

5. DETAILED ASSESSMENT OF THE IMPACTS, PROPOSED MITIGATION, AND MONITORING OF THE TRANSIT PROJECT

Section 15(1) of the Transit Projects Regulation (Ontario Regulation 231/08) requires the proponent to prepare an EPR Addendum for a change to the transit project that is inconsistent with the approved EPR. The EPR Addendum is to contain the following information, among other requirements:

- The proponent's assessment and evaluation of the impacts that the change might have on the environment; and
- A description of any measure proposed by the proponent for mitigating any negative impacts that the change might have on the environment.

The purpose of this chapter is to review the anticipated impacts, proposed mitigation measures, and recommended monitoring activities as presented in the 2009 EPR, identify changes to the potential impacts, mitigation, and monitoring that result from the addition of the TSF, and then present that information for public review and comment. Similar to **Chapter 4**, the information presented herein contains a summary of the impact assessment, mitigation and monitoring that appeared in the 2009 EPR, along with specific changes that are attributable to the changes described in **Chapter 3**.

The environmental effects of the undertaking can be classified under three categories:

- Displacement of Existing Features – These include existing features within the Study Area which will be directly affected by the TSF;
- Construction Impacts – These are short-term potential impacts resulting from construction activities; and
- Operation and Maintenance Impacts – These are ongoing, long-term effects arising from the operation and maintenance of the Transit Project.

For each of the factor areas presented in this section, potential impacts, mitigation measures, monitoring, and any contingency measures are included where applicable / required. The preliminary monitoring and contingency plans for the Transit Project are considered preliminary, dynamic and subject to refinements during design in consultation with regulatory agencies and the public. The specific monitoring requirements of any environmental permits/approvals/exemptions secured during design will be incorporated into the monitoring and contingency plan at that time. The details of the monitoring and contingency plan will be incorporated into provisions included in the construction contracts package.

5.1 Natural Environment

Impacts from the TSF are similar to those described in the Natural Environment Report prepared for the 2009 EPR and many of the general mitigation measures outlined in that report are reflected in the EPR Addendum, as outlined in the following sections.

5.1.1 Terrestrial Habitat

5.1.1.1 Displacement of Existing Features

The TSF consists of underground structures and railway infrastructure, as well as services to support the utility building and staff parking lot. Two EEBs are proposed. One is located in the TSF parking lot and the other is beyond the TSF in a manicured area beyond the rail right-of-way just south of Coburg Crescent. The surface portions of the proposed underground structures are not anticipated to impact natural vegetation communities.

The utility building and staff parking lot will require the removal of approximately 20 x 100 m (2,000 m²) of cultural meadow in the northwest corner of the Study Area. Vegetation to be removed includes common species, many of which are invasive. None of the plants within the vegetation clearing zone are considered uncommon, rare, or species of concern in Ontario.

Existing wildlife within the Study Area are accustomed to dense urban conditions with high levels of noise and light, and impacts to these species are expected to be minimal. If construction occurs during the bird breeding season, it may interrupt or curtail the nesting efforts of bird species.

Mitigation Measures

Zones to be cleared of vegetation will be clearly delineated to minimize vegetation impacts.

No permit for tree removal will be required under the Town of Richmond Hill's tree preservation by-law (By-law No. 41-07, Article 3.8).

No additional specific measures have been proposed to mitigate impacts to wildlife and wildlife habitat resulting from the TSF.

5.1.1.2 Construction Impacts

Impacts to terrestrial habitat from construction of the TSF are expected to cause temporary disturbance that can be managed using best practice mitigation and restoration measures to be refined based on the final design details.

Underground portions of the YSE will be constructed using tunnelling with the tunnel ingress point located at Richmond Hill Centre in the middle of a parking lot. The TSF, however, will be constructed using cut-and-cover construction.

If construction occurs during the bird breeding season, it may interrupt or curtail nesting efforts.

Mitigation Measures

The mitigation measures proposed in the 2009 EPR to address the construction impacts associated with terrestrial habitat remain valid and apply to the works proposed in the EPR Addendum. The key relevant measures are:

- Zones to be cleared of vegetation will be clearly delineated to minimize vegetation impacts and avoid incidental impacts from temporary stockpiling, debris disposal and site access.
- Vegetation clearing will be conducted outside the breeding bird season (May 1 to July 31) to avoid removal or destruction of active bird nests and remain consistent with the Migratory Birds Convention Act. An avian biologist will conduct a nest survey if vegetation removal is proposed during this period. Wildlife of any species incidentally encountered during construction will not be knowingly harmed.
- Where there is provincial or federal interest, all works will be completed in accordance with applicable legislation including, but not necessarily limited to, the *Migratory Birds Convention Act*, the *Endangered Species Act* and the *Species at Risk Act*.

Monitoring

It is possible that additional mitigation measures, monitoring, and commitments may be identified in consultation with relevant provincial and federal agencies during the design/construction phase of the project. Any additional mitigation measures, monitoring, and commitments agreed to will be complied with.

5.1.1.3 Operations and Maintenance Impacts

No permanent impacts are anticipated to result from the operation and maintenance associated with the TSF. Therefore, potential impacts should be limited to temporary disturbance-related impacts that can be addressed using standard mitigation measures.

5.1.2 Fish and Aquatic Habitat

5.1.2.1 Displacement of Existing Features

Permanent impacts to fish and aquatic habitat within the Study Area for the TSF are not anticipated. The local surficial drainage feature does not appear to provide either direct or indirect fish habitat as it likely contains negligible amounts of water.

Although the Pomona Mills Creek travels through the Study Area, it is contained within a pipe. Therefore it is expected that there will be no interaction between the piped watercourse and the below ground tunneling for the TSF.

Mitigation Measures

No specific mitigation measures for fish and aquatic habitat are required as a result of the TSF. To mitigate potential impacts to fish and aquatic habitat, erosion and sediment impacts from the TSF will be addressed as part of a comprehensive strategy for the entire YSE project developed during detailed design to meet the requirements, guidelines and design standards provided in TRCA's 2006 Erosion and Sediment Control Guidelines for Urban Construction.

5.1.2.2 Construction Impacts

Impacts to fish and aquatic habitat from construction of the TSF are expected to cause temporary disturbances that can be managed using best practice mitigation and restoration measures to be refined based on the final design details.

Mitigation Measures

Where there is provincial or federal interest, all works will be completed in accordance with applicable legislation including, but not necessarily limited to, the Fisheries Act, the *Endangered Species Act* and the *Species at Risk Act*.

Monitoring

It is possible that additional mitigation measures, monitoring, and commitments may be identified in consultation with relevant provincial and federal agencies during the design/construction phase of the project. Any additional mitigation measures, monitoring, and commitments agreed to will be complied with.

5.1.2.3 Operations and Maintenance Impacts

No permanent impacts are anticipated to result from the operation and maintenance associated with the TSF. Future maintenance activities would not be expected to involve any in-water works or any new permanent footprint impacts. Therefore, potential impacts should be limited to temporary disturbance-related impacts that can be addressed using standard mitigation measures.

5.1.3 Species at Risk

5.1.3.1 Displacement of Existing Features

There are no designated natural areas within 1km of the TSF. No additional impacts to designated natural areas beyond those outlined in the 2009 EPR are anticipated.

NHIC records of four provincially significant species in the Study Area (Redside Dace, Jefferson X Blue-spotted Salamander (Jefferson genome dominates), Painted Skimmer and Green-striped Darner) were likely derived from the vicinity of German Mills Creek owing to the aquatic habitat requirements of these species. The likelihood of encountering them in the Study Area is minimal.

Mitigation Measures

Vegetation clearing will be conducted outside the breeding bird season (May 1st to July 31st) to avoid removal or destruction of active bird nests and remain consistent with the *Migratory Birds Convention Act*. An avian biologist will conduct a nest survey if vegetation removal is proposed during this period. Wildlife of any species incidentally encountered during construction will not be knowingly harmed.

Given that there are no designated natural areas within 1km of the proposed TSF. No additional mitigation measures for designated natural areas beyond those outlined in the 2009 EPR are required for the TSF.

Since Species at Risk and locally or regionally rare species are not expected to be present within the Study Area, no species-specific mitigation measures for Species at Risk are proposed.

5.1.3.2 Construction Impacts

Locally or regionally rare species and Species at Risk are not expected in the Study Area, therefore no there are no anticipated construction impacts to Species at Risk associated with the TSF.

Mitigation Measures

Locally or regionally rare species and Species at Risk are not expected in the Study Area, therefore, no Species at Risk species-specific mitigation measures are proposed.

Monitoring

It is possible that additional mitigation measures, monitoring, and commitments may be identified in consultation with relevant provincial and federal agencies during the design/construction phase of the project. Any additional mitigation measures, monitoring, and commitments agreed to will be complied with.

5.1.3.3 Operations and Maintenance Impacts

No permanent impacts are anticipated to result from the operation and maintenance associated with the TSF. Therefore, potential impacts should be limited to temporary disturbance-related impacts that can be addressed using standard mitigation measures.

5.1.4 Soil and Groundwater

5.1.4.1 Displacement of Existing Features

Existing soil and groundwater conditions for the proposed TSF have been investigated and are summarized **Section 4.1.4**. Recommendations have also been provided as a basis for the conceptual design and may be utilized for future planning and design purposes. The Geotechnical Report for Conceptual Design (copy provided in **Appendix E**) provides an interpretation of the geotechnical

data for the design of the TSF. Additional subsurface information will be required during subsequent stages of design and construction.

There are no permanent displacement impacts to soils associated with the TSF. All soil impacts are transient and relate to the construction of the TSF.

Based on currently available information, groundwater impacts are anticipated to be transient and relate to dewatering required for construction of the TSF.

Mitigation Measures

Groundwater flow to nearby watercourses (East Don River and Pomona Creek) is expected to be maintained at environmentally acceptable levels by dewatering and groundwater inflow measures and contingency plans developed through additional investigations, during detailed design and continued consultation with the TRCA and MOECC regulatory agencies. It is anticipated that these measures will adequately mitigate groundwater impacts from the TSF construction.

Please refer to **Section 5.1.7.1** for mitigation measures related to contaminated property.

5.1.4.2 Construction Impacts

The Geotechnical Report highlights several geotechnical requirements to be considered for the TSF construction, which may include temporary ground support systems, design of dewatering systems and backfilling specifications. The Report also provides insight into the potential for ground movement and monitoring program to be completed during excavation activities, which are anticipated to go the depth of up to 31 mbgs.

In addition, recommendations related to the management and disposal of excess soils is also included in the Geotechnical Report. An environmental intrusive investigation is currently being completed by MMM Group for evaluation of soil quality in the local Study Area, which will provide recommendations for management of excess soils to be generated during the construction stage of the project.

Based on currently available geotechnical and groundwater information, it is anticipated that dewatering will likely be required to temporarily reduce the groundwater levels and pressure in the upper and lower aquifers for construction of the TSF structure. Detailed geotechnical and groundwater investigations will be completed to fully delineate the impacts of the construction to the groundwater resources in the Study Area, once design details are available.

Mitigation Measures

A Permit to Take Water (PTTW) will be obtained from the MOECC for dewatering purposes and groundwater control, prior to the TSF construction. The PTTW will specify the rates and duration of the dewatering program, a monitoring program, and mitigation and contingency measures to be used during dewatering.

As outlined in the 2009 EPR, a Soil Management Strategy Plan will be developed for re-use or disposal of excavated soils (i.e. excess soils), consistent with past TTC practice. This plan will be part of the Excess Materials Management Plan and require that management of excess soils is conducted in accordance with the applicable MOE (now MOECC) recommendations outlined in the documents titled "*Protocol for Analytical Methods Used in the Assessment of Properties*" (MOE, March 2004, amended in July 2011) and "*Management of Excess Soils – A Guide for Best Management Practices*" (MOE, January 2014).

The dewatering program is likely required to be completed for the groundwater control during the TSF construction. This may include using multi-stage eductors, localized vacuum points, deep wells, etc. Temporary support systems may need to be utilized in space-restricted areas and high groundwater level conditions. Detailed mitigation measures for the groundwater control will be prepared following completion of detailed geotechnical investigations and groundwater assessments.

Please refer to **Section 5.1.7.2** for mitigation measures related to contaminated property.

Monitoring

Ground movement will be monitored by a qualified geotechnical specialist during construction to ensure that existing infrastructure (roads, structures, utilities, etc.) are protected. Baseline readings and existing condition reports will be completed prior to any construction activities.

All construction activities will be conducted in a manner that maintains ground movement/vibration within a specified limit (pre-approved).

An environmental inspector will be responsible for ensuring that all environmental mitigation and design measures are properly installed/constructed, implemented and maintained, and appropriate contingency, response plans and remedial measures are in place and implemented if required.

A monitoring program will be completed by a dewatering contractor as per conditions of the PTTW. This program will include monitoring dewatering rates and drawdown in monitoring wells and implementing erosion control measures to comply with the conditions imposed by the MOECC in the PTTW.

5.1.4.3 Operations and Maintenance Impacts

No permanent effects are anticipated after construction of the facility. However, general recommendations for the design stage are outlined below, to mitigate any possible groundwater issues.

As noted in the Groundwater Assessment Report (copy provided in **Appendix F**), additional hydrogeological/groundwater investigations are required to better understand the hydrogeological conditions present in the Study Area, especially in the southern portion where productive aquifers may potentially be present. These studies are to be completed at the detail design stage of the project, when

details of the TSF design are confirmed. Conclusions whether permanent dewatering measures are required to be used during operation of the TSF should be provided once hydrogeology of the Study Area is well understood and design of the TSF is confirmed.

It is recommended to design structures in the cut-and-cover sections as “water-tight” structures to minimize the inflow of water into the structure and avoid permanent changes to the groundwater flow regime. Although such designs are intended to be “water-tight” it is recognized and anticipated that there may be some inflow of water into the structure particularly at construction joints and shrinkage cracks. This can be addressed by grouting from within the structure and, in some cases, mineral precipitation associated with seepage through concrete shrinkage cracks largely reduces seepage over a period of a few years. Using current subway design and construction practices it is anticipated that seepage flows and the effect of the permanent subway structures on the surrounding groundwater regime should be minimal provided appropriate design and construction measures are implemented.

As outlined in the 2009 EPR, a Soil Management Strategy Plan will be developed for disposal of excavated material, consistent with past TTC practice. That plan will be part of the Excess Materials Management Plan. As no permanent impacts to soil are anticipated after the construction of the facility, no further mitigation measures are recommended.

Please refer to **Section 5.1.7.3** for mitigation measures related to contaminated property.

5.1.5 Drainage and Stormwater Management

5.1.5.1 Displacement of Existing Features

Given that most of the infrastructure for the TSF will be underground, and the urban nature of the Study Area, this project will not add significant impervious areas. It is anticipated that the drainage characteristics of the Study Area will not be significantly altered. The introduction of the TSF access roadway and employee parking lot will result in a minor increase in impervious area (and therefore a minor increase in stormwater run-off) within the catchment area for the drainage system.

Mitigation Measures

In the design of the roadway and parking facility for the TSF, consideration will be given to ensure that run-off is directed away from the residential properties and the rail corridor.

General drainage and stormwater management mitigation measures were outlined in the 2009 EPR, including stormwater management design criteria and a conceptual stormwater management plan (to be further defined in the design phase of the project in consultation with the Town of Richmond Hill and TRCA). These same stormwater management design criteria will apply to the works

proposed in this EPR Addendum, and the design of the stormwater management plan will incorporate the proposed TSF as presented in this EPR Addendum.

In addition, subsequent to the approval of the 2009 EPR, the TRCA has developed a Stormwater Management Criteria document. Therefore, in the development of the stormwater management plan (to be completed in the design/construction phase of the project), consideration will be given to implementing recommendations from TRCA's Stormwater Management Criteria, as appropriate, for the works proposed in the EPR Addendum.

5.1.5.2 Construction Impacts

Construction of the TSF will be completed by open-cut excavation. Runoff into this excavation zone will require a dewatering system that will pump flow into the local storm sewer system until the proposed box structure is complete. Management of the additional flow to be handled by the local drainage network shall be reviewed in further detail during the detailed design phase of the project.

Mitigation Measures

Groundwater flow to nearby watercourses (East Don River and Pomona Creek) is expected to be maintained at environmentally acceptable levels through dewatering and groundwater inflow measures, and contingency plans developed through additional investigations, detailed design, and continued consultation with the TRCA and MOECC regulatory agencies. It is anticipated that these measures will adequately mitigate groundwater impacts from the TSF construction.

The detailed design phase will include specifications for sediment and erosion control to be complied with during construction. These specifications will be prepared in accordance with the TRCA's Erosion and Sedimentation Guidelines which are based on Provincial and Regional legislation, guidelines and by-laws on the matter.

Monitoring

An environmental inspector will be responsible for ensuring that all environmental mitigation and design measures are properly installed/constructed, implemented and maintained, and appropriate contingency, response plans and remedial measures are in place and implemented if required.

5.1.5.3 Operations and Maintenance Impacts

No permanent impacts are anticipated to result from the operation and maintenance associated with the TSF. Given that most of the infrastructure for the TSF will be underground, and the urban nature of the Study Area, this project will not add significant impervious areas. It is anticipated that the drainage characteristics of the Study Area will not be significantly altered.

5.1.6 Air Quality

5.1.6.1 Displacement of Existing Features

There are no permanent air quality impacts associated with the TSF.

5.1.6.2 Construction Impacts

Air quality impacts will occur where exposed construction activities are conducted. Areas where these activities are anticipated are identified in **Figure 5-1**. The construction area includes the location of the TSF and associated structures, and covers a total area of approximately 16,000 m².

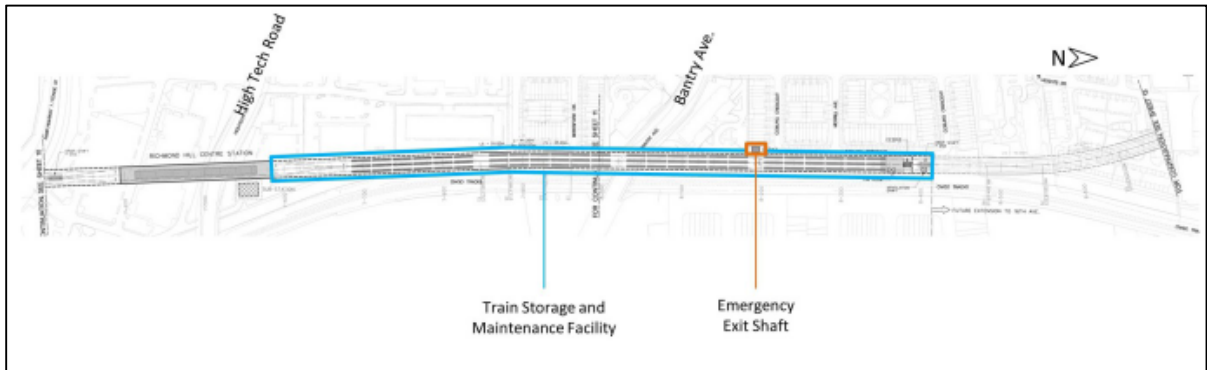


Figure 5-1: Location of Construction Activities

The area surrounding the exposed construction activities contains a mixture of commercial and residential land uses. Land uses which are defined as sensitive receptors for evaluating air quality effects are:

- Health care facilities;
- Senior citizen long-term care facilities;
- Child care facilities;
- Educational facilities;
- Places of worship; and
- Residential dwellings

The worst-case sensitive receptor is shown relative to the exposed construction activities in **Figure 5-2**. Impacts at sensitive receptors further from the activities will be lower.



Figure 5-2: Location of Sensitive Receptors

The contaminants of interest from construction and demolition activities include particulate matter, carbon dioxide, nitrogen dioxide, sulphur dioxide, and volatile organic compounds.

Results of the dispersion modelling are discussed in the Construction Air Quality Assessment Report included in **Appendix B**. Modelling was performed both with and without mitigation to show the improvements in ground level dust concentrations that can be achieved. Due to the large amount of dust generated during construction processes, mitigation is often required.

It should be understood that the maximum predicted total suspended particulate matter (TSP) concentrations were assessed using conservative assumptions and that for the majority of time experienced TSP levels off-site will be substantially less than those provided in the Construction Air Quality Assessment Report.

Based on the discussed mitigation techniques, a reduction of particulate emissions of up to 98% can be achieved. The U.S. Environmental Protection Act AP-42 chapter 13.2.2 suggests that by doubling the surface moisture content, 75% control efficiency can be achieved. Furthermore, increasing surface moisture content five-fold times can achieve 95% control efficiency; although less efficient than doubling the moisture content, in some cases this additional control efficiency will be beneficial. Due to the inevitable nature of construction, in order to meet high efficiency reduction targets (i.e. 98%) at nearby receptors large barriers will likely be required.

Based on these recommendations an emission reduction target of 75% was applied in this assessment in order to estimate an achievable reduction in TSP concentrations with the inclusion of mitigation. It should be noted that this

reduction was not applied to the construction vehicle emissions as watering will not have any impact on these sources.

Mitigation Measures

As with any major construction project, dust concentrations are at times expected to be highly visible in the surrounding area. As such, mitigation is recommended in most cases to reduce the nuisance associated with construction activities.

As documented in the Construction Air Quality Assessment Report, applying a mitigation strategy at a 75% reduction target will greatly reduce construction impacts. Therefore, it is recommended that a dust management plan be developed by the contractor.

Along with good dust management practices, best management practices should include activities such as:

- Providing signage with appropriate contact information for public inquiries;
- Choosing work plans which are likely to reduce dust generation (i.e. performing dust generating tasks individually as opposed to all at one time);
- Ensuring that local businesses are aware of the impacts which are likely to occur; and
- Providing adequate training to employees with respect to reducing dust generation.

Additionally, methods such as barrier construction will not reduce site-wide emissions but rather act to reduce off-site impacts of such emissions.

Specific mitigation techniques are described in the Construction Air Quality Assessment Report, and include:

- Material Wetting or Chemical Suppressants;
- Construction of Barriers;
- Limiting Exposed Areas; and
- Equipment Washing.

Different levels of mitigation may be required at different construction phases. The focus of the mitigation plan is to reduce the dust emissions from the material processing activities, the major contributor to total dust emissions, and not to reduce vehicle emissions.

Environment Canada “Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities” provides guidance for mitigation techniques, not only for dust but for other pollutants such as carbon monoxide and oxides of nitrogen as well (Environment Canada, 2005). Common best practices for these emission sources include reformulated fuels, emulsified fuels, catalysts and filtration technologies, and cleaner engine repowers.

A mitigation plan will be developed during the design / construction phase of the project to reduce the dust emissions generated during construction processes with guidance from Environment Canada's "Best Practices for the Reduction of Air Emissions from Construction or Demolition Activities", 2005;

Monitoring

The 2009 EPR outlines monitoring requirements for air quality construction impacts to ensure that construction operations meet Regulation 419/05 requirements. There are no changes to air quality monitoring requirements as a result of the works proposed in this EPR Addendum.

5.1.6.3 Operations and Maintenance Impacts

There are no notable permanent air quality impacts associated with the TSF, , and therefore no specific mitigation or monitoring measures have been proposed.

5.1.7 Contaminated Properties

5.1.7.1 Displacement of Existing Features

Based on the findings of the Contamination Overview Study, Areas of Potential Environmental Concern (APECs) within the Study Area have been identified and are described below.

APECs with High Potential for Contamination

The APECs with high potential for contamination correspond to locations within the Study Area where land uses consist of commercial or industrial operations that could impact soil and/or groundwater. APECs with high potential for contamination include the following:

- One gas station, located in the north-western corner of the intersection of Roosevelt Drive and Yonge Street;
- One dry cleaning facility, located in southwestern corner of the intersection of Scott Drive and Yonge Street;
- Three records of fuel storage tanks, located at 8830, 9076 and 9137 Yonge Street.

APECs with Moderate Potential for Contamination

Several areas were found to be of moderate contamination potential. These areas include land uses that are small commercial properties suspected of using chemical compounds or performing activities that could negatively impact soil and/or groundwater. However, these areas may not be directly impacted by construction of the TSF. APECs with moderate potential for contamination include the following:

- Two car dealerships, located in the northwestern quadrant of the intersection of Yonge Street and Oak Avenue and in the southwestern quadrant of the intersection of Yonge Street and Roosevelt Drive;

- One motorcycle dealership, located in the northeastern corner of Yonge Street and High Tech Road;
- One centre for truck sales, located in the southwestern corner of Yonge Street and Roosevelt Drive;
- Several retail companies, an office building and businesses, located to the west of Yonge Street between High Tech Road and Spruce Avenue;
- Several commercial companies and offices, located to the east of Yonge Street between High Tech Road and Beresford Drive;
- One construction site, located in the northwestern corner of the intersection of Yonge Street and Edgar Avenue;
- Medical offices, located in southwestern corner of the intersection of Bantry Road and Red Maple Road;
- One railway, adjacent to the TSF from north to south;
- Office buildings, located to the north of High Tech Road between the TSF and Yonge Street;
- One theatre, located in the southeastern quadrant of the intersection of Yonge Street and High Tech Road.

APECs with Low Potential for Contamination

All other areas consist of land use features considered to have a low potential for site contamination. These areas are generally classified as open space or residential areas that are not suspected of using chemical compounds harmful to the environment or human health.

Another source for areas with low potential for contamination is residual road salt impacts, metals and Petroleum Hydrocarbons along right-of-ways, roads, and in parking lots. These may be present in the shallow soil and groundwater resulting from winter road salting operations along the right-of-way, vehicular exhausts, transportation accidents, and spills. This does not represent a significant environmental concern.

A Contaminant Investigation (copy of report provided in **Appendix D**) was also completed north of Bantry Avenue to provide information regarding existing conditions. Existing condition findings are described in **Section 4.1.7** and recommendations from the Contaminant Investigation are reflected below.

Mitigation Measures

Since there are no APECs with high potential for contamination within close proximity of the TSF, no additional environmental investigations are recommended to be carried out with respect to this classification.

Several areas with *moderate potential* for contamination were identified to be present within the Study Area; however, the only property/area likely to be

impacted by construction of the TSF is a CN/GO railway line present to the east of the proposed TSF.

Where there are property acquisitions that will be directly impacted by construction of the TSF (i.e. impacted properties) footprint or in the areas immediately adjacent to the railway line, Phase I and/or Phase II Environmental Site Assessments (in accordance with O.Reg.153/04, as amended) will be completed for these properties. These studies will support both property acquisition and construction activities.

For *moderate* APECs where there are no property impacts, soil contaminant investigation will be completed in areas where excavation may be required, to assess soil quality and soil management options during construction. Some investigations have already been completed through the Contaminant Investigation (**Appendix D**).

No additional environmental investigations are recommended for APECs with low potential for contamination. However, along existing road right-of-ways there is the potential for residual salt impacts, metals and Petroleum Hydrocarbons to be present in the shallow soil and groundwater resulting from winter road salting operations, vehicular exhausts, transportation accidents and spills. Where works are required along existing road right-of-ways appropriate management of salt, metal and Petroleum Hydrocarbons impacted soils (and groundwater) may be required with regard to environmental regulations.

Soil and groundwater quality will be evaluated for the area where the Train Storage Facility is proposed to be constructed south of Bantry Avenue. This area was not evaluated as part of the Contaminant Investigation due to difficulties in locating a storm sewer.

Additional groundwater sampling will be completed in wells MW4 and MW5 and wells to be installed during future investigations in the area south of Bantry Avenue, to provide recommendations for groundwater discharge options during dewatering for the TSF construction.

5.1.7.2 Construction Impacts

A number of broad APECs were identified in the Contaminant Overview Study Report. These areas, as outlined in **Section 4.1.7**, have been categorized by assessing the overall relative potential of contamination.

Mitigation Measures

An Excess Materials Management Plan will be implemented to provide a mitigation strategy to effectively manage any contaminated excess materials (both soil and groundwater) encountered during construction. This plan will develop a sampling program to collect soil confirmatory samples for evaluation of options for soil re-use, recycling or disposal, as recommended in the MOE (now MOECC) Guide for Best Management Practices for Soil Management (MOE, 2014) and according to applicable regulations.

In addition to managing contaminated materials generated during construction, it is equally important to ensure that off-site contamination (i.e. contamination outside of the subway corridor excavation area) does not migrate back into the corridor. This may require engineered containment barriers/walls such as grout curtains and sheet piling; and/or hydraulic traps to contain, capture and treat contaminant plumes. These requirements will be integrated into the detailed design of the subway corridor.

Monitoring

A monitoring program will be included in the Soil and Groundwater Management Strategy which will be developed prior to construction. A contingency plan will be developed prior to construction where appropriate.

5.1.7.3 Operations and Maintenance Impacts

There is the potential for soil and/or groundwater contamination to occur as a result of the operation and maintenance of the TSF.

Monitoring

Additional environmental investigations may be required to be completed to evaluate the impacts to soil and/or groundwater quality during operations and maintenance. A monitoring program and a contingency plan to deal with potential spills and releases of contaminants into soil and groundwater will be developed at the detail design stage of the project.

5.2 Socio-Economic Environment

5.2.1 Property

5.2.1.1 Displacement of Existing Features

The following table (**Table 5-1**) summarizes the properties located within the Study Area (See **Section 1.4.1**). A plan of the impacted properties is shown in **Figure 5-3**. The preliminary property requirements identified in this section will be confirmed during the detailed design/implementation phase of the study.

Table 5-1: Permanent Property Impact Summary

Property #	Street	PIN #	Impact Under This Addendum	Public/ Private
1	N/A	031092029	Permanent Subsurface Easement Required	Private
2	N/A	031092025	Permanent Subsurface Easement Required	Private
3	35 Beresford Dr	031090583	Permanent Subsurface Easement Required	Private
4	N/A	031091893	Town of Richmond Hill Permanent Subsurface Easement Required	Public

Property #	Street	PIN #	Impact Under This Addendum	Public/ Private
5	N/A	031090140	Permanent Town of Richmond Hill Property Required	Public
6	Beresford Dr	031090157	Permanent sub-surface easement required	Public
7	N/A	031090153	Permanent Town of Richmond Hill Property Required	Public
8	N/A	031090141	Permanent Town of Richmond Hill Property Required	Public
9	Adjacent to Coburg Cres	031090093	Permanent Town of Richmond Hill Property Required	Public
10	N/A	031090092	Permanent Town of Richmond Hill Property Required	Public
11	N/A	031090859	Permanent Subsurface Easement Required	Public

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LEGEND:

DATE:

JANUARY 2014

SCALE:

1:2000

YONGE SUBWAY EXTENSION ENVIRONMENTAL PROJECT REPORT ADDENDUM

IMPACTED PROPERTIES

FIGURE

5-3

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Mitigation Measures

Per the 2009 EPR, if property acquisition is required for this project, it will be undertaken by the Proponent. In acquiring property, the Proponent balances community need and the rights of the property owner. The objective is to ensure that individual rights are respected and protected and to provide fair compensation within the framework of the Expropriations Act for any property acquired or affected by civic projects. The acquisition process emphasizes negotiation and the achievement of a mutually satisfactory agreement between the Proponent and the owner. If necessary, in order to protect the ability to proceed with the Project, expropriation may be required to acquire the necessary property. In general, property acquisition uses the following steps:

- The Proponent contacts the property owner to indicate its interest in the property and to identify issues and concerns;
- The Proponent conducts legal surveys, appraisals, environmental site assessments and other property-related assessments;
- An offering price is discussed. If a tentative agreement is reached, an Offer to Sell is signed by the owner. The Offer is then sent to the Proponent for approval and acceptance;
- If discussions do not result in an agreement, the Proponent initiates the expropriations procedures. The expropriation process may be initiated while negotiations are occurring;
- If expropriation is pursued, the owner has a right to an independent inquiry called a Hearing of Necessity, which determines whether the property requirements are fair, sound and reasonably necessary;
- The Proponent approves the settlement/expropriation, and acquires the property; and
- If expropriated, the owner has the right to have compensation payable referred to arbitration at the Ontario Municipal Board.

The objective of the Expropriations Act is to put tenants and property owners in the same position that they were in prior to the beginning of the civic project directly affecting their properties. Compensation is determined having regard for the Expropriations Act by experienced, qualified appraisers and other experts. Compensation is generally based on three factors:

- **Market Value** – Market value is defined as “the amount that the land will be expected to realize if sold on the open market by a willing seller to a willing buyer.” The date of expropriation is usually determined as the date to determine market value.
- **Damages Attributable to Disturbance** – These refer to the economic loss suffered by an owner as a result of having to vacate expropriated property. This can include moving costs, temporary accommodation, redundant

furnishings, or loss of business revenues and profitability. Compensation for damages of this type is determined after expropriation.

- Damages for Injurious Affection – Injurious affection is sometimes referred to as “consequential damages.” It has very precise and limited applications according to the law and can include items such as reduced market value and increased business operating expenses. Injurious affection is usually determined after expropriation.

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

Partial property takings required include underground easements and surface facilities. The Proponent will conduct a Property Protection Study during the detailed design of the TSF, which will determine detailed property requirements, including temporary construction easements. The acquisition of these properties will follow the same principles described above.

Any brownfield sites will be managed in accordance with the Ontario Regulation 153/04 as amended. A Designated Substances Surveys for any buildings or structures which require demolition will be undertaken during the design phase.

5.2.1.2 Construction Impacts

Temporary property easements will be required during the construction phase to establish work zones, material laydown areas, equipment maintenance/storage (pocket) and to obtain access for construction activities.

Construction activities (e.g. excavation and protection system) may result in potential for ground settlement, and impacts to existing buildings/structures adjacent to construction.

Property requirements for this project are noted in **Table 5-2**.

Table 5-2: Construction Property Impact Summary

Property #	Street	PIN #	Impact Under This Addendum	Public/ Private
1	N/A	031092029	Temporary Construction Easement Required	Private
2	N/A	031092025	Temporary Construction Easement Required	Private
3	35 Beresford Dr	031090583	Temporary Construction Easement Required	Private
4	N/A	031091893	Town of Richmond Hill Temporary Construction Easement Required	Public
5	N/A	031090140	Permanent Town of Richmond Hill Property Required	Public
6	Beresford Dr	031090157	Temporary Construction Easement Required,	Public

Property #	Street	PIN #	Impact Under This Addendum	Public/ Private
7	3 Ellesmere St	N/A (Property is located in NE quadrant of CN Rail & Bantry Ave Intersection)	Temporary Construction Easement Required	Private
8	Coburg Cres	031090107	Temporary Construction Easement Required	Public
9	N/A	031090859	Temporary Construction Easement Required	Public

Mitigation Measures

The Proponent will negotiate temporary construction easements with property owners on a case-by-case basis following the procedures described in **Section 5.2.1.1**. Following construction, the Proponent will reinstate lands to pre-construction conditions, if feasible.

Monitoring and Contingency

Prior to the commencement of construction operations, a pre-condition survey will be undertaken to document existing ground elevations and building/structure conditions.

During construction, surveys will be undertaken to monitor any movement to existing ground and buildings/structures within 50m of the work zone. Surveys will be undertaken on a weekly basis (minimum). 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, the Proponent and its Contractor will jointly assess the necessity of altering the method, rate or sequence of construction. At “alert” levels, the Proponent can order construction operations to cease until the necessary mitigation measures are undertaken.

Following construction, the Proponent and its contractors 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.

The Proponent will monitor horizontal and vertical movements 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), the Proponent 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.

In the event that a property owner submits a claim for property damage, the Proponent will conduct further investigations and, if appropriate, will negotiate a settlement.

5.2.1.3 Operations and Maintenance Impacts

The proposed changes to the 2009 EPR are not expected to result in any operations and maintenance-related impacts to property ownership.

5.2.2 Noise and Vibration

5.2.2.1 Displacement of Existing Features

No surface subway operations are anticipated in the Study Area. Therefore, surface transportation noise has not been considered as part of the TSF Addendum.

Based on the TTC requirement for all ancillary equipment to meet 60 dBA at 1 m in all public spaces, no adverse impacts are expected from the HVAC equipment to be located at the surface electrical service building.

Vibration levels due to operations are expected to be below the MOECC/TTC guideline limit of 0.10 mm/s root mean square (RMS) at all locations. Therefore, no adverse vibration impacts from normal operations are anticipated.

Mitigation Measures

Should noise emissions or operations vary significantly from those outlined in the Noise and Vibration Assessment (**Appendix C**), noise impacts will be reassessed to assure compliance with all relevant legislative requirements.

5.2.2.2 Construction Impacts

As indicated in the 2009 EPR, construction noise and vibration impacts are temporary in nature and depend on the type of work required and its location relative to sensitive receptors.

A Noise and Vibration Report was prepared by Novus Environmental to model and assess potential noise impacts associated with the construction of the TSF. The Noise and Vibration report is included in **Appendix C**.

Cut-and-cover and open construction will be required for the proposed facility. Construction activity may include:

- Installation of secant or soldier piling, to hold up the sides of excavations;
- Removal of overburden, excavation of foundations and excavation for vent shafts and stairway shafts;

- Front end loaders and trucks for removal of material from the site;
- Concrete trucks and pumps for foundation and building construction; and
- Backfilling, finishing, repaving, and landscaping.

Noise

Construction noise levels will vary over time as the activities at the site change. Worst-case sound levels from construction activity, at the closest noise-sensitive receptors, will range from:

- 75 dBA to 104 dBA, for removal of original surface material (including a +10 dB annoyance penalty applied to the hoe ram / mounted impact hammer).
- 73 dBA to 96 dBA, for pile driving.
- 74 dBA to 85 dBA, for general excavation and removal of material.

These worst-case impacts are expected to occur immediately to the west of the cut-and-cover construction. Noise sensitive areas to the east, across the CN / GO Richmond Hill rail line can expect worst-case sound levels at least 17 dB lower than those outlined above.

Vibration

Construction vibration within the City is controlled by By-law 514-2008, which provides limits on maximum allowable vibration levels for construction and demolition activities (Toronto, 2008).

The by-law identifies requirements for:

- a) Preliminary studies of vibration impacts;
- b) The identification of a “vibration zone of influence”, where such a zone will extend beyond the property line / legal boundary of the construction site;
- c) The existence within the zone of influence of any buildings that have been designated under the Ontario Heritage Act;
- d) Pre-construction consultation with property owners within the zone of influence;
- e) Pre-construction measurements of ambient background vibration levels, and site inspections; and,
- f) Development of a monitoring plan and continuous measurements of construction vibration during activities which may affect off-site receptors.

The vibration Zone of Influence is identified in the by-law as the area beyond the property line of the construction site where vibration levels may exceed 5 mm/s.

Vibration from pile driving and other general construction activities at the TSF could affect buildings on Coburg Crescent.

Human Health and Safety

Local employees and residents as well as TSF construction workers will be potentially affected by construction-related noise, vibration and dust. Another important issue is the health and safety of construction workers.

Mitigation Measures

Noise

Construction noise impacts are temporary in nature, and generally unavoidable. Although construction noise will be noticeable for some periods and types of work, with adequate controls impacts can be minimized. A Construction Code of Practice and the following provisions have been identified to mitigate the potential impacts from construction noise:

- Construction should be limited to the time periods allowed by the locally applicable by-laws (0700h to 2300h, except in the case of emergencies). If construction activities are required outside of these hours, the Contractor must seek permits / exemptions directly from the Town of Richmond Hill.
- There will be explicit indication that Contractors are expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work done by Contractors.
- All equipment will be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order.
- The Contract documents will contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to, are in effect.
- In the presence of persistent noise complaints, all construction equipment will be verified to comply with MOECC NPC-115 guidelines.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required where reasonably available. In selecting appropriate noise control and mitigation measures, consideration would be given to the technical, administrative and economic feasibility of the various alternatives.
- Any blasting works will be designed to meet any applicable overpressure and vibration limits established by the MOECC in Publication NPC-119 and by the Ministry of Transportation Ontario in OPSS 120.
- Since the sound levels from the construction activity are anticipated to be quite high during some periods, and the site is located adjacent to public space, construction hoarding/temporary fences are to be used where feasible.

Vibration

The Town of Richmond Hill does not have a by-law addressing construction vibration. Although not directly applicable within Richmond Hill, City of Toronto By-law 514-2008 provides limits on maximum allowable vibration levels for construction and demolition activities (Toronto, 2008). Under the terms of the City of Toronto Vibration By-law, a vibration control form should be provided with the Building Permit or Demolition Permit application. Pre-construction consultation, vibration monitoring, and site inspections will likely be required. Care should be taken where structures are located within the zone of influence.

Human Health and Safety

As documented in the 2009 EPR, the Proponent and its contractors will monitor noise, vibration and dust effects during construction. In addition, the proponent will monitor contractor compliance with applicable legislation and regulations.

Monitoring

The Proponent will conduct a noise and vibration study, in accordance with the MOECC protocols. Specifically, this will include additional base line noise and vibration surveys (as required), similar to those already undertaken as part of the Transit Project. Post construction measurement will be undertaken to confirm “no adverse impact” as predicted in the noise and vibration impact analysis undertaken as part of the Transit Project (see **Appendix C** for details).

5.2.2.3 Operations and Maintenance Impacts

Noise

No surface subway operations are anticipated in the Study Area. Therefore, surface transportation noise has not been considered.

The TSF and associated ventilation shafts / HVAC are considered to be “Ancillary Facilities” under the MOECC / TTC guidelines. The TSF will have an HVAC system for station comfort ventilation, and an emergency fire ventilation system to supply air to the stations and tunnel system.

TTC Design Manual DM-0403-00 (TTC 1994) sets out requirements for ancillary equipment in public areas. Noise from “Ancillary Equipment” (excluding emergency ventilation fans) should not exceed 60 dBA at 1 m distance in all public areas.

In addition, MOECC Publication NPC-205 noise guidelines apply for these facilities. These guidelines state that the 1-hour average sound level from the equipment (L_{eq} (1-hr) values measured in dBA), must meet the following limits at all off-site noise sensitive points of reception:

The MOECC guidelines require that impacts be assessed for the “predictable worst-case operating scenario”. The four tunnel ventilation fans are the dominant noise sources, and will be used in one of three modes:

1. Regular Operations

During regular operations of the subway system, the fans operate on half ($\frac{1}{2}$) speed on a continuous basis during warm days.

2. Emergency Operation

In emergency operation, all fans will operate at full speed. As an emergency, this situation is excluded from the MOECC's noise guidelines.

3. Track Maintenance

During overnight track maintenance, the fans will be operated at three-quarter ($\frac{3}{4}$) speed. The fans could run for extended periods of time between 0200 – 0600h.

4. Testing

Full speed testing of the fans occurs on a weekly basis. The fans are operated in both directions (supply and discharge) at full speed for up to 60 seconds for each direction (2 minute total test times).

From the above, the “predictable worst-case scenario” is the track maintenance operations, which occurs for extended periods of time, during the over-night period. Despite the 2-minute long higher sound level during full speed testing, average hourly sound levels will be higher for maintenance operations.

Excesses over the guideline limits are not expected in any noise sensitive areas. Noise sensitive points of reception include but are not limited to:

- Permanent and seasonal residences;
- Hotels, motels, campgrounds;
- Noise sensitive institutional uses such as hospitals, daycares, nursing homes, and schools; and
- Places of worship.

Stationary noise sources have been assessed cumulatively. Cumulative noise impacts include ventilation noise and noise from HVAC in the mechanical rooms of the electrical and access buildings.

Based on the generic sound power emission data and silencer insertion loss data used in this assessment the emergency fire ventilation fans are expected to meet the applicable MOECC NPC-205 guideline limits at all noise sensitive locations.

Based on the TTC requirement for all ancillary equipment to meet 60 dBA at 1 m in all public spaces, no adverse impacts are expected from the HVAC equipment to be located at the surface electrical service building.

Vibration

Ground-borne vibration from subway operations is addressed under the MOECC/TTC Protocols. Criteria are provided for maximum vibration levels outside of the premises of the receptor (outside of the foundation). Similar to noise, the point

of assessment is any outdoor point on the property more than 15 m from the track centreline.

Vibration is measured in terms of Root-Mean-Squared (rms) vibration velocity in units of mm/s. Only vertical axis vibration is included in the assessment. For subway systems, this is the dominant direction of vibration excitation.

In terms of human perception, a 0.10 mm/s vibration velocity level is just perceptible for most people.

Meeting the vibration perceptibility criteria of 0.10 mm/s discussed above is generally more than adequate for most commercial and industrial uses, which are usually less vibration-sensitive than residential uses (ISO, 1985). However, in situations where vibration-sensitive equipment is in use, such as magnetic resonance imaging (MRI) machines or scanning electron microscopes, stricter limits are required.

Ground-borne noise is created by ground-borne vibration transmitting into a building structure and causing the surface of interior walls and structural member to vibrate, resulting in potentially audible noise. According to the MOECC / TTC protocol, it is unlikely that audible ground-borne noise will result from vibration levels that meet the 0.10 mm/s rms residential vibration criterion. Vibration levels of 0.20 mm/s rms should generate indoor sound levels less than 35 dBA, which is reasonable for sleeping and unlikely to disturb residences (FTA 2006).

The vibration impact assessment assumes the track will be constructed using current TTC track bed and “double tie” designs, which reduce ground-borne noise and vibration. In accordance with the MOECC/TTC guidelines, the assessment also assumes the vehicles are in good operating condition, with minimal wheel flats, operating on well-maintained rail, with minimal rail corrugation.

Operational vibration impacts were estimated assuming no coupling losses related to transmission from ground to building. In practice, vibration levels inside a residence are lower than those measured outside the building at grade due to attenuation from the foundation. However, MOECC/TTC guidelines require vibration criteria to be met outside the residence, at grade. Coupling losses for a standard wood-framed house have the potential to lead to vibration impacts approximately 2 times lower than those outside of the structure.

Ground-borne vibration will be generated by underground operations of the subway travelling through the TSF. In assessing the potential for impacts, conservative worst-case speeds of 60 km/h have been assumed. Actual speeds are anticipated to be much lower. The distances required to meet the criteria are provided in the Noise and Vibration Report (**Appendix C**).

Throughout the Study Area, the track is planned to be approximately 20 m underground. Although train speeds operating through the TSF will be very slow, a future scenario where the subway is extended to 16th Avenue may bring higher speeds through along this section of track. With the conservative assumption of

trains travelling of 60 km/h through the TSF, the guideline limit is not expected to be exceeded at any of the sensitive receptors. Therefore, mitigation investigation is not required.

Vibration levels due to operations are expected to be below the MOECC/TTC guideline limit of 0.10 mm/s rms at all locations. Therefore, no adverse vibration impacts from normal operations are anticipated.

5.2.3 Electromagnetic Interference

There are no additional Electromagnetic Interference (EMI) impacts as a result of the TSF beyond those identified in the 2009 EPR.

5.2.4 Stray Current

There are no additional stray current impacts as a result of the TSF beyond those identified in the 2009 EPR.

5.3 Cultural Environment

5.3.1 Built Heritage and Cultural Heritage Landscapes

No known built heritage resources or cultural heritage landscapes will be displaced or permanently impacted by the proposed TSF, including those identified in the 2009 EPR. No mitigation measures are proposed as known built heritage resources or cultural heritage landscapes will not be impacted during construction of the proposed TSF. Should additional property be required outside of the current plan, further cultural heritage assessment may be required.

5.3.2 Archaeological Resources

5.3.2.1 Displacement of Existing Features

The Stage 1-2 Archaeological Assessment carried out in 2012 by New Directions Archaeology (**Appendix G**) found that the majority of the study corridor lies within the existing right-of-way and is generally disturbed due to roadway construction and surrounding residential and commercial land uses and utilities. During field investigations the Study Area was visually determined to be disturbed by roadway, parking lot, building, and railroad track construction and subsequent berming and was therefore not subject to test pit survey.

Mitigation Measures

No mitigation measures are proposed as no cultural material was recovered during the assessment. As a result, the Stage 1-2 Archaeological Assessment Report recommended that no further archaeological assessment is required.

Should the boundaries of the Study Area change to include lands outside the current plan, further Stage 2 archaeological assessment is will be completed as warranted.

The Stage 1-2 Archaeological Assessment Report has been submitted to the Ministry of Tourism, Culture and Sport in compliance with Section 65 (1) of the *Ontario Heritage Act* and has been entered into the Ontario Public Register of Archaeological Reports.

5.3.2.2 Construction Impacts

Mitigation Measures

Consultation with relevant stakeholders, including any applicable Aboriginal communities, will be initiated in the event that archaeological resources or human remains are discovered.

If cultural heritage resources (such as archaeological sites, artefacts, building and structural remains, and/or human burials) are discovered during excavation, the following procedures will apply⁶:

1. Work shall be suspended until an assessment has been completed by the Ministry of Tourism, Culture, and Sport; and
2. YRRTC / TTC shall perform required measures to mitigate negative impacts on found resources as required by the Ministry of Tourism, Culture, and Sport.

In addition, if human burials are encountered, the Registrar/Deputy Registrar of the Cemeteries Regulation Unit, Ministry of Government and Consumer Services will also be notified.

5.3.2.3 Operations and Maintenance Impacts

No cultural material was recovered during the Stage 1-2 Archaeological Assessment and no further archaeological assessment is required. Therefore, no impacts are anticipated during operation and maintenance of the TSF.

5.4 Transportation Network

5.4.1 Transit Network

5.4.1.1 Displacement of Existing Features

There are no permanent displacement impacts associated with the Transit Project. The extension of the underground facility will provide better functionality to the operation of the subway system due to the TSF.

5.4.1.2 Construction Impacts

The potential to impact YRT, Viva or GO Transit bus operations during construction is limited as none of their current routes pass through the roadways that will be affected by the construction of the TSF.

⁶ Toronto Transit Commission Master Specification 05-06-28 - Section 02230, subsection 1.2.2

Construction of the underground TSF will require a protection system for the deep excavation. The protection system will encroach within the CN railway corridor in which GO Transit operates, but will allow for the continued operation of all rail activity. In addition, encroachment will be required for utility relocation work which may involve jack and bore/tunneling work and/or directional drilling.

Mitigation Measures

Encroachment into railway corridor will require CN and Metrolinx approval and supervision to ensure construction is conducted safely and does not impact railway operations.

In accordance with CN requirements for facilities to be constructed over or adjacent to CN railways, an agreement with CN Rail will be established prior to initiating construction.

5.4.1.3 Operations and Maintenance Impacts

The TSF will enhance the operations of the YSE to Richmond Hill Centre Station and hence will provide an overall positive impact to the local transit network. As the operation of the TSF will not impact above ground operations, there are no negative impacts to the above ground transit operations.

5.4.2 Pedestrian and Cycling Network

5.4.2.1 Displacement of Existing Features

There are no permanent displacement impacts associated with the Transit Project. The proposed access road and staff utility building will not preclude future pedestrian connectivity to Richmond Hill Centre Station.

5.4.2.2 Construction Impacts

Proposed closure of Bantry Avenue for 12-16 months for the construction of the underground TSF will impact cyclists and pedestrians using the existing sidewalk and bike route.

Proposed construction adjacent to Beresford Drive and Coburg Crescent will require the temporary reduction of roadway traffic to one lane and potentially a shift of the existing boulevard and sidewalk closer to the existing residential properties.

Mitigation Measures

At the Bantry Avenue road closure, detour signing will be provided to direct cyclists and pedestrians to use facilities along High Tech Road.

All construction work adjacent to Coburg Crescent and Beresford Drive will be carried out in a manner as to ensure the least interference with pedestrians and cyclists and shall include fencing and lighting as required to provide a safe environment.

5.4.2.3 Operations and Maintenance Impacts

As the operation of the TSF will not impact above ground operations, there are no potential impacts to the surrounding pedestrian and cycling network.

5.4.3 Existing Roadway Network

5.4.3.1 Displacement of Existing Features

There are no permanent displacement impacts associated with the Transit Project.

At the northern end of the TSF, an above ground building with a cargo elevator and stairway down to the facility is required for staff access. A permanent access road to the building and parking lot will be constructed within the open space next to the railway corridor (adjacent to Coburg Crescent) which will connect to the existing road network at Beresford Drive. The boulevard between the local roadways and the access road shall include fencing, landscaping and lighting as required to provide a safe environment.

The implementation of the roadway will require minor modifications to Beresford Drive at the intersection with the proposed site access road. This intersection is expected to result in no significant impacts.

5.4.3.2 Construction Impacts

Construction of the TSF by 'open cut' necessitates the removal and subsequent reconstruction of a significant portion of the existing Bantry Avenue between Red Maple Road and Ellesmere Road. At Bantry Avenue, the proposed construction conflicts with the existing west abutment/pier, therefore the roadway will have to be closed for 12-16 months and local traffic diverted.

This will result in the displacement of approximately 610/590 vehicles per hour in the AM/PM Peak Hours. A preliminary assessment of future traffic volumes indicates that there will be sufficient capacity on the parallel alternative roadways (16th Avenue and High Tech Road) to accommodate the traffic displaced by the temporary closure of Bantry Avenue.

It is expected that, per the YSE conceptual design study, access to the construction site for construction vehicles will be via Yonge Street, and either Bantry Avenue or Beresford Drive. On Yonge Street, the addition of trucks to remove the excavated material is considered a negligible increase in truck traffic.

In addition, the underground TSF is in close proximity to Beresford Drive and Coburg Crescent. In order to construct the required protection system to complete the required deep excavation, the roadways will be reduced to one lane of traffic. Access will be maintained to all residences in the area throughout the duration of construction. **Figures 3-5A-C** illustrate in plan and section, the proposed construction and its impact to these roadways.

In addition to these roadways, temporary property easements will be required during construction to establish work zones, material laydown areas, equipment maintenance/storage and to obtain access for construction activities. Construction for the TSF will be a very large earth moving exercise, with an overall length of approximately 830 m and a depth of approximately 22 m. In order to facilitate the removal of this material, construction vehicle access will be required from several locations along the existing road network. The conceptual construction access plan (prepared as part of the YSE Conceptual Design Study) proposed construction access points at:

- High Tech Drive, east and west of proposed work zone required for construction of Richmond Hill Centre Station and beyond;
- 16th Avenue at Town of Richmond Hill right-of-way limit;
- Bantry Avenue Bridge (over railway corridor) is expected to be removed and reinstated; however alternative modes of construction may be possible;
- Beresford Drive (south leg) in the vicinity of the proposed new access road.

Mitigation Measures

During detailed design and implementation process, the Proponent and their consultants/contractors will work with York Region and the Town of Richmond Hill to develop an acceptable Traffic Management Plan (TMP) to be applied during construction. Truck haul routes will be identified during detail design as part of constructor's TMP. For the study area, trucks hauling materials associated with the YSE will be restricted from entering residential areas through contract provisions to the extent feasible.

A conceptual construction staging scheme was developed during the YSE Conceptual Design Study to confirm constructability, and was used as a basis for assessing the potential construction-related impacts. In the conceptual staging plan, it was proposed to split the work into two contract packages as detailed below.

1. Construction of the TSF from the north end of Richmond Hill Centre Station to 30m south of the Bantry Avenue Bridge Overpass
2. Construction of the TSF from 30m south of Bantry Avenue Bridge to the north end including associated facilities (EEBs, fan room, electrical services building, change facility and the removal and replacement of the Bantry Avenue Bridge.

Primary access for Contract 1 would be from High Tech Road and Beresford Drive. Access for Contract 2 would be from 16th Avenue and Bantry Avenue.

The Proponent will ensure that the contractor is following the approved Traffic Management Plan (TMP). In the event that the contractor proposes a deviation from the Plan, the contractor will be required to submit a revised TMP for review by York Region and the Town of Richmond Hill.

5.4.3.3 Operations and Maintenance Impacts

The TSF building located adjacent to the north-east corner of Coburg Crescent will be staffed 24/7 to carry out cleaning, preventative maintenance (including diagnostic checks) as well as provide a permanent presence (overnight security) at the facility. This will result in additional traffic along Beresford Drive (south portion) where the proposed site access road will connect to the 30-space employee parking lot. The magnitude of the traffic generated by the site, however, is marginal and is not expected to result in any significant impacts on the existing road network. The employee contingent present at the site is expected to be in the order of 12-14 employees per shift, and it is expected that the peak period for site-generated traffic will be offset from the peak period for background traffic due to the timing of employee shift changes.

No significant long-term operational impacts to existing roadways are expected, and therefore no associated mitigation measures are proposed.

All maintenance activities associated with the access road will be undertaken by the transit authority. Given the minor increase in traffic along Beresford Drive, no mitigation measures are required.

5.4.4 Utilities

5.4.4.1 Displacement of Existing Features

Within the Study Area, utilities will be impacted along the east side of Coburg Crescent and Beresford Drive as well as the proposed crossing under Bantry Avenue. A thorough review of existing and proposed future utilities plans, as well as all necessary relocations or modifications will be undertaken during detailed design of this Transit Project to determine permanent relocation requirements.

The existing trunk storm sewer as described in **Section 4.5** will have to be relocated as it is in conflict with the proposed construction of the TSF.

Mitigation Measures

Per the 2009 EPR, utilities will be avoided to the extent possible. Minor utilities that are not in direct conflict with the TSF will be supported and protected during construction where possible. Any utilities that are in direct conflict with the TSF will require relocation. Services will be maintained to the extent possible during relocation and notice of planned service interruptions will be provided to service users prior to interruptions. The location of all plant, potential conflicts and the relocation strategy will be confirmed with service providers during design.

Any utilities requiring relocation within the CN railway corridor will be undertaken in accordance with York Region and CN's requirements.

5.4.4.2 Construction Impacts

The existing trunk storm sewer running parallel with (and directly on top of) the proposed underground TSF will require relocation prior to construction. All other

utilities described in **Section 4.5** can be relocated either prior to or during construction depending on the proposed relocation strategy. Utility impacts and relocation strategies will be confirmed during the detailed design phase of the project.

Mitigation Measures

Due to the complexities of relocating the large trunk storm sewer system, it is recommended that the relocation be permanent. There are three potential options suggested for a relocation of the sewer system:

Option 1 involves completing an underground crossing of the existing CN Railway/GO Transit railway corridor at the north east corner of Beresford Drive. The sewer system would proceed south, roughly parallel to the railway corridor on the east side in what currently appears to be an open green-field. North of High Tech Drive the system would once again cross under the existing CN/GO Transit corridor and connect back into the existing system. Both crossings of the railway corridor would require deep excavation pits (approximately 10 meters down) and would need to be tunneled. In order to cross the proposed YSE corridor, sewer construction would have to be staged to occur after the underground maintenance and TSF subway box.

Option 2 involves re-routing the sewer system westerly along Beresford Drive and south through the existing commercial parking lots and across High Tech Road to the existing storm water management pond.

Option 3 involves temporarily relocating the existing sewer system adjacent to the proposed subway structure within the CN railway corridor (see **Figure 5-4**). This would require re-building the sewer in its existing location during backfill of the excavation for the subway box structure. The benefit of this option is that no crossing of the railway corridor will be required and no additional property owners will be affected.

Services to residential homes on Beresford Drive and Coburg Crescent will be maintained to the extent possible during construction and notice of planned service interruptions will be provided to service users prior to interruptions. The location of all plant, potential conflicts and the relocation strategy will be confirmed with service providers during detailed design.

For all utilities that will be relocated, relocation plans and construction activities will be undertaken in accordance with the Road Rights of Way Act and with the Town's requirements for the Installation of Services within the Town of Richmond Hill Road allowance.

The Proponent will pursue the necessary crossing permits required from any affected utilities during the detailed design phase of this study.

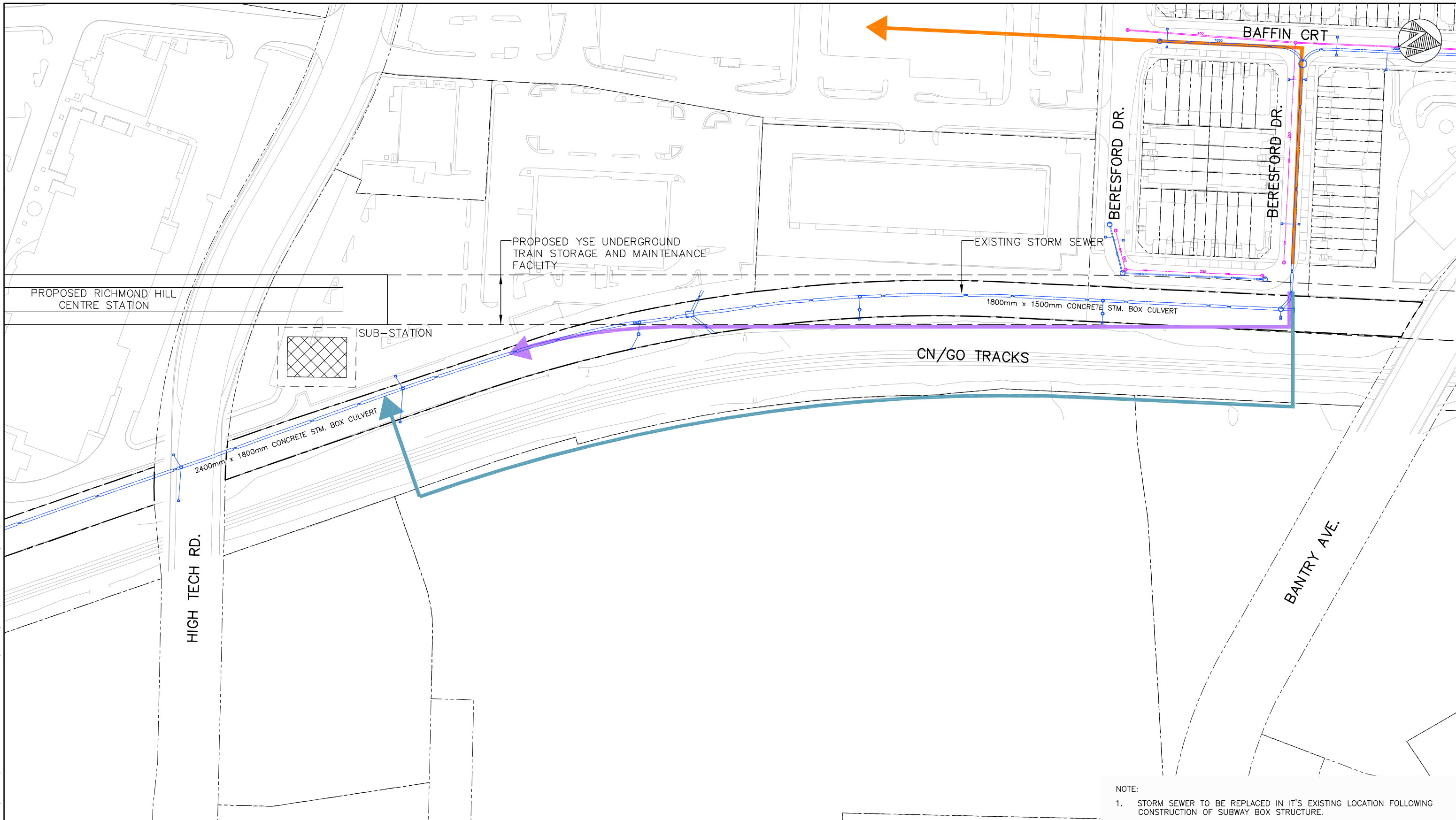
Monitoring

An appropriate monitoring plan will be developed during the detailed design phase of this project.

5.5 Summary of Potential Impacts, Proposed Mitigation Measures, Monitoring, and Future Work

The following table summarizes the potential impacts, proposed mitigation measures and monitoring processes, and future work associated with the proposed changes to the YSE project.

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NOTE:
 1. STORM SEWER TO BE REPLACED IN IT'S EXISTING LOCATION FOLLOWING CONSTRUCTION OF SUBWAY BOX STRUCTURE.



LEGEND:

	PERMANENT RELOCATION OPTION #1
	PERMANENT RELOCATION OPTION #2
	TEMPORARY RELOCATION OPTION #3 (NOTE 1)

DATE:	JANUARY 2014
SCALE:	1:1500

**YONGE SUBWAY EXTENSION
 ENVIRONMENTAL PROJECT REPORT ADDENDUM**

EXISTING STORM SEWER / RELOCATION OPTIONS

Table 5-3: Summary of Potential Impacts, Mitigation Measures, Future Work, and Contingencies

Factor	Environmental Issue / Concern	Effect / Impact (During Construction; During Operations)	Mitigation Measures	Monitoring / Future Work / Contingency
Natural Environment				
Terrestrial Habitat	Direct and indirect impacts to terrestrial habitats during construction.	<p>Impacts to terrestrial habitat from construction of the TSF are expected to cause temporary disturbance that can be managed using best practice mitigation and restoration measures.</p> <p>If construction occurs during the bird breeding season, it may interrupt or curtail nesting efforts.</p> <p>No permanent impacts are anticipated to result from the operation and maintenance associated with the TSF.</p>	<ul style="list-style-type: none"> Zones to be cleared of vegetation will be clearly delineated to minimize vegetation impacts and avoid incidental impacts from temporary stockpiling, debris disposal and site access. Vegetation clearing will be conducted outside the breeding bird season (May 1 to July 31) to avoid removal or destruction of active bird nests and remain consistent with the Migratory Birds Convention Act. An avian biologist will conduct a nest survey if vegetation removal is proposed during this period. Wildlife of any species incidentally encountered during construction will not be knowingly harmed. Where there is provincial or federal interest, all works will be completed in accordance with applicable legislation including, but not necessarily limited to, the <i>Migratory Birds Convention Act</i>, the <i>Endangered Species Act</i> and the <i>Species at Risk Act</i>. 	It is possible that additional mitigation measures, monitoring, and commitments may be identified in consultation with relevant provincial and federal agencies during the design/construction phase of the project. Any additional mitigation measures, monitoring, and commitments agreed to will be complied with.
Fish and Aquatic Habitat	Potential impacts to fish and fish habitat	<p>Permanent impacts to fish and aquatic habitat within the Study Area for the TSF are not anticipated.</p> <p>Impacts to fish and aquatic habitat from construction of the TSF are expected to cause temporary disturbances that can be managed using best practice mitigation and restoration measures to be refined based on the final design details.</p> <p>No permanent impacts are anticipated to result from the operation and maintenance associated with the TSF.</p>	<p>No specific mitigation measures for fish and aquatic habitat are required as a result of the TSF.</p> <p>To mitigate potential impacts to fish and aquatic habitat, erosion and sediment impacts from the TSF will be addressed as part of a comprehensive strategy for the entire YSE project developed during detailed design to meet the requirements, guidelines and design standards provided in TRCA's 2006 Erosion and Sediment Control Guidelines for Urban Construction.</p> <p>Where there is provincial or federal interest, all works will be completed in accordance with applicable legislation including, but not necessarily limited to, the Fisheries Act, the <i>Endangered Species Act</i> and the <i>Species at Risk Act</i>.</p>	It is possible that additional mitigation measures, monitoring, and commitments may be identified in consultation with relevant provincial and federal agencies during the design/construction phase of the project. Any additional mitigation measures, monitoring, and commitments agreed to will be complied with.
Species at Risk	Potential impacts to species at risk	<p>Locally or regionally rare species and Species at Risk are not expected in the Study Area, therefore there are no anticipated construction impacts to Species at Risk associated with the TSF.</p> <p>No permanent impacts are anticipated to result from the operation and maintenance associated with the TSF. Therefore, potential impacts should be limited to temporary disturbance-related impacts that can be addressed using standard mitigation measures.</p>	Vegetation clearing will be conducted outside the breeding bird season (May 1st to July 31st) to avoid removal or destruction of active bird nests and remain consistent with the <i>Migratory Birds Convention Act</i> . An avian biologist will conduct a nest survey if vegetation removal is proposed during this period. Wildlife of any species incidentally encountered during construction will not be knowingly harmed.	It is possible that additional mitigation measures, monitoring, and commitments may be identified in consultation with relevant provincial and federal agencies during the design/construction phase of the project. Any additional mitigation measures, monitoring, and commitments agreed to will be complied with.
Soil and Groundwater	Impacts to soil and groundwater during construction and operation	There are no permanent displacement impacts expected to soils associated with the TSF. All soil impacts are transient and relate to	Dewatering and groundwater inflow measures and contingency plans will be developed through additional investigations, during detailed design and continued consultation with the TRCA and	Ground movement will be monitored by a qualified geotechnical specialist during construction to ensure that existing infrastructure (roads, structures, utilities, etc.) are

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		<p>the construction of the TSF</p> <p>Based on currently available information, groundwater impacts are anticipated to be transient and relate to dewatering required for construction of the TSF.</p> <p>Dewatering will likely be required to temporarily reduce the groundwater levels and pressure in the upper and lower aquifers for construction of the TSF structure.</p>	<p>MOECC regulatory agencies. It is anticipated that these measures will adequately mitigate groundwater impacts from the TSF construction.</p> <p>A Permit to Take Water (PTTW) will be obtained from the MOECC for dewatering purposes and groundwater control, prior to the TSF construction. The PTTW will specify the rates and duration of the dewatering program, a monitoring program, and mitigation and contingency measures to be used during dewatering.</p> <p>A Soil Management Strategy Plan will be developed for re-use or disposal of excavated soils (i.e. excess soils), consistent with past TTC practice. This plan will be part of the Excess Materials Management Plan and require that management of excess soils is conducted in accordance with the applicable MOE (now MOECC) recommendations outlined in the documents titled "Protocol for Analytical Methods Used in the Assessment of Properties" (MOE, March 2004, amended in July 2011) and "Management of Excess Soils – A Guide for Best Management Practices" (MOE, January 2014).</p> <p>Please refer to <i>Contaminated Properties</i> for mitigation measures related to contaminated property.</p>	<p>protected. Baseline readings and existing condition reports will be completed prior to any construction activities.</p> <p>All construction activities will be conducted in a manner that maintains ground movement/vibration within a specified limit (pre-approved).</p> <p>An environmental inspector will be responsible for ensuring that all environmental mitigation and design measures are properly installed/constructed, implemented and maintained, and appropriate contingency, response plans and remedial measures are in place and implemented if required.</p> <p>A monitoring program will be completed by a dewatering contractor as per conditions of the PTTW. This program will include monitoring dewatering rates and drawdown in monitoring wells and implementing erosion control measures to comply with the conditions imposed by the MOECC in the PTTW.</p>
Drainage and Stormwater Management	Impacts to drainage and stormwater systems	<p>The introduction of the TSF access roadway and employee parking lot will result in a minor increase in impervious area (and therefore a minor increase in stormwater run-off) within the catchment area for the drainage system.</p> <p>Construction of the TSF will be completed by open-cut excavation. Runoff into this excavation zone will require a dewatering system that will pump flow into the local storm sewer system until the proposed box structure is complete. Management of the additional flow to be handled by the local drainage network shall be reviewed in further detail during the detailed design phase of the project.</p> <p>No permanent impacts are anticipated to result from the operation and maintenance associated with the TSF.</p>	<p>In the design of the roadway and parking facility for the TSF, consideration will be given to ensure that run-off is directed away from the residential properties and the rail corridor.</p> <p>General drainage and stormwater management mitigation measures were outlined in the 2009 EPR, including stormwater management design criteria and a conceptual stormwater management plan (to be further defined in the design phase of the project in consultation with the Town of Richmond Hill and TRCA). These same stormwater management design criteria will apply to the works proposed in this EPR Addendum as well, and the design of the stormwater management plan will incorporate the proposed TSF as presented in this EPR Addendum.</p> <p>In addition, subsequent to the approval of the 2009 EPR, the TRCA has developed a Stormwater Management Criteria document. Therefore, in the development of the stormwater management plan (to be completed in the design/construction phase of the project), consideration will be given to implementing recommendations from TRCA's Stormwater Management Criteria, as appropriate, for the works proposed in the EPR Addendum.</p> <p>The detailed design phase will include specifications for sediment and erosion control to be complied with during construction. These specifications will be prepared in accordance with the TRCA's Erosion and Sedimentation</p>	<p>An environmental inspector will be responsible for ensuring that all environmental mitigation and design measures are properly installed / constructed, implemented and maintained, and appropriate contingency, response plans and remedial measures are in place and implemented if required.</p>

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			Guidelines which are based on Provincial and Regional legislation, guidelines and by-laws on the matter.	
Air Quality	Impacts to air quality during construction. Impacts on air quality due to implementation of the TSF.	As with any major construction project, dust concentrations are at times expected to be highly visible in the surrounding area. There are no notable permanent air quality impacts associated with the TSF, and therefore no specific mitigation or monitoring measures have been proposed.	A mitigation plan will be developed during the design / construction phase of the project to reduce the dust emissions generated during construction processes with guidance from Environment Canada's "Best Practices for the Reduction of Air Emissions from Construction or Demolition Activities", 2005;	The 2009 EPR outlines monitoring requirements for air quality construction impacts to ensure that construction operations meet Regulation 419/05 requirements. There are no changes to air quality monitoring requirements as a result of the works proposed in this EPR Addendum.
Contaminated Properties	Impacts to areas of high, moderate and low potential for contamination present within the study area.	A number of broad Areas of Potential Environmental Concern (APECs) were identified in the Contaminant Overview Study Report, however, no APECs with high potential for contamination were identified within close proximity of the TSF. Several areas with <i>moderate potential</i> for contamination were identified to be present within the Study Area; however, the only property/area likely to be impacted by construction of the TSF is a CN/GO railway line present to the east of the proposed TSF. There is the potential for soil and/or groundwater contamination to occur as a result of the operation and maintenance of the TSF.	Where there are property acquisitions that will be directly impacted by construction of the TSF (i.e. impacted properties) footprint or in the areas immediately adjacent to the railway line, Phase I and/or Phase II Environmental Site Assessments (in accordance with O.Reg.153/04, as amended) will be completed for these properties For <i>moderate</i> APECs where there are no property impacts, soil contaminant investigation will be completed in areas where excavation may be required, to assess soil quality and soil management options during construction. Some investigations have already been completed through the Contaminant Investigation (Appendix D). Where works are required along existing road right-of-ways appropriate management of salt, metal and Petroleum Hydrocarbons impacted soils (and groundwater) may be required with regard to environmental regulations. Soil and groundwater quality will be evaluated for the area where the Train Storage Facility is proposed to be constructed south of Bantry Avenue. This area was not evaluated as part of the Contaminant Investigation due to difficulties in locating a storm sewer. Additional groundwater sampling will be completed in wells MW4 and MW5 and wells to be installed during future investigations in the area south of Bantry Avenue, to provide recommendations for groundwater discharge options during dewatering for the TSF construction. An Excess Materials Management Plan will be implemented to provide a mitigation strategy to effectively manage any contaminated excess materials (both soil and groundwater) encountered during construction. This plan will develop a sampling program to collect soil confirmatory samples for evaluation of options for soil re-use, recycling or disposal, as recommended in the MOE (now MOECC) Guide for Best Management Practices for Soil Management (MOE, 2014) and according to applicable regulations. In addition to managing contaminated materials generated during construction, it is equally important to ensure that off-site	Additional environmental investigations may be required to evaluate the impacts to soil and/or groundwater during operations and maintenance. A monitoring program and a contingency plan to deal with potential spills and releases of contaminants into soil and groundwater will be developed at the detail design stage of the project. A monitoring program will be included in the Soil and Groundwater Management Strategy which will be developed prior to construction. A contingency plan will be developed prior to construction where appropriate.

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			contamination (i.e. contamination outside of the subway corridor excavation area) does not migrate back into the corridor. This may require engineered containment barriers/walls such as grout curtains and sheet piling; and/or hydraulic traps to contain, capture and treat contaminant plumes. These requirements will be integrated into the detailed design of the subway corridor.	
Socio-Economic Environment				
Property	Property impacts for the construction of the YSR.	<p>11 properties will be permanently impacted within the study area (see Table 5-1).</p> <p>Temporary property easements will be required at nine properties as noted in Table 5-2.</p> <p>Temporary property easements will be required during the construction phase to establish work zones, material laydown areas, equipment maintenance/storage (pocket) and to obtain access for construction activities.</p> <p>Construction activities (e.g. excavation and protection system) may result in potential for ground settlement, and impacts to existing buildings/structures adjacent to construction.</p> <p>No operations and maintenance-related impacts to property ownership are anticipated.</p>	<p>Per the 2009 EPR, if property acquisition is required for this project, it will be undertaken by the Proponent. The acquisition process emphasizes negotiation and the achievement of a mutually satisfactory agreement between the Proponent and the owner. If necessary, in order to protect the ability to proceed with the Project, expropriation may be required to acquire the necessary property. The total property acquisition process and resulting compensation is intended to leave the affected owner "whole" and thereby mitigating the negative impact.</p> <p>The Proponent will negotiate temporary construction easements with property owners on a case-by-case basis following the procedures described in Section 5.2.1.1. Following construction, the Proponent will reinstate lands to pre-construction conditions, if feasible.</p>	<p>Prior to the commencement of construction operations, a pre-condition survey will be undertaken to document existing ground elevations and building/structure conditions.</p> <p>During construction, surveys will be undertaken to monitor any movement to existing ground and buildings/structures within 50m of the work zone. Surveys will be undertaken on a weekly basis (minimum). This monitoring schedule is reduced to every three months for up to a year following backfilling.</p> <p>The monitoring program will include review and alert levels. If instrument readings exceed "review" levels, the Proponent and its Contractor will jointly assess the necessity of altering the method, rate or sequence of construction. At "alert" levels, the Proponent can order construction operations to cease until the necessary mitigation measures are undertaken.</p> <p>Following construction, the Proponent and its contractors 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.</p> <p>The Proponent will monitor horizontal and vertical movements 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), the Proponent 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.</p> <p>In the event that a property owner submits a claim for property damage, the Proponent will conduct further investigations and, if appropriate, will negotiate a settlement.</p>
Noise and Vibration	Temporary noise and vibration impacts during construction.	<p>Based on the TTC requirement for all ancillary equipment to meet 60 dBA at 1 m in all public spaces, no adverse impacts are expected from the HVAC equipment to be located at the surface electrical service building.</p> <p>Vibration levels due to operations are expected to be below the</p>	<p>Should noise emissions or operations vary significantly from those outlined in the Noise and Vibration Assessment (Appendix C), noise impacts will be reassessed to assure compliance with all relevant legislative requirements.</p> <p><i>Noise</i></p>	<p>The Proponent will conduct a noise and vibration study, in accordance with the MOECC protocols. Specifically, this will include additional base line noise and vibration surveys (as required), similar to those already undertaken as part of the Transit Project. Post construction measurement will be undertaken to confirm "no adverse impact" as predicted in the</p>

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		<p>MOECC/TTC guideline limit of 0.10 mm/s root mean square (RMS) at all locations. Therefore, no adverse vibration impacts from normal operations are anticipated.</p> <p><i>Noise</i></p> <p>Construction noise levels will vary over time as the activities at the site change. Worst-case sound levels from construction activity, at the closest noise-sensitive receptors, will range from:</p> <ul style="list-style-type: none"> • 75 dBA to 104 dBA, for removal of original surface material (including a +10 dB annoyance penalty applied to the hoe ram / mounted impact hammer). • 73 dBA to 96 dBA, for pile driving. • 74 dBA to 85 dBA, for general excavation and removal of material. <p>These worst-case impacts are expected to occur immediately to the west of the cut-and-cover construction. Noise sensitive areas to the east, across the CN / GO Richmond Hill rail line can expect worst-case sound levels at least 17 dB lower than those outlined above.</p> <p>Stationary noise sources have been assessed cumulatively. Cumulative noise impacts include ventilation noise and noise from HVAC in the mechanical rooms of the electrical and access buildings.</p> <p>Based on the generic sound power emission data and silencer insertion loss data used in this assessment the emergency fire ventilation fans are expected to meet the applicable MOECC NPC-205 guideline limits at all noise sensitive locations.</p> <p>Based on the TTC requirement for all ancillary equipment to meet 60 dBA at 1 m in all public spaces, no adverse impacts are expected from the HVAC equipment to be located at the surface electrical service building.</p> <p><i>Vibration</i></p> <p>Construction vibration within the City is controlled by By-law 514-2008, which provides limits on maximum allowable vibration levels for construction and demolition activities (Toronto, 2008).</p> <p>The by-law identifies requirements for:</p> <ul style="list-style-type: none"> g) Preliminary studies of vibration impacts; h) The identification of a "vibration zone of influence", where such a zone will extend beyond the property line / legal boundary of the construction site; i) The existence within the zone of influence of any buildings that have been designated under the Ontario Heritage Act; j) Pre-construction consultation with property owners within the 	<p>Construction noise impacts are temporary in nature, and generally unavoidable. Although construction noise will be noticeable for some periods and types of work, with adequate controls impacts can be minimized. A Construction Code of Practice and the following provisions have been identified to mitigate the potential impacts from construction noise:</p> <ul style="list-style-type: none"> • Construction should be limited to the time periods allowed by the locally applicable by-laws (0700h to 2300h, except in the case of emergencies). If construction activities are required outside of these hours, the Contractor must seek permits / exemptions directly from the Town of Richmond Hill. • There will be explicit indication that Contractors are expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work done by Contractors. • All equipment will be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. • The Contract documents will contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to, are in effect. • In the presence of persistent noise complaints, all construction equipment will be verified to comply with MOECC NPC-115 guidelines. • In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required where reasonably available. In selecting appropriate noise control and mitigation measures, consideration would be given to the technical, administrative and economic feasibility of the various alternatives. • Any blasting works will be designed to meet any applicable overpressure and vibration limits established by the MOECC in Publication NPC-119 and by the Ministry of Transportation Ontario in OPSS 120. • Since the sound levels from the construction activity are anticipated to be quite high during some periods, and the site is located adjacent to public space, construction hoarding/temporary fences are to be used where feasible. <p><i>Vibration</i></p> <p>The Town of Richmond Hill does not have a by-law addressing construction vibration. Although not directly applicable within Richmond Hill, City of Toronto By-law 514-2008 provides limits on maximum allowable vibration levels for construction and demolition activities (Toronto, 2008). Under the terms of the City of Toronto Vibration By-law, a vibration control form should be</p>	<p>noise and vibration impact analysis undertaken as part of the Transit Project (see Appendix C for details).</p>

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		<p>zone of influence;</p> <p>k) Pre-construction measurements of ambient background vibration levels, and site inspections; and,</p> <p>l) Development of a monitoring plan and continuous measurements of construction vibration during activities which may affect off-site receptors.</p> <p>The vibration Zone of Influence is identified in the by-law as the area beyond the property line of the construction site where vibration levels may exceed 5 mm/s.</p> <p>Vibration from pile driving and other general construction activities at the TSF could affect buildings on Coburg Crescent.</p> <p>Throughout the Study Area, the track is planned to be approximately 20 m underground. Although train speeds operating through the TSF will be very slow, a future scenario where the subway is extended to 16th Avenue may bring higher speeds through along this section of track. With the conservative assumption of trains travelling of 60 km/h through the TSF, the guideline limit is not expected to be exceeded at any of the sensitive receptors. Therefore, mitigation investigation is not required.</p> <p>Vibration levels due to operations are expected to be below the MOECC/TTC guideline limit of 0.10 mm/s rms at all locations. Therefore, no adverse vibration impacts from normal operations are anticipated.</p> <p><i>Human Health and Safety</i></p> <p>Local employees and residents as well as TSF construction workers will be potentially affected by construction-related noise, vibration and dust. Another important issue is the health and safety of construction workers.</p>	<p>provided with the Building Permit or Demolition Permit application. Pre-construction consultation, vibration monitoring, and site inspections will likely be required. Care should be taken where structures are located within the zone of influence.</p> <p><i>Human Health and Safety</i></p> <p>As documented in the 2009 EPR, the Proponent and its contractors will monitor noise, vibration and dust effects during construction. In addition, the proponent will monitor contractor compliance with applicable legislation and regulations.</p>	
Electromagnetic Interference	Potential generation of electromagnetic interference	There are no additional Electromagnetic Interference (EMI) impacts as a result of the TSF beyond those identified in the 2009 EPR.	N/A	N/A
Stray Current	Potential impacts from stray current	There are no additional stray current impacts as a result of the TSF beyond those identified in the 2009 EPR.	N/A	N/A
Cultural Environment				
Built Heritage and Cultural Landscapes	<p>Potential for displacement and/or disruption of cultural heritage landscapes and built heritage resources during and after construction.</p> <p>Potential for indirect impacts by</p>	No known built heritage resources or cultural heritage landscapes will be displaced or permanently impacted by the proposed TSF, including those identified in the 2009 EPR.	No mitigation measures are proposed as known built heritage resources or cultural heritage landscapes will not be impacted during construction of the proposed TSF. Should additional property be required outside of the current plan, further cultural heritage assessment may be required.	N/A

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	the introduction of physical, visual, audible or atmospheric elements not in keeping with their existing character and, or setting.			
Archaeological Resources	Potential loss of archaeological resources	Based on findings of the Stage 1-2 Archaeological Assessment, no impacts are anticipated during construction, operation and maintenance of the TSF.	<p>Should the boundaries of the Study Area change to include lands outside the current plan, further Stage 2 archaeological assessment is will be completed as warranted.</p> <p>Consultation with relevant stakeholders, including any applicable Aboriginal communities, will be initiated in the event that archaeological resources or human remains are discovered.</p> <p>If cultural heritage resources (such as archaeological sites, artefacts, building and structural remains, and/or human burials) are discovered during excavation, the following procedures will apply⁷:</p> <ol style="list-style-type: none"> 1. Work shall be suspended until an assessment has been completed by the Ministry of Tourism, Culture, and Sport; and 2. YRRTC / TTC shall perform required measures to mitigate negative impacts on found resources as required by the Ministry of Tourism, Culture, and Sport. <p>In addition, if human burials are encountered, the Registrar/Deputy Registrar of the Cemeteries Regulation Unit, Ministry of Government and Consumer Services will also be notified.</p>	N/A
Transportation Network				
Transit Network	Potential impacts to the transit network	<p>There are no permanent displacement impacts associated with the Transit Project. The extension of the underground facility will provide better functionality to the operation of the subway system due to the TSF.</p> <p>The potential to impact YRT, Viva or GO Transit bus operations during construction is limited as none of their current routes pass through the roadways that will be affected by the construction of the TSF.</p> <p>Construction of the underground TSF will require a protection system for the deep excavation. The protection system will encroach within the CN railway corridor in which GO Transit operates, but will allow for the continued operation of all rail activity. In addition, encroachment will be required for utility relocation work which may involve jack and bore/tunneling work and/or directional</p>	<p>Encroachment into railway corridor will require CN and Metrolinx approval and supervision to ensure construction is conducted safely and does not impact railway operations.</p> <p>In accordance with CN requirements for facilities to be constructed over or adjacent to CN railways, an agreement with CN Rail will be established prior to initiating construction.</p>	N/A

⁷ Toronto Transit Commission Master Specification 05-06-28 - Section 02230, subsection 1.2.2

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		drilling.		
Pedestrian and Cycling Network	Relocation of existing sidewalks in the study area.	<p>There are no permanent displacement impacts associated with the Transit Project.</p> <p>Proposed closure of Bantry Avenue for 12-16 months for the construction of the underground TSF will impact cyclists and pedestrians using the existing sidewalk and bike route.</p> <p>Proposed construction adjacent to Beresford Drive and Coburg Crescent will require the temporary reduction of roadway traffic to one lane and potentially a shift of the existing boulevard and sidewalk closer to the existing residential properties.</p>	<p>At the Bantry Avenue road closure, detour signing will be provided to direct cyclists and pedestrians to use facilities along High Tech Road.</p> <p>All construction work adjacent to Coburg Crescent and Beresford Drive will be carried out in a manner as to ensure the least interference with pedestrians and cyclists and shall include fencing and lighting as required to provide a safe environment.</p>	N/A
Existing Roadway Network	<p>Reduction in the road capacity available for automobile movements.</p> <p>Changes to traffic movements.</p>	<p>There are no permanent displacement impacts associated with the Transit Project.</p> <p>A permanent access road to the TSF building and parking lot will be constructed within the open space next to the railway corridor (adjacent to Coburg Crescent) which will connect to the existing road network at Beresford Drive. The implementation of the roadway will require minor modifications to Beresford Drive at the intersection with the proposed site access road. This intersection is expected to result in no significant impacts.</p> <p>Construction of the TSF by 'open cut' necessitates the removal and subsequent reconstruction of a significant portion of the existing Bantry Avenue between Red Maple Road and Ellesmere Road. At Bantry Avenue, the proposed construction conflicts with the existing west abutment/pier, therefore the roadway will have to be closed for 12-16 months and local traffic diverted.</p> <p>This will result in the displacement of approximately 610/590 vehicles per hour in the AM/PM Peak Hours. A preliminary assessment of future traffic volumes indicates that there will be sufficient capacity on the parallel alternative roadways (16th Avenue and High Tech Road) to accommodate the traffic displaced by the temporary closure of Bantry Avenue.</p> <p>It is expected that, per the YSE conceptual design study, access to the construction site for construction vehicles will be via Yonge Street, and either Bantry Avenue or Beresford Drive. On Yonge Street, the addition of trucks to remove the excavated material is considered a negligible increase in truck traffic.</p> <p>In addition, the underground TSF is in close proximity to Beresford Drive and Coburg Crescent. In order to construct the required protection system to complete the required deep excavation, the roadways will be reduced to one lane of traffic. Access will be maintained to all residences in the area throughout the duration of construction.</p> <p>In addition to these roadways, temporary property easements will</p>	<p>No significant long-term operational impacts to existing roadways are expected, and therefore no associated mitigation measures are proposed.</p> <p>During detailed design and implementation process, the Proponent and their consultants/contractors will work with York Region and the Town of Richmond Hill to develop an acceptable Traffic Management Plan (TMP) to be applied during construction. Truck haul routes will be identified during detail design as part of constructor's TMP. For the study area, trucks hauling materials associated with the YSE will be restricted from entering residential areas through contract provisions to the extent feasible.</p> <p>The Proponent will ensure that the contractor is following the approved Traffic Management Plan (TMP). In the event that the contractor proposes a deviation from the Plan, the contractor will be required to submit a revised TMP for review by York Region and the Town of Richmond Hill.</p>	N/A

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		<p>be required during construction to establish work zones, material laydown areas, equipment maintenance/storage and to obtain access for construction activities. Construction for the TSF will be a very large earth moving exercise, with an overall length of approximately 830 m and a depth of approximately 22 m. In order to facilitate the removal of this material, construction vehicle access will be required from several locations along the existing road network.</p> <p>The magnitude of the traffic generated by the operation of the TSF, however, is marginal and is not expected to result in any significant impacts on the existing road network. All maintenance activities associated with the access road will be undertaken by the transit authority. Given the minor increase in traffic along Beresford Drive, no mitigation measures are required.</p>		
Utilities	Impacts to utilities in study area	<p>Within the Study Area, utilities will be impacted along the east side of Coburg Crescent and Beresford Drive as well as the proposed crossing under Bantry Avenue. A thorough review of existing and proposed future utilities plans, as well as all necessary relocations or modifications will be undertaken during detailed design of this Transit Project to determine permanent relocation requirements.</p> <p>The existing trunk storm sewer running parallel with (and directly on top of) the proposed underground TSF will require relocation prior to construction. All other utilities described in Section 4.5 can be relocated either prior to or during construction depending on the proposed relocation strategy. Utility impacts and relocation strategies will be confirmed during the detailed design phase of the project.</p>	<p>Minor utilities that are not in direct conflict with the TSF will be supported and protected during construction where possible. Any utilities that are in direct conflict with the TSF will require relocation. Services will be maintained to the extent possible during relocation and notice of planned service interruptions will be provided to service users prior to interruptions. The location of all plant, potential conflicts and the relocation strategy will be confirmed with service providers during design.</p> <p>Any utilities requiring relocation within the CN railway corridor will be undertaken in accordance with York Region and CN's requirements.</p> <p>For all utilities that will be relocated, relocation plans and construction activities will be undertaken in accordance with the Road Rights of Way Act and with the Town's requirements for the Installation of Services within the Town of Richmond Hill Road allowance.</p> <p>The Proponent will pursue the necessary crossing permits required from any affected utilities during the detailed design phase of this study.</p>	An appropriate monitoring plan will be developed during the detailed design phase of this project.