly above the preferred alignment (R30, R39 and R40 respectively – see **Appendix B-4 Table 2**) added caution is recommended in the form of further investigation of the residual impact on these buildings.

A resilient track system, specifically a “floating slab” system or equivalent is to be installed throughout the entire running structure as noise / vibration impacts are predicted at sensitive receptors along the preferred alignment. This is in order to reduce the ground-borne vibration and noise created by subway train movements. While the floating slab solution is regarded as an excellent recommendation for noise and vibration control throughout the entire alignment, further detailed consideration for the design of this floating slab should also be considered near the noted receptors, where the floating slab design may also incorporate the use of slightly higher vibration isolation efficiency of rubber isolation pads under the floating concrete slabs.

Implementation of noise control measures for the TPSS predicted to exceed the MOECC sound level criteria at any point of reception to include one or a combination of the following:

- Specifying low sound emission transformer system, for example:
 - Transformers core: maximum 59 dBA at 15 metres
 - Cooling fans: maximum 64 dBA at 15 metres
- The use of partial sound barriers or enclosed structures; and,
- Orientation of the equipment and structures.

The controls required for each TPSS may be unique depending on the distance setback, and height of the nearest receptors.

Application of acoustical treatment to ventilation shafts will be used if required. The acoustical treatment may include the use of acoustically lined turns and bends, partial barriers / enclosures near the ground surface and the application of special sound absorbing material to the inside walls of the shaft. The issue of noise in this case is considered as a routine technical matter for Detailed Design purposes.

The following is a summary of the potential stationary sources of noise that will require functional and Detailed Design with one of the objectives being to obtain MOECC approvals, Environmental Compliance Approval under the authority of the *EPA*:

- Bus Terminal;
- Ventilation shafts serving the station box and associated Heating, Ventilation and Air Conditioning (HVAC) equipment;
- Fire ventilation shafts and associated HVAC equipment;
- Ventilation shafts with grating at grade and associated HVAC equipment;
- Equipment that serves EEBs;
- HVAC equipment associated with TPSS’s, subway and / or bus stations; and,
- Electrical substations in the TPSS that feed the subway.

During operations, TTC will continue to follow their practices of routine maintenance of train wheels to eliminate “wheel flats” on their remote “wheel flats” monitoring stations or based on routine inspections of subway train wheels.

Impacts, Mitigation Measures and Monitoring

5.4.2.3 Electromagnetic Interference

Impacts

The most common concern with respect to EMI is the impact that it will have on computing devices including: microprocessor based patient diagnostic, monitoring, and therapeutic equipment. Based on tests undertaken by the Bay Area Rapid Transit (BART) system, examples of EMF intensities from human activities include the following: earth's static magnetic field varies from 300 milligauss (mG) (30 microtesla (μT)) at the equator to over 600 mG (60 μT) at the magnetic poles; overhead power transmission line: 32 to 57 mG (range of exposure to utility workers); household appliances: 8 to 165 mG (at a distance of 27 centimetres, or 12 inches); computer video display: 2 to 4 mG (at 35 centimetres, or 16 inches); and, rail vehicle (electrically powered): 400 mG (at 110 centimetres, or 43 inches from the vehicle floor) to 1,500 mG (at floor level).

Mitigation

TTC currently operates under and nearby a variety of sensitive uses, including hospitals and university laboratories. TTC has had no EMI related issues materialize along any part of its electric system. Based on measurements taken on the BART system, the results of the modelling showed that electromagnetic (not static) field levels above 50 μT do not extend beyond 10 metres from the centre of the two BART tracks at track level. Therefore the EMI is mitigated by the depth of the running structure (30 metres at the hospital) and horizontal distance (20 metres) from the hospital.

5.4.2.4 Climate Change

Impacts of Climate Change on the Project

Climate change is now being integrated into infrastructure planning and design as a way of building more resilient and robust systems. Incorporating sustainability and resiliency early on in the decision making process provides a level of flexibility to allow for changes in future weather and climate uncertainty to be incorporated into Project design. Climate change trends across Ontario, and more locally across the Greater Toronto Area show that temperatures are increasing across all seasons, precipitation patterns are changing, and extreme weather events are becoming more intense and frequent. Planning to account for these changes in historical averages, as well as shorter-term more extreme events, is challenging but essential.

Certain components of the SSE infrastructure will be more susceptible to climate change impacts than others, mainly those that are directly exposed to the elements. Since the majority of the SSE will be underground, the running structure is likely not directly impacted by a changing climate and weather conditions. However, there are other components that will be exposed, including the EEBs, ventilation shafts, TPSSs, station entrances and the Bus Terminal, as they are above ground components that will need to be designed to withstand the elements and consequently extreme weather events. Planning and design of the exposed infrastructure, should take into consideration key factors and climate change trends, such as building to withstand extreme precipitation and extreme heat. These climate events will impact the physical infrastructure as well as SSE users, including commuters and staff that are exposed to them.

Mitigation for Climate Change on the Project

Mitigation measures to minimize impacts to staff and commuters who may face more extreme and adverse weather and service disruptions in the future may include (but are not limited to) updating plans for weather emergencies, closures and rerouting, traveler information systems to include future climate change projections.

Impacts of the Project on Climate Change

Climate change impacts for the SSE are largely related to operations and maintenance. The transportation sector is one of the biggest contributors to the generation of carbon dioxide (CO_2). However, public transit produces lower greenhouse gas (GHG) emissions per passenger than individual vehicle trips, which helps minimize the carbon footprint of a transit system as a whole.

To better understand the environmental benefits of the SSE option, from a greenhouse gas perspective, the study team modelled Vehicle Kilometres Travelled (VKT) based on the approved transit network, for two scenarios: the approved transit network with the SRT and the approved transit network with the SSE (Express McCowan option). The results showed the approved transit network with the SSE would reduce the number of vehicle kilometres travelled by approximately 61,500 kilometres/day in 2031. This comparison suggests the addition of the SSE project to the approved transit network would likely reduce greenhouse gas emissions over the SRT option.

One of the key objectives of the SSE is to support the development of Scarborough Centre into a vibrant urban node by bringing a fast, efficient, high-capacity transit option for transit riders. The SSE will encourage residential intensification and urbanization of Scarborough Centre, facilitating compact land use and encouraging greater walkability. This intensification has the potential to reduce the distance people need to travel to work by locating jobs and essential services closer places of residence, ultimately reducing GHG emissions. Currently, Scarborough Centre is a destination that is predominantly accessed by vehicle. By extending Line 2 express to the Centre, this may lead to a shift in the modal split, and ultimately a reduction in the amount of cars, and as a result GHGs (which are a major contributor to climate change). The Line 2 extension will provide a capacity of over 30,000 people per hour whereas the SRT (Line 3) with the current fleet has a capacity of 4,000 people. Additionally, the TTC will expand its frequency of bus fleet by 11 buses in each direction during peak hours. The impact of the bus operation on climate change will depend on fuel source. It should be noted that the TTC does operate some energy smart buses that are a diesel-electric hybrid.

Ontario's Climate Change Mitigation and Low-carbon Economy Act, 2016, sets out steps and actions that may be taken to fight climate change as well as initiatives relating to the reduction of greenhouse gas from transportation such as public transit vehicles, infrastructure and buildings that reduce greenhouse gas emissions. One of the key components of the ministry's mandate includes building on and supporting the most current science, by leading the development of a new long-term climate change strategy for Ontario to help the government achieve its greenhouse gas reduction targets of 15% by 2020, 37% by 2030 and 80% by 2050 below 1990 level.

The TTC and City of Toronto contribute to Ontario's efforts of meeting its goal of becoming a low-carbon economy through their policies, practices, procedures and design. The TTC's established safety, health and environment policy targets sustainability and environmental footprint reduction through energy and resource conservation.

Impacts, Mitigation Measures and Monitoring

Additionally, the TTC complies with the Toronto Green Standard (TGS), and the associated Green Roof By-law subject to further discussions with the City. These standards are a set of performance measures and guidelines for new developments that promote sustainable site and building designs with the goal of addressing Toronto's urban environmental pressures, such as air quality, climate change and energy efficiency. The TGS is also a key strategy to achieve the City of Toronto's Climate Change Action Plan, an environmental plan aimed at reducing the City's GHG emissions by 80% by 2050. The Plan outlines regular monitoring and reporting by the City to the community on the progress of reducing emissions and meeting their targets.

Achieving the TGS also contributes towards Leadership in Energy and Environmental Design (LEED) Certification. The TTC goes beyond the TGS through the use of LEED specifications to ensure that additional LEED standards are incorporated in their projects in an effort to further encourage energy reductions. The TTC and City of Toronto's environmental sustainability policy guidelines and the application of the TGS and LEED practices assist in meeting not only the City's emission targets, but also contribute to Ontario's goal of low-carbon economy.

5.4.3 Socio-Economic Environment

5.4.3.1 Utilities

No permanent impacts to utilities are anticipated as a result of the operations and maintenance associated with the Project. Impacts to utilities are transient and are related to construction which is discussed in **Section 5.3.3.1**.

5.4.3.2 Buildings and Property

No permanent impacts to building or property are anticipated as a result of the operations and maintenance associated with the Project. Impacts to buildings and property are either permanent displacements (**Section 5.2.3.3**) or are transient and related to construction (**Section 5.3.3.2**).

5.4.3.3 Business and Recreational Disruption

No permanent impacts to businesses or recreational facilities (the Don Montgomery Community Recreation Centre, Bendale Library and the Frank Faubert Woodlot) are anticipated as a result of the operations and maintenance associated with the Project. Impacts to businesses and recreational facilities are transient and related to construction (**Section 5.3.3.3**).

During testing of emergency equipment nearby businesses and recreational facilities may be momentarily interrupted; however there will be no business loss from testing the emergency equipment.

5.4.3.4 Urban Design

No permanent impacts to aesthetics are anticipated as a result of the operations and maintenance associated with the Project. Potential impacts to aesthetics are associated with the displacement of existing features and are described in **Sections 5.2.3.4**.

The Project will result in vast improvements to public realm, including an extension of Borough Drive between Town Centre Court and Progress Avenue, while also setting aside an allowance for public realm improvements.

5.4.3.5 Waste Management

Impacts

Waste materials may be generated as part of SSE operations and maintenance activities. Poorly managed waste may contribute to an increase in waste material on the landscape and contamination of the natural environment.

Mitigation

Waste material generated during operations and maintenance activities will be removed regularly from the Scarborough Centre Station and Bus Terminal sites and disposed of at an approved waste facility.

5.4.4 Cultural Environment

5.4.4.1 Archaeology

No permanent impacts to archaeological resources are anticipated as a result of the operations and maintenance associated with the Project. Potential impacts to archaeological resources are related to construction and are discussed in **Sections 5.2.4.1** and **5.3.4.1**.

5.4.4.2 Built Heritage Resources and Cultural Heritage Landscapes

No permanent impacts to built heritage resources and cultural heritage landscapes are anticipated as a result of the operations and maintenance associated with the Project. Potential impacts are related to construction and are discussed in **Sections 5.2.4.2** and **5.3.4.2**.

5.4.5 Transportation

5.4.5.1 Automobile Traffic and Transit Service

Impacts

Upon construction completion, Triton Road and Borough Drive will be re-instated and existing road connections restored at all construction work sites related to the SSE construction efforts. As a result of the extensive construction at the tunnel mobilization site at Borough Drive and Town Centre Court, the opportunity to reconfigure Borough Drive was created and as such the new Borough Drive road connection was designed and is to extend directly north from Town Centre Court through the existing parking lot and connect into a newly designed and functional intersection at Progress Avenue. This provides more direct access to Progress Avenue, eliminating the existing westward jog of Borough Drive to bypass the Scarborough Town Centre parking lot for the theatre.

Impacts, Mitigation Measures and Monitoring

The new connection of Borough Drive with Progress Avenue will create a newly designed and functional intersection with the existing Scarborough Town Centre entry to the west, Progress Avenue running north and east, the McCowan Road off ramp from the northeast and Borough Drive to the south. It is likely that the overall vehicular demand at this intersection will increase due to the re-alignment, which in turn may result in new capacity-related operational issues and / or increase in the severity of existing operational issues due to the change in traffic patterns around the Scarborough Town Centre as a result of the Project.

The existing Triton Road intersection at McCowan Road is to be widened to account for a large median separation between inbound and outbound movements for the new Scarborough Centre Station Bus Terminal design, and station entrance from McCowan Road. This widening of the access to Triton Road will involve modification of the intersection at Triton Road and McCowan Road to accommodate the wider connection. With the creation of a larger bus terminal, traffic operations along Triton Road are expected to increase by a nominal 11 buses per direction in peak hours. The addition of these buses onto McCowan Road is not anticipated to impact overall capacity of McCowan Road, however there may be some impacts to the intersection with Triton Road and McCowan Road as an increase in transit vehicles will cause more transit prioritization calls to trigger the intersection to cycle. This may affect travel times on McCowan Road.

The new connection of Borough Drive with Progress Avenue will eliminate existing parking. A new parking lot is to be created over the old Borough Drive connection that looped westward, towards the Scarborough Town Centre and theater entrance to replace the parking lost by the new connection.

Any impacts associated with the EEB, TPSS and Kennedy Station Extraction Shaft construction sites will be eliminated and the existing conditions be reinstated once construction is complete. No changes will be observed.

Mitigation

Detailed traffic analysis will be completed during the Detailed Design Phase of the Project for the road network surrounding Scarborough Town Centre to ensure that traffic can be accommodated within the new road network. Future travel patterns will be predicted and anticipated vehicle movements will be routed to evaluate operations. Recommendations and mitigation measures will be created and applied to the road network to ensure existing operations are maintained and / or improved.

The extension of Borough Drive through to Progress Avenue creates a five-legged intersection. Therefore, a detailed traffic analysis and intersection design is required to ensure the intersection operates correctly and efficiently. This is to be completed during the Detailed Design Phase of the Project. Desired paths through the intersection will likely need to be formalized through the use of raised islands / channels in order to minimize potential driver confusion. Vehicle turning radii will need to be confirmed for the new movements created. Some movements may need to be restricted or prohibited during high-demand times (i.e., peak hours) to maintain acceptable levels of service. Additionally, there may be potential for queues to propagate from the intersection of Progress Avenue and the Borough Drive extension to upstream intersections, including southbound on McCowan Road. This may subsequently impact the operations at the Highway 401 ramp terminal intersections on McCowan Road. Operational performance will be highly dependent on the proposed operational configuration and optimizations for the new intersection.

The existing intersection of Triton Road and McCowan Road will be reconfigured with separate bus entry and exit. The mode of operations at the entry and exit access points, potential delays and queues for the buses exiting the terminal, and impact on the traffic operations on McCowan Road will all be assessed in a traffic impact study. The traffic impact study shall conform to the applicable requirements of the City of Toronto and MTO guidelines for traffic impact studies, and utilize the latest traffic counts and proposed operational schedules (i.e., bus routes and frequencies) from TTC. The traffic impact study is to be completed during the Detailed Design Phase of the Project and will include the above mentioned traffic analysis. Due to the close proximity of the intersection with the surrounding intersection of McCowan Road and Town Centre Court, as well as the potential at-grade configuration of the Progress Avenue with McCowan Road, as outlined in the Scarborough Centre Transportation Master Plan, the intersections will need to be designed with co-ordination in mind to ensure delays and queuing are acceptable and kept to a minimum.

Parking affected by construction will be re-instated and replaced on a one to one basis. Parking eliminated as a result of the new Borough Drive extension will be replaced westward over the previous Borough Drive / Mall Road in front of the Scarborough Town Centre theatre. The parking lot will be carefully planned and designed to utilize the space to the best potential. Any parking unable to be accommodated within this area will be supplied or relocated to a new location within the Scarborough Town Centre property limits.

5.4.5.2 Pedestrians and Cyclists

Impacts

The main impacts during operations and maintenance for the SSE will be experienced within the new Scarborough Centre Station design, the new Borough Drive connection between Town Centre Court and Progress Avenue, and the creation of a newly designed and functional Progress Avenue with Borough Drive. This new connection will provide a new access point for pedestrians coming to and from the new Scarborough Centre Station.

No additional impacts will result from the operation or maintenance of the SSE as all existing road conditions prior to construction are to be restored and reinstated upon completion of the construction operations.

Mitigation

All pedestrian and cycling connections will be restored to existing conditions and new sidewalks and crossing opportunities will be supplied at the new Borough Drive. The newly designed and functional intersection of Borough Drive and Progress Avenue will be reconfigured and will incorporate new pedestrian connections and crossing opportunities. In order to maximize pedestrian mobility, a sidewalk connection will be provided along Borough Drive and at the new intersection with Progress Avenue. The new intersection will be designed with pedestrian users in mind, and will be constructed to meet existing AODA compliance.

Pedestrian and cyclist amenities will be included in the Scarborough Centre Station to facilitate the new service. These will be developed (through the Site Plan Process) to enhance current amenities in order to achieve an equal or better level of service for both travel modes. To keep in line with the Scarborough Centre Transportation Master Plan, pedestrian walkways will be provided and integrated into all new construction works fronting the streets and future cycling routes will be evaluated and implemented into the Site Plan Process.

Impacts, Mitigation Measures and Monitoring

Cycling amenities will include new bicycle racks on the exterior, as well as indoor bicycle storage located within the Scarborough Centre Station to provide a secure and protected area for cyclists. These facilities will encourage future cycling to and from the Scarborough Centre Station.

5.4.5.3 Rail

There are no permanent impacts resulting from the operations and maintenance associated with the SSE. All potential impacts are transient and relate to the construction of the SSE (see **Section 5.3.5.3**).

5.5 Summary of Impacts, Mitigation Measures and Monitoring

Below are three tables summarizing potential impacts, mitigation and monitoring for the following categories as detailed in **Sections 5.2, 5.3** and **5.4** above:

- Displacement of existing features;
- Construction impacts; and,
- Operations and maintenance impacts.

Potential impacts in each table are described by feature, corresponding to the order in which they are presented within **Sections 5.2, 5.3** and **5.4**. Only features that are potentially impacted are described.

Table 5-5, Table 5-6 and **Table 5-7** are intended to provide a summary of key impacts, mitigation measures and monitoring to be undertaken as part of the implementation of the SSE. Commitments to future work that have resulted from the identification of potential impacts, including necessary permits and approvals, are also described. A complete list of future commitments is also provided in **Section 6**.

All impacts described above are a result of the implementation of the SSE only; they do not account for cumulative effects⁵ due to the overlap of effects with other current / futures projects in the area. An assessment of cumulative effects is not required under the Provincial EA process / Transit Project Assessment Process (TPAP) and given the nature of the Project, the cumulative effects are not anticipated to be considerable.

5. Cumulative effects are changes to the environment caused by the residual effects from a project combined with residual effects from other projects. Cumulative effects assessments are typically required under the Federal EA process.

Impacts, Mitigation Measures and Monitoring

Table 5-5: Impacts, Mitigation and Monitoring Related to the Displacement of Existing Features

Feature	Impacts	Mitigation	Monitoring
Drainage and Hydrology	<ul style="list-style-type: none"> ▶ Impacts to existing storm sewers requiring relocation or replacement. ▶ Minor increase in impervious areas. ▶ Impacts to surface water quality, quantity, water balance and erosion control. ▶ Potential impacts to Highland Creek watercourse due to relocated storm sewer outfall. 	<ul style="list-style-type: none"> ▶ Conduct Hydraulic Analysis and Modelling to define the level of impact on flow rates, runoff volumes, and water levels and velocities as a result of Project ancillary facilities during the Detailed Design Phase of the Project. ▶ Complete a storm sewers impact assessment during the Detailed Design Phase of the Project. ▶ Complete a stormwater management strategy during the Detailed Design Phase of the Project. ▶ Potential relocation / replacement of existing storm sewers to be identified during the Detailed Design Phase of the Project. ▶ During the Detailed Design Phase of the Project, utilize the following lot level controls as appropriate, to mitigate surface water quality, quantity, water balance and erosion: <ul style="list-style-type: none"> - Rooftop garden; - Landscape areas with absorbent soil; - LID including permeable pavement, perforated pipe, infiltration trenches, enhanced swale, etc. based on site conditions in accordance to the City of Toronto Green Streets guideline and other LID guidelines, including the TRCA LID-SWM Planning Design Guide; - OGS; - Roof Control Drains on above-ground buildings; and, - Lot level conveyance controls such as underground storage and parking lot storage. ▶ During the Detailed Design Phase of the Project, the following TRCA policy programs and guidelines will be used to design components of the EEBs, station and TPSSs: <ul style="list-style-type: none"> - TRCA Stormwater Management Criteria (2012); - Low Impact Development Guidelines for Storm Water Management Design; - GGHACA Erosion and Sediment Control Guidelines for Urban Construction (2006); - TRCA Geotechnical Engineering Design and Submission Plan Guidelines; and, - TRCA Environmental Impacts Statement Guidelines. ▶ Advanced waterproofing measures for running structure at watercourse crossing to mitigate potential water leakage. 	N/A
Fish and Fish Habitat	<ul style="list-style-type: none"> ▶ Potential impacts to watercourses including: <ul style="list-style-type: none"> - Tributary of Dorset Park Branch of West Highland Creek, - Dorset Park Branch of West Highland Creek and - Bendale Branch of West Highland Creek. ▶ All watercourses support direct fish habitat. However, running structure will be tunnelled at least 10 metres below the stream bed; therefore, no serious harm to fish or fish habitat is anticipated. 	<ul style="list-style-type: none"> ▶ Request for Review by the Department of Fisheries and Oceans Canada will be required during the Detailed Design Phase of the Project. 	N/A

Impacts, Mitigation Measures and Monitoring

Table 5-5: Impacts, Mitigation and Monitoring Related to the Displacement of Existing Features

Feature	Impacts	Mitigation	Monitoring
Terrestrial Ecosystems	<ul style="list-style-type: none"> ▶ Cut-and-cover excavation sites for construction of EEBs and TPSS's may require the removal of private and city owned trees. 	<ul style="list-style-type: none"> ▶ Creation of a tree protection zone (TPZ) delineated by tree protection fencing in accordance with the City of Toronto specifications. Any area inside the TPZ must be left undisturbed (including overhead), no altering of grade, excavating, trenching, scraping, dumping or disturbance of any kind shall occur within this zone. ▶ If extensive soil compaction has occurred, the City's contractor will be responsible for aerating the area once construction is completed and fertilizing in the following year. ▶ Construction materials, equipment, soil, construction waste or debris are not to be stored within the TPZ or drip line of the trees identified for protection. ▶ There should be no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ. ▶ If the TPZ needs to be reduced to facilitate construction access, the tree protection barrier must be maintained at a lesser distance and the exposed TPZ protected with plywood and woodchips. ▶ Determine, in consultation with City of Toronto, whether the Ravine and Natural Feature Protection By-law applies to this Project. 	N/A
Buildings and Property	<ul style="list-style-type: none"> ▶ Portions of private holdings will need to be acquired along the preferred alignment in order to accommodate the Scarborough Centre Station Bus Terminal, station entrances, TPSS's, and EEBs. ▶ Permanent property impacts will include: <ul style="list-style-type: none"> - Full acquisition: three properties - Partial acquisition: 41 properties 	<ul style="list-style-type: none"> ▶ By locating 80 % of the preferred alignment within municipal and provincial road allowances, the need for acquiring private property interests is reduced. ▶ Property requirements will be carefully determined and refined during the Detailed Design Phase of the Project, in order to minimize the amount of private land required. ▶ Demolition permits will be obtained from the City of Toronto for buildings and structures requiring demolition. ▶ Undertake Designated Substances Surveys for any buildings or structures which require demolition. ▶ The property acquisition process will be conducted such that it is fair and equitable to all property owners. 	N/A
Urban Design	<ul style="list-style-type: none"> ▶ Addition of transit facilities (such as EEBs, TPSS's, etc.) to communities will alter the visual setting in which they are located. 	<ul style="list-style-type: none"> ▶ Location of non-public station elements to be determined during the Detailed Design Phase of the Project to minimize impact on residential or commercial areas. ▶ Further public consultation as part of the Site Plan Approval process will occur during the Detailed Design Phase to allow the public and key stakeholders to provide additional input into the design of surface station elements. 	N/A
Archaeology	<ul style="list-style-type: none"> ▶ Potential temporary impacts related to the Stage 2 Archaeological Assessment include shovel test pitting survey on impacted properties and the possibility of identifying an archaeological site within the impacted properties. 	<ul style="list-style-type: none"> ▶ All test pits will be backfilled to grade so that no visible indications of the survey will be present. ▶ Any archaeological sites identified during the Stage 2 assessment will be subject to further Stage 3 and 4 assessments if required in order to clear the way for construction. ▶ Stage 2 Archaeological Assessment report will be submitted to the Ministry of Tourism, Culture and Sport for their review in order to obtain a letter of acceptance. ▶ Any further archaeological assessments will be completed as necessary, and corresponding documentation will be registered with the MTCS. 	N/A
Pedestrians and Cyclists	<ul style="list-style-type: none"> ▶ Permanent removal of informal walkway at Scarborough Town Centre allowing direct access from the south side of the Triton Road trench to the north side of the Triton Road trench, near the mall loading docks and theatre. ▶ Longer walks relative to the existing SRT station for customers from the west side of Borough Drive. 	<ul style="list-style-type: none"> ▶ A pedestrian bridge will be constructed across the new bus terminal in the general area of the western end of the YMCA building, thus providing an additional crossing between the existing mall bridge to the west, and the new Borough Drive to the east. ▶ Access will be maintained to the new bus terminal level from the existing mall bridge on the west and a new street entrance at McCowan Road on the east. ▶ A main entrance will be incorporated at the upper level on the east side of Borough Drive and provision will be made for construction of an additional access further north at the Borough Drive level. 	N/A

Impacts, Mitigation Measures and Monitoring

Table 5-6: Impacts, Mitigation and Monitoring related to Construction

Feature	Impacts	Mitigation	Monitoring
Terrain and Soils	<ul style="list-style-type: none"> ▶ Potential settlement or ground movement as a result of construction and the impact of this movement on existing facilities, infrastructure, buildings, etc. within the proposed corridor. Impacts may include cosmetic and / or structural damage to buildings and other types of structures adjacent to the tunnel and excavation works. 	<ul style="list-style-type: none"> ▶ Further studies will be conducted during the Detailed Design Phase of the Project, for example, studies to understand the soil matrix, the soil's compression index, soil type thickness, and sustained building load and foundation aspect ratio. ▶ Conduct Settlement Impact Assessment for the tunnelling and Scarborough Centre Station construction based on the results of the geotechnical and geo-environmental investigation program. Specifically, the assessment will address: <ul style="list-style-type: none"> - Tunnelling in the vicinity of HONI Tower 41 (Gatineau Hydro Corridor); - Tunnelling under existing buildings and structures; and, - Cut-and-cover construction for Scarborough Centre Station and the tunnel construction shaft in the vicinity of the Scarborough Rapid Transit (SRT) (Line 3). ▶ Utilize ground stabilization methods such as grouting, groundwater cut-offs, the installation of underpinning and support for infrastructure, structures and buildings, as required, and the use of stiff excavation support systems such as contiguous caisson walls. ▶ Utilize typical mitigation for cut-and-cover construction (e.g., support of excavation, wall embedment to cut off groundwater, use of tie-backs and / or internal struts to support excavation). ▶ Protection of Line 3 structures (e.g., limiting live load surcharges from heavy construction vehicles, material stockpiling, or uneven earth pressures, jet grouting under the piers, and applying temporary bracing for the duration of construction). 	<ul style="list-style-type: none"> ▶ Develop and implement a Settlement Monitoring Plan ▶ Monitoring points will include: <ul style="list-style-type: none"> - Settlement monitoring points; - Utility monitoring points; - Building monitoring points; - Tilt meters and level beams; - Inclinometers; and, - Strain gauges. ▶ Post-construction inspection surveys will be compared with pre-construction surveys to determine if there were any structural impacts from the construction activities.
	<ul style="list-style-type: none"> ▶ Displacement of approximately 1,000,000 cubic metres of surplus excavated material generated by tunnelling and cut-and-cover construction of the running structure and Scarborough Centre Station. ▶ Excess soil may be stained, odourous, contain debris or contaminated. 	<ul style="list-style-type: none"> ▶ A Soil and Groundwater Management Strategy will be developed during the Detailed Design Phase of the Project. ▶ Excess soil will require waste classifications in accordance with regulatory requirements. Regulatory requirements in place at the time of construction and excess materials management guidelines and specifications (e.g., OPSS180) will be used when developing an Excess Materials Management Plan. 	<ul style="list-style-type: none"> ▶ Test and monitor excavated soils in accordance with the Soil and Groundwater Management Strategy.
Groundwater	<ul style="list-style-type: none"> ▶ Impacts are largely related to dewatering and may include: <ul style="list-style-type: none"> - Impacts to aquifers and recharged / discharge areas; - Settlement of the ground surface and movement / settlement of structures as well as surface and subsurface infrastructure; and, - Changes to the groundwater flow patterns. 	<ul style="list-style-type: none"> ▶ Tunnel will be installed using earth pressure balancing TBMs ▶ Cut-and-cover sections requiring temporary dewatering will be minimized using continuous caisson wall, slurry wall or other watertight support systems as required ▶ Obtain Permit to Take Water from the MOECC for locations where dewatering exceeds 50,000 litres per day. ▶ Obtain Discharge Permit or Discharge Agreement with the City of Toronto for dewatering during construction. ▶ Execute Industrial Waste Surcharge Agreement with City of Toronto, if water discharge to sanitary sewer exceeds City of Toronto Sanitary and Combined Sewer By-Law. 	<ul style="list-style-type: none"> ▶ The monitoring program will include: <ul style="list-style-type: none"> - Groundwater monitoring wells to be installed within and around excavations to measure the groundwater levels (before, during and after construction activities); - Monitoring of the dewatering system to ensure that the flow rates meet with the MOECC issued Permit To Take Water as well as the City of Toronto issued Construction Dewatering Discharge Permit; and, - Temporary filtering and treatment facilities to monitor the effluent to ensure that discharge water meets the applicable analytical standards and criteria.

Impacts, Mitigation Measures and Monitoring

Table 5-6: Impacts, Mitigation and Monitoring related to Construction

Feature	Impacts	Mitigation	Monitoring
Drainage and Hydrology	▶ Cut-and-cover construction could potentially interfere with existing drainage, including storm sewers and major flow and overland flow routes.	<ul style="list-style-type: none"> ▶ Co-ordinate with the City of Toronto for ongoing City projects within the Bendale Branch of West Highland Creek. ▶ Prepare an ESC Plan, which complies with prevailing TRCA and Toronto Water guidelines and requirements prior to the start of Project construction activities. ▶ Obtain permits and approvals in accordance with Ontario Regulation 166/06 (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses) within TRCA-regulated areas (Bendale Branch of West Highland Creek) prior to the start of Project construction activities. 	▶ The ESC Plan, will provide the framework for the inspection and maintenance including repair, and record keeping procedures during all stages of construction.
	<ul style="list-style-type: none"> ▶ The construction footprint of EEB 5 and associated vent structure is within 30 metres of TRCA regulated Bendale Branch of West Highland Creek. Potential impacts include: <ul style="list-style-type: none"> - Tree removal; - Water quality (e.g., silt); and, - Relocation of stormwater outfall. 	<ul style="list-style-type: none"> ▶ Prepare an Environmental Management Plan for the construction of EEB 5 to assess and address impacts such as impacts to nearby terrestrial features from construction and any dewatering impacts related to surface features such as fish and fish habitat. ▶ Consult with TRCA for TRCA regulated areas, to determine whether the Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario Regulation 166/06) applies to this Project. Apply for and secure a Permit, as applicable prior to the start of Project construction activities. 	N/A
Terrestrial Ecosystems	▶ Although no nests of migratory birds were documented with the Study Area, there was evidence of breeding birds having the potential to nest within the vicinity of the Project.	▶ If construction must occur during the nesting window (April 1 to August 31), construction activities will be conducted in accordance with the <i>MBCA</i> . A qualified avian biologist will be retained to conduct a nesting survey. If active nests are found, prepare a site-specific mitigation plan in consultation with the Canadian Wildlife Service.	N/A
Air Quality	▶ Potential for temporary dust, NO _x and VOC emissions during construction.	▶ Application of best management practices will be followed during construction (e.g., dust suppression).	N/A
Noise and Vibration	▶ Impacts due to cut-and-cover construction from equipment may impact sensitive receptors depending on number, type, and time of operation of machines.	<ul style="list-style-type: none"> ▶ Develop and implement a Construction Noise and Vibration Management Plan prior to the start of Project construction, which may include mitigation measures such as the use of temporary noise walls, timing of construction activities, etc. ▶ Obtain Noise By-Law Exemption, if required, in accordance with City of Toronto Noise By-Law (Chapter 591), requirements for 24-hour tunnelling and other schedule critical construction activities. ▶ Develop and implement a complaint protocol to manage complaints that may arise from construction activities. 	▶ Monitoring to be conducted in accordance with the Construction Noise and Vibration Management Plan.
	▶ Impacts due to building demolition.	▶ Consideration should be given to time of operation of the equipment / demolition event.	N/A
	▶ Minor vibration impacts due the operation of the TBM.	▶ Undertake a settlement analysis during the Detailed Design Phase of the Project for the preferred alignment and define the zone of influence.	▶ Vibration monitoring will be required in cases where a receptor is within the zone of influence.
Utilities	▶ Permanent or temporary impacts to utilities due to cut-and-cover construction.	<ul style="list-style-type: none"> ▶ Discussions with utility companies will be conducted throughout the design and construction phases to ensure stakeholder and customer interests are taken into account and disruptions as a result of customer connections/ disconnections are minimized. ▶ Develop utility and municipal servicing relocation plans with service providers. Contact utility companies including Bell Canada, Rogers Communications Partnership, Cogeco Data Services, Zayo Group (formerly Allstream Inc.), Telus Communications Company, Enbridge Gas, Toronto Hydro Electric System Limited and the City of Toronto (watermains, stormwater and sanitary sewers) early during the Detailed Design Phase to confirm plant location and discuss relocation strategies / cost sharing. ▶ For Project elements that are to be constructed by cut-and cover methods, two approaches will generally be used for impacted utilities: <ul style="list-style-type: none"> - Temporary support and protection through the construction site; and, - Relocation of utilities that cannot be temporarily supported (e.g., large utilities). 	▶ Undertake stray current protection (if applicable) and monitoring for utilities.

Impacts, Mitigation Measures and Monitoring

Table 5-6: Impacts, Mitigation and Monitoring related to Construction

Feature	Impacts	Mitigation	Monitoring
	<ul style="list-style-type: none"> ▶ High voltage overhead wires where the preferred alignment crosses the Gattineau HONI Corridor north of Lawrence Avenue (not likely impacted). Potential impact to existing hydro tower at the north end of the HONI Corridor, west of McCowan Rd. 		<ul style="list-style-type: none"> ▶ Conduct further discussions with HONI to reach agreement on monitoring of HONI infrastructure during construction.
Buildings and Property	<ul style="list-style-type: none"> ▶ Temporary property will be required during the construction phase to establish work zones, material laydown areas, equipment / maintenance storage, construction worker parking. 	<ul style="list-style-type: none"> ▶ The City of Toronto will negotiate temporary agreements with property owners on a case-by case basis following the same procedures as permanent displacement. ▶ Following construction, properties are to be restored to pre-construction condition, to the extent possible. 	N/A
Business and Recreational Disruption	<ul style="list-style-type: none"> ▶ The impacts to local businesses can primarily be changes in vehicle and pedestrian movement patterns, but may also include the following: <ul style="list-style-type: none"> - Reduced visibility of storefronts and signs; - Reduced on-street parking; - Less convenient access and disruption or closures to any off-street parking facilities; and, - Patron inconvenience due to temporary construction debris, noise and dust. 	<ul style="list-style-type: none"> ▶ Develop a Consultation Plan for construction prior to the start of Project construction activities. ▶ TTC's Community Relations Team will work with and inform communities, residents, business owners and institutions directly impacted by new construction. 	N/A
Urban Design	<ul style="list-style-type: none"> ▶ Construction work will be visible along the preferred alignment. Potential impacts to visual landscapes / setting during construction include the construction work sites; mud on the roads; construction vehicles idling; lighting of the work sites. 	<ul style="list-style-type: none"> ▶ Construction sites will be hoarded to minimize visual intrusion of the construction activity. ▶ Temporary construction site lighting will be positioned to meet construction safety requirements, while minimizing light infiltration into adjacent residential properties. ▶ Wheel wash stations located at construction site exit points for heavy construction vehicles. 	N/A
Waste Management	<ul style="list-style-type: none"> ▶ Poorly managed waste may contribute to an increase in waste material on the landscape and contamination of the natural environment. 	<ul style="list-style-type: none"> ▶ Waste and excess materials will be dealt with in accordance with OPSS 180, General Specification for the Management and Disposal of Excess Material. Waste generated on-site, which requires off-site removal should be in accordance with Ontario Regulation 347 under the EPA which provides for the transportation and processing of hazardous and non-hazardous waste. Additionally, in order to mitigate the potential impacts associated with excess material storage, no stockpiles shall be located closer than 30 metres from water features, in accordance with OPSS 180. ▶ Phase 1 and 2 Environmental Site Assessments will be conducted as applicable prior to property acquisition. 	N/A

Impacts, Mitigation Measures and Monitoring

Table 5-6: Impacts, Mitigation and Monitoring related to Construction

Feature	Impacts	Mitigation	Monitoring
Automobile Traffic and Transit Services	<ul style="list-style-type: none"> ▶ Construction sites will cause roadways to be narrowed and diverted around construction sites. ▶ Progress Avenue temporary diversions to accommodate road decking. No closures, instead lane reductions. ▶ Movement of construction vehicles (heavy trucks) in to, out of, and within the construction sites. ▶ Triton Road closed east of Borough Drive. ▶ Parking lots north of Triton Road (east of the theatre) closed near Borough Drive. ▶ Buses rerouted. 	<ul style="list-style-type: none"> ▶ Traffic Impact Study to be conducted. ▶ Staging and Traffic Management Plan produced and implemented during construction. ▶ Maintain existing level of service for roads around tunnel mobilization sites. ▶ Bus routes on Triton Road to be diverted to the west end at Triton Road and Borough Drive. ▶ Mall delivery and service vehicles affected by Triton Road closure will be accommodated and re-routed to alternative loading bays. ▶ Alternative signal timing plans and detour route signage to be implemented. ▶ Consultation and communication with emergency services (fire, police, emergency medical systems) to maintain acceptable routes and service levels. ▶ Emergency service routes must be secured. ▶ Develop a communications plan / protocol to address any changes in TTC, GO Transit, Durham Region Transit (DRT) and intercity bus carriers during construction. ▶ Truck turning movement assessments for proposed truck routes in the Study Area. ▶ Traffic management measures (temporary barriers, on-site personnel) for movement of construction trucks are to be employed. ▶ Any parking lost during construction will be replaced as appropriate. 	<ul style="list-style-type: none"> ▶ All roadways will be monitored during construction as part of the Staging and Traffic Management Plan.
Pedestrians and Cyclists	<ul style="list-style-type: none"> ▶ Limited accessibility between McCowan Road / Town Centre Court and the Scarborough Town Centre (the theatre). ▶ Safety concerns for pedestrians on sidewalks near construction sites. ▶ Pedestrian sidewalks may be partially closed during certain stages of construction. ▶ Cyclists affected by lane reductions / narrowed lanes around construction sites. 	<ul style="list-style-type: none"> ▶ Pedestrians may access the Scarborough Town Centre at alternative access points and travel north / south internally within the Scarborough Town Centre. ▶ Pedestrians may be forced to the opposite side (i.e., from west to east side). ▶ Pedestrian sidewalks / connections to be maintained via use of temporary structures to provide physical separation from the construction and safety against potential hazards. ▶ Maintain curb lane widths to the greatest extent possible to provide a safe environment for cyclists. 	<ul style="list-style-type: none"> ▶ Monitoring and maintenance of safety features near construction sites.
Rail	<ul style="list-style-type: none"> ▶ Cut-and-cover construction will occur east of the Metrolinx / GO corridor adjacent to Kennedy Station. There is a low potential for settlement of the tracks to occur. ▶ Line 3 needs to be operational / service level maintained for existing riders during the construction of the Project. There is potential for impacts to occur due to construction activities in the vicinity of the Line 3 corridor. 	<ul style="list-style-type: none"> ▶ Maintain the subway box under the rail corridor and ensure construction of the new cut-and-cover box connection to existing Line 2 will be made east of the rail corridor. ▶ Line 3 to be protected during construction, as appropriate, so that service is maintained. 	<ul style="list-style-type: none"> ▶ Ground settlement monitoring as determined by the Settlement Monitoring Plan.

Impacts, Mitigation Measures and Monitoring

Table 5-7: Impacts, Mitigation and Monitoring Related to Operations and Maintenance

Feature	Impacts	Mitigation	Monitoring
Drainage and Hydrology	<ul style="list-style-type: none"> ▶ Stormwater management around the built facilities will be required. 	<ul style="list-style-type: none"> ▶ Develop Stormwater Management Strategy which may include the use of OGSs, green roofs and bio-retention features, as required. ▶ Develop Operations and Maintenance Manual prior to commissioning of the SSE. 	<ul style="list-style-type: none"> ▶ Regular inspections and periodical removal of sediment. ▶ OGS units subject to manufacturer's specification. ▶ Periodical removal of filter media and replacement of planting material will be required for green roofs and bio-retention features if implemented as part of the final Stormwater Management Strategy.
Noise and Vibration	<ul style="list-style-type: none"> ▶ Vibration and some structure-born noise due to subway pass-bys, especially near crossovers and special track work. 	<ul style="list-style-type: none"> ▶ A resilient track system, specifically a "floating slab" system is to be installed throughout the entire SSE as noise / vibration impacts are predicted at sensitive receptors along the preferred alignment. ▶ The track design may also incorporate the use of slightly higher vibration isolation efficiency of the rubber isolation pads under the floating concrete slabs. ▶ Vibration isolation slabs and rubber pads are required to achieve acceptable sound levels. ▶ Ventilation shafts and EEBs are to be acoustically lined with sound absorptive insulation material. ▶ Follow TTC practices of routine maintenance of train wheels to eliminate "wheel flats" on their remote "wheel flats" monitoring stations or based on routine inspections of subway train wheels. 	N/A
	<ul style="list-style-type: none"> ▶ Impacts to sensitive receptors such as the Scarborough General Hospital and dwelling units located directly above the preferred alignment. 	<ul style="list-style-type: none"> ▶ Further investigation of noise and vibration impacts on these receptors is recommended during the Detailed Design Phase of the Project. ▶ Site specific vibration measurements will be taken near the Scarborough and Rouge Hospital and Stanwell Drive that will validate analysis assumptions made in the noise and vibration impact assessment. 	N/A
	<ul style="list-style-type: none"> ▶ TPSSs may impact the closest noise sensitive land uses. 	<ul style="list-style-type: none"> ▶ The controls required for each TPSS may be unique depending on the distance setback and height of the nearest receptors; however, in general one or more of the following noise control measures may be applied to mitigate impacts: <ul style="list-style-type: none"> - Specifying low sound emission transformer system, for example: <ul style="list-style-type: none"> ▪ Transformers core: maximum 59 dBA at 15 metres ▪ Cooling fans: maximum 64 dBA at 15 metres - The use of partial sound barriers or enclosed structures; and, - Orientation of the equipment and structures. 	N/A
	<ul style="list-style-type: none"> ▶ During some maintenance events the ventilation shafts will have a higher than normal noise output. ▶ Maintenance activities can create structure-borne noise and vibration due to running structure maintenance. 	<ul style="list-style-type: none"> ▶ Noise due to maintenance cannot be mitigated. Consideration should be given to time, duration of events, and selection of low noise equipment where possible. ▶ Vibration activity due to maintenance is excluded from consideration by the MOECC. 	N/A

Impacts, Mitigation Measures and Monitoring

Table 5-7: Impacts, Mitigation and Monitoring Related to Operations and Maintenance

Feature	Impacts	Mitigation	Monitoring
Climate Change	<ul style="list-style-type: none"> ▶ Infrastructure components that will be directly exposed to the elements will be more susceptible to climate change. These components include the EEBs, ventilation shafts, TPSSs and the Scarborough Centre Station Bus Terminal. They will need to be designed to withstand the elements and consequently extreme weather events including extreme precipitation and heat. ▶ Climate events will impact the physical infrastructure and SSE users, including commuters and staff that are exposed to them. 	<ul style="list-style-type: none"> ▶ Mitigation measures to minimize impacts to staff and commuters who may face more extreme and adverse weather and service disruptions in the future may include (but are not limited to) updating plans for weather emergencies, closures and rerouting, traveler information systems to include future climate change projections. 	N/A
Automobile Traffic and Transit Services	<ul style="list-style-type: none"> ▶ Redistribution of potential traffic with new additional vehicular demands, potential queuing on approach movements. ▶ Impacts due to reconfigured intersection of Triton Road at McCowan Road related to signalization and queuing. ▶ Impacts due to new intersection (Borough Drive Extension at Scarborough Town Centre access) related to operational configurations, safety, etc. 	<ul style="list-style-type: none"> ▶ Conduct further traffic analysis and undertake a detailed Traffic Impact Study during the Detailed Design Phase of the Project. ▶ Optimize signal phases, alternative modes of operation / prohibition of movements during peak times or all times. ▶ Co-ordinate signals along McCowan Road and implement transit signal priority measures at / approaching the intersection with Triton Road. ▶ Induce dispersion of Scarborough Town Centre traffic via specific signage. 	N/A
Pedestrians and Cyclists	<ul style="list-style-type: none"> ▶ Borough Drive Extension follows the current grade (i.e., is graded separated from the Scarborough Centre Station Bus Terminal) – access is needed for pedestrians and transit users between the sidewalks and lay-by areas and the terminal. 	<ul style="list-style-type: none"> ▶ Illumination and other amenities for sidewalks (and bike paths, if any). ▶ Access provided between Borough Drive (above Scarborough Centre Station Bus Terminal level) and the Scarborough Centre Station Bus Terminal via stairs. 	N/A