

## PREFACE

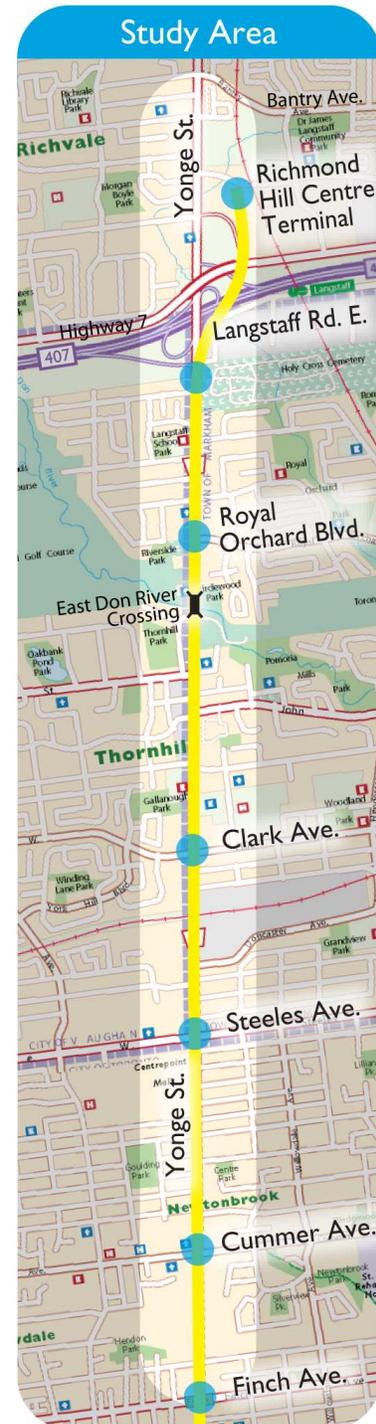
The Regional Municipality of York (York Region), in partnership with York Region Rapid Transit Corporation, the Toronto Transit Commission (TTC) and the City of Toronto have completed a Transit Project Assessment for a proposed extension of the Yonge Subway.

On June 15, 2007, the Province of Ontario announced \$17.5 billion in funding for transit projects for the Greater Toronto Area and Hamilton. Named ‘MoveOntario 2020’, the provincial transit plan includes funding for an extension of the Yonge Subway from its current terminus at Finch Station in the City of Toronto to Highway 7 (Richmond Hill Centre) in the Town of Richmond Hill. As a result, on June 21, 2007, York Region Council authorized commencement of a Conceptual Planning and Functional Design Study in coordination with the City of Toronto for the timely extension of the subway.

The scope of Conceptual Design and Functional Planning was to examine and evaluate possible vertical and horizontal alignment alternatives, station locations, and associated surface facilities along the corridor in consultation with public and government stakeholders. The goal was to develop a technically feasible solution and the results serve as the basis that defines the Transit Project.

The Transit Project is an underground 6.8 km 6 subway station extension of the Yonge Subway from its terminus at Finch Station in the City of Toronto to a proposed terminus at the Richmond Hill Centre in the Town of Richmond Hill. Stations are proposed at Cummer Avenue / Drewry Avenue, Steeles Avenue, Clark Avenue, Royal Orchard Boulevard, Langstaff Road / Longbridge Road, and Richmond Hill Centre Station. Intermodal bus terminals are proposed for Steeles Station and Richmond Hill Centre Station.

The purpose of this Environmental Project Report is to document the transit project assessment process followed and the conclusions reached.



## 1. INTRODUCTION

The Regional Municipality of York (York Region), York Region Rapid Transit Corporation (YRRTC), the Toronto Transit Commission (TTC), and the City of Toronto have jointly prepared this Environmental Project Report (EPR) as required under the Transit Project Assessment Process (TPAP).

On June 15, 2007, the Province of Ontario announced \$17.5 billion in funding for transit projects for the Greater Toronto Area and Hamilton. Named ‘MoveOntario 2020’, the provincial transit plan includes funding for an extension of the Yonge Subway from its current terminus at Finch Station in the City of Toronto to Highway 7 (Richmond Hill Centre) in the Town of Richmond Hill.

On June 21 2007, York Region Council authorized commencement of a Conceptual Design and Functional Planning Study in coordination with the Toronto Transit Commission and the City of Toronto for the timely extension of the subway. The scope of the Conceptual Design and Functional Planning Study included an examination and evaluation of possible subway alignment alternatives, station locations, and surface facilities associated with each station along the corridor. The goal was to develop a preferred solution in consultation with public and government stakeholders.

On October 3, 2008, following completion of the Conceptual Design and Functional Planning Study, York Region initiated the TPAP for the Yonge Subway extension to Richmond Hill Centre (the Transit Project). Results from the Conceptual Design and Functional Planning Study served as the basis that defined the Transit Project. On October 29/30, 2008, Toronto City Council approved the TTC/City of Toronto as co-proponents of the Transit Project.

### 1.1 Purpose of the Study

The purpose of this study was to identify the impacts and mitigation associated with the preferred Transit Project.

### 1.2 Study Process

The Yonge Subway Extension Transit Project Assessment Process is following Ontario Regulation 231/08, Transit Projects and Greater Toronto Transportation Authority Undertakings (2008). The environmental impact of this Transit Project will be assessed in accordance with the Transit Project Assessment Process as prescribed in Ontario Regulation 231/08.

### 1.3 Study Background

Higher-order transit in the Yonge Street corridor has a long history. The following sections summarize the key findings of a series of past planning studies as they pertain to extending the Yonge subway northward along the Yonge Street corridor and the options to improve the capacity of the Yonge Line in the long term. Past studies have identified and acknowledged the benefits associated with an extension of the Yonge Line north of Finch Station. However, these studies also reinforce the need to match

ridership growth in the Yonge Corridor with capacity improvements. Understanding the historical impacts of Yonge line ridership on the capacity of the system (and quality and reliability of service) is important in assessing the capacity risks to the Yonge-University-Spadina subway system from a network perspective.

### 1.3.1 Historical Ridership on the Yonge-University-Spadina Subway

As shown in Exhibit 1-1, Yonge Subway peak point ridership peaked in the mid-1980s at approximately 30,000 passengers per hour and declined to a low of 20,400 per hour in 1996-7. Since the late 1990s, peak point ridership has steadily increased back to approximately the 30,000 per hour level.

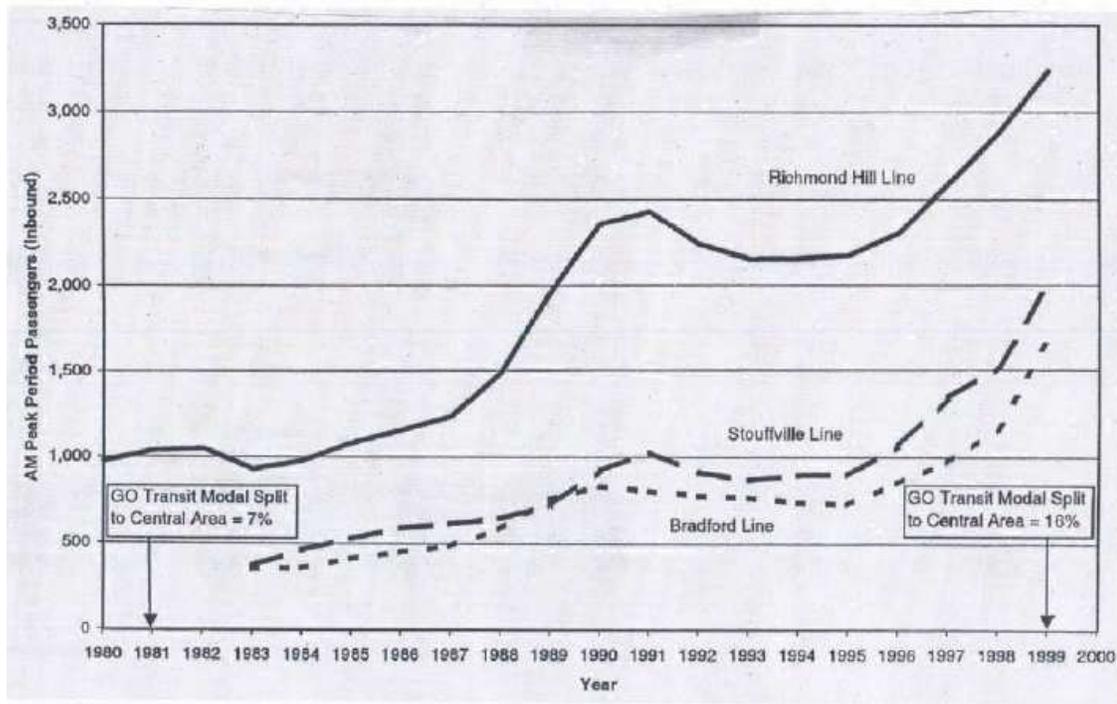
**Exhibit 1-1: Yonge-University-Spadina Subway – Peak Hour Volumes**



Over the period from 1985 to the late 1990s, the TTC modal share of morning peak period trips into the downtown core crossing the Central Area Cordon declined from 57% to 43%. Since the late 1990s, the TTC transit modal split to the downtown core has stabilized around 46%.

During the same period (1985-98), GO rail ridership in the peak three hour period (6-9am) in the Stouffville, Richmond Hill and Bradford (now Barrie) GO corridors has increased significantly (See Exhibit 1-2) and GO's share of travel to the downtown core (for all GO rail lines) has increase from 7% in 1981 to 16% in 1999. Since 1999, GO Transit's share of the downtown travel market has continued to increase to almost 19% by 2006.

**Exhibit 1-2: GO Rail A.M. Peak Period Ridership – North Lines (1980-1999)**



**1.3.2 GO Rail/Yonge Subway Ridership Relationship**

The relative modal share of TTC and GO Transit into the downtown core is influenced by a large number of factors including the following:

- Population/employment growth in the 905 region which is well served by GO Transit;
- Employment levels and parking costs/availability of parking in the downtown core;
- GO rail service levels and GO rail service extensions implemented over time in response to demand in outlying areas;
- Congestion levels on the Yonge Subway line;
- Overall economic conditions/trends in TTC ridership;
- Fare levels on TTC and GO; and
- The cost of TTC commuter parking.

The Yonge Subway and north/south GO Rail lines serve different travel markets. Almost all GO Rail passengers are destined to the downtown core and are making longer distance trips where the travel time savings to ride GO (relative to the TTC) is worth paying a premium fare to ride the GO system. The subway is used by people making shorter distance trips to a variety of destinations including the downtown and

by longer distance riders to the downtown who are not prepared to pay a premium fare to ride the GO system.

The relationship between GO and TTC ridership in the areas potentially served by the Transit Project is complex to forecast as people's choice of mode depends on relative fares, ease of access to rapid transit stations and speed of travel. For example, a large percentage of riders arriving downtown at Union Station walk as far as College Avenue to avoid the payment of a TTC subway fare to access their destination. This significantly exceeds the walking distance (500-600 metres) considered to be convenient based on empirical data and is assisted by the availability of the underground PATH network in the downtown connecting Union Station to points as far north as Dundas. Decisions regarding fares, station locations/access and the frequency of service provided on GO Rail can result in significant numbers of passengers switching between GO Rail and the Yonge Subway for access to the downtown. As noted above, increases in GO Rail service levels have historically helped to mitigate Yonge ridership levels and alleviate congestion on the Yonge line.

### **1.3.3 Studies to Address Yonge-University-Spadina Capacity and Ridership**

As a result of the above ridership pressures, a number of studies have been undertaken to ensure that the TTC's most important asset (the Yonge Subway) has the capacity to provide TTC riders with high quality, reliable and efficient transit services. The following key studies have been undertaken since the mid 1980s:

- Downtown Rapid Transit Study (1984)
- Network 2011 Study (1985)
- Yonge-University-Spadina Improved Headway Study (1988)
- Bloor-Yonge Capacity Improvement Study (1988)
- Yonge-University-Spadina Loop Environmental Assessment (1994)
- Rapid Transit Expansion Study (2001).

An overview of each of the above studies is highlighted below.

#### **1.3.3.1 Downtown Rapid Transit Study**

The Downtown Rapid Transit (DRT) study was completed in 1984 in response to the peak point ridership on the Yonge line south of Bloor reaching historical highs of approximately 32,000 people per hour in 1981. The study recommended the construction of a rail transit "relief" line to the Yonge Subway by connecting the CBD to the Bloor-Danforth line at Pape Station. It was intended for the line to divert approximately 12,800 southbound passengers from the Yonge line by providing a transfer to the downtown for westbound Bloor-Danforth Subway riders at Pape Station.

#### **1.3.3.2 Network 2011 Study**

The Network 2011 Study (1985) concluded that the DRT line could be deferred to the second priority (after completion of the Sheppard Subway from Yonge to Victoria

Park) due to the conclusion that “the expected economic short-term growth in ridership in the downtown core can be handled by interim measures until the mid 1990’s”.

When TTC peak point ridership on the Yonge Subway line south of Bloor declined to less than 25,000 in the mid 1990’s (reaching a low of 20,400 in 1996-7), the need, justification, and timing of additional rapid transit in the downtown core became a much lower priority than recommended by the Network 2011 study.

### ***1.3.3.3 Yonge-University-Spadina Improved Headway Study***

Despite the decline in Yonge Subway ridership at the time, the high capital cost of the Downtown “Relief” Line led the TTC to examine alternatives to constructing a new rapid transit line into the downtown core.

The Yonge-University-Spadina Improved Headway Study focused on the feasibility of operating Yonge-University-Spadina subway trains closer together than was feasible with the existing TTC train signalling system implemented when the Yonge Subway opened in 1954. The study identified three major implementation issues related to the operation of trains closer together:

- Replacing the existing fixed block signal system with a more modern signalling technology (Automatic Train Operation/Automatic Train Control, known as ATO/ATC). A new signalling system could allow subway trains to operate as close as 90 seconds apart compared to the capacity of the existing signal system which constrained train spacing to in excess of 120 seconds;
- Reducing the amount of time Yonge-University-Spadina subway trains “dwell” at Bloor Station on the Yonge line to load and unload passengers to acceptable levels; and
- Reducing the amount of time to turn trains around at terminal stations.

The Yonge-University-Spadina Subway Improved Headway Study was completed in 1988 and concluded that, as an alternative to the Downtown Relief line, the capacity of the Yonge Subway could be improved through a variety of signal, terminal and Yonge-Bloor Station modifications. It was this study that identified the need to “determine the feasibility of construction of branch lines, or connection of Finch Station on the Yonge Subway line with the Spadina Subway line to form a large circular route in order to avoid the problems associated with close headway operation at terminal stations”. This was the first study to identify the concept of looping the Yonge and Spadina lines into a single line with no terminal constraints, and led, in the early 1990s, to the Yonge-University-Spadina Loop EA.

### ***1.3.3.4 Bloor Yonge Station Capacity Improvement Study***

The Yonge-University-Spadina Improved Headway Study concluded that one of the most significant obstacles to improved spacing of Yonge-University-Spadina subway trains (and capitalizing on the ATO/ATC signalling system, if available in the future) was the excessive dwell times for trains at Yonge-Bloor Station.

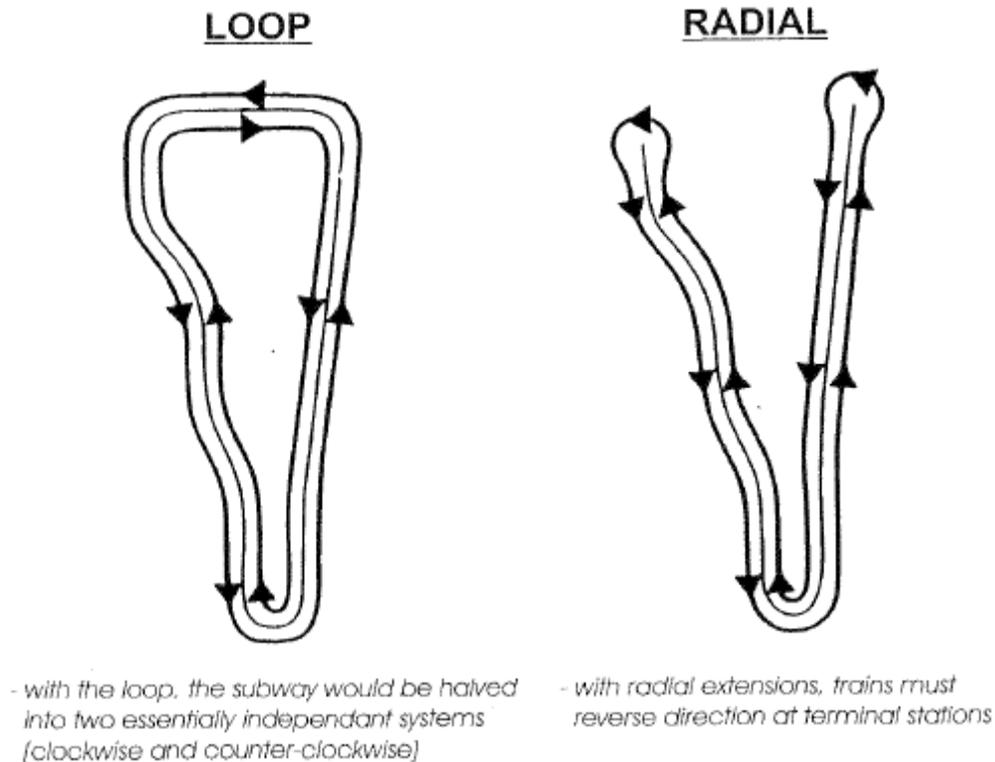
Currently, at the upper level station (Bloor Station on the Yonge Subway), trains utilize the existing side platforms by opening the train doors on one side of the train to allow passengers to enter and exit the train. Yonge-Bloor Station is the busiest station in the TTC system mainly due to the station acting as the major transfer point for Bloor-Danforth riders to the Yonge Subway (and vice versa). As a result of the high transfer volume of passengers at this station and the fact that passengers can only exit and enter the trains through a single set of doors on one side of the train, the trains typically dwell 45-60 seconds in the station to allow passengers to load/unload the train. During periods of heavy congestion, dwell times in excess of 90 seconds have been experienced and this delays trains south of Bloor Station thereby limiting the number of trains that can serve Yonge-Bloor Station in a single hour. The practical capacity of Yonge-Bloor Station acts as a limiting factor to the capacity of the Yonge line to operate trains closer together even with a new signalling system and acceptable train turnaround times at terminal stations.

To address the dwell time and capacity constraints of Yonge-Bloor Station, a study was undertaken to protect for the future addition of a third platform at Bloor Station on the Yonge line (and future side platforms at the Yonge Station on the Bloor-Danforth level), to solve the dwell time constraint to operating reduced headways. The study concluded that by adding a third centre platform to the Bloor Station (Yonge Subway level) in addition to the two existing side platforms, passengers could exit and board trains simultaneously thereby reducing station dwell times to 30 seconds or less. This study led to the partial protection of the centre platform in the southern third of Bloor Station in 1990 at a cost of \$11.5 million. The construction of the remaining part of the centre platform at Bloor Station on the Yonge Line and the future side platforms at Yonge Station (lower level, Bloor-Danforth line) remains to be completed as warranted by future ridership levels.

#### **1.3.3.5 Yonge-University-Spadina Loop EA, TTC, 1994**

The concept of “looping” the Yonge University Subway lines into a single continuous subway line (by connecting the two ends of the Spadina and Yonge lines operationally) has its roots in the Yonge-University-Spadina Improved Headway Study which identified the time to turn trains around at the end of the line as a constraint to closer spacing of trains with a new signalling system (See Exhibit 1-3).

### Exhibit 1-3: Loop-Versus Radial Configuration



The TTC completed the Yonge-Spadina Loop Environmental Assessment (hereinafter referred to as the 1994 EA). The 1994 EA established the need and justification for transportation improvements in northwest Toronto. The study examined radial extensions of the Yonge-University-Spadina Line, in conjunction with improvements to Finch Station and Yonge-Bloor Station, as part of the assessment and evaluation of “Alternatives to the Undertaking”. It was assumed that the Yonge Line would terminate at either Steeles Avenue – within the former Metro boundary – or in the vicinity of the proposed Highway 407. The study acknowledged that there would be multiple benefits associated with an extension of the Yonge Line.

Notwithstanding the above, the study determined that extending and connecting the north ends of the Yonge and Spadina Subway to Steeles Avenue and connecting the two subways across Steeles Avenue was the preferred alternative. However, the 1994 EA determined that the need for the “loop” along Steeles Avenue was a longer-term requirement; therefore, the TTC only sought approval for the extension of the Spadina Subway from Downsview Station to York University as the initial stage in implementing a loop subway line.

#### 1.3.3.6 Rapid Transit Expansion Study, TTC, 2001

The purpose of the Rapid Transit Expansion Study (RTES) was to examine the needs and priorities for expansion of the TTC’s rapid transit system to the year 2021 in support of the population and employment growth envisioned in the new City of Toronto Official Plan and in recognition of GTA development trends.

The RTES identified that a Yonge Subway extension to Highway 7 had significant long term potential. The option ranked high on ridership potential, cost effectiveness, network connectivity, and development potential. However, RTES noted that a northerly extension of the Yonge Line had the potential to overload its peak location south of Yonge-Bloor Station. Increases in the Yonge Line ridership raised concerns that overcrowding of the subway line may be a reality in the short to medium term. From an operational perspective, an extension of the Spadina Subway Line to York University and beyond should be implemented first in order to offload the Yonge Line and better balance ridership between the Yonge Line and the Spadina Line.

More importantly, the RTES concluded that the looping of the Yonge and Spadina subway lines in the next 10-15 years would not be required and that, in all likelihood, looping of the two lines at Steeles Avenue in the long term is unlikely. In summary, the Loop provided no short term benefits that could not be achieved less expensively by other initiatives. This opened opportunities for consideration of radial extensions particularly of the Spadina Subway line including the following:

- Extending the Spadina Subway line north of Finch Avenue having the benefit of not only off-loading the Yonge Subway line, but potentially has higher overall ridership than the top of the Loop,
- Looping of the Yonge and Spadina Subway lines on Steeles Avenue could be pushed further north (e.g. Highway 7) if required in the future,
- Radial extensions of the Spadina Subway line beyond York University could be considered if Steeles Avenue is no longer a constraint on the location of the top of the Loop, and
- Alignments which penetrate further west into York University campus could be considered. Alignments further west into the University were rejected in the 1994 EA as a more westerly alignment into the University increased the capital costs for an easterly extension of the Spadina Subway line to join the Yonge Subway line in a loop configuration.

The conclusions of the RTES led, in part, to the initiation of the Spadina Subway Extension EA Study to examine a radial extension of the Spadina line north (including the diversion effect of such an extension on Yonge Line ridership).

#### **1.3.4 York Region Transportation Master Plan 2002**

The approved York Region Transportation Master Plan (TMP), undertaken in accordance with the Municipal Class Environment Assessment (Class EA) Master Plan process, reaffirmed the need to achieve a balanced transportation system by implementing rapid transit in four corridors, including the Yonge Street Corridor. The TMP also incorporated the Government of Ontario's Smart Growth vision for fostering and managing growth.

In the Region's planned rapid transit network, three of the identified corridors comprise north-south rapid transit facilities. These include:

- Yonge Street corridor connecting Newmarket Regional Centre to the Yonge Subway;
- Link the Vaughan Corporate Centre to the Spadina Subway; and
- Link the proposed Markham Centre to the Sheppard Subway.

For York Region, the purpose of the TMP encompassed two fundamental objectives:

- To improve accessibility to current and planned development by providing a high quality public transit alternative to reduce automobile dependence; and
- To contribute to the achievement of the Regional Official Plan objectives of sustainable natural environment, economic vitality and healthy communities.

The TMP must help make the Region's urban centers more livable, pedestrian-oriented and economically viable by providing a valuable tool for structuring and achieving land use and social objectives.

### **1.3.5 Toronto-York Spadina Subway Extension (TYSSE) to Vaughan Corporate Centre**

As set out in the recommendations contained in RTES, the TTC initiated an Environmental Assessment Study in 2004 to examine alignment options for an extension of the Spadina Line from Downsview Station to Steeles Avenue West via York University. York Region, in response to a request by the City of Vaughan as well as the Region's Centres and Corridors Strategy initiatives, conducted a separate assessment of a potential extension of the Spadina Subway from Steeles Avenue West to the Vaughan Corporate Centre.

The TTC EA was submitted in 2006 and approved by the Ministry of the Environment in early 2007. The York Region EA was submitted in June 2007 and approved in April 2008.

Completion of the Spadina Subway extension to the Vaughan Corporate Centre prior to completion of the extension of the Yonge Subway is important to divert Yonge Line riders to the Spadina Line in order to alleviate congestion on the Yonge line and maximize utilization of the Spadina line.

The full funding secured for the Spadina Subway Extension project will result in completion of the project by third quarter 2015, prior to the earliest opening date of the Yonge Subway extension to Richmond Hill Centre/Highway 7 in 2017.

### **1.3.6 MoveOntario 2020, Province of Ontario (2007)**

On June 15, 2007, the Province of Ontario announced \$17.5 billion in funding for transit projects for the Greater Toronto Area and Hamilton. Named 'MoveOntario 2020', the provincial transit plan includes funding for an extension of the Yonge Subway from Finch Station to Highway 7 (Richmond Hill Centre) in the Town of Richmond Hill among 52 transit projects for the GTAH.

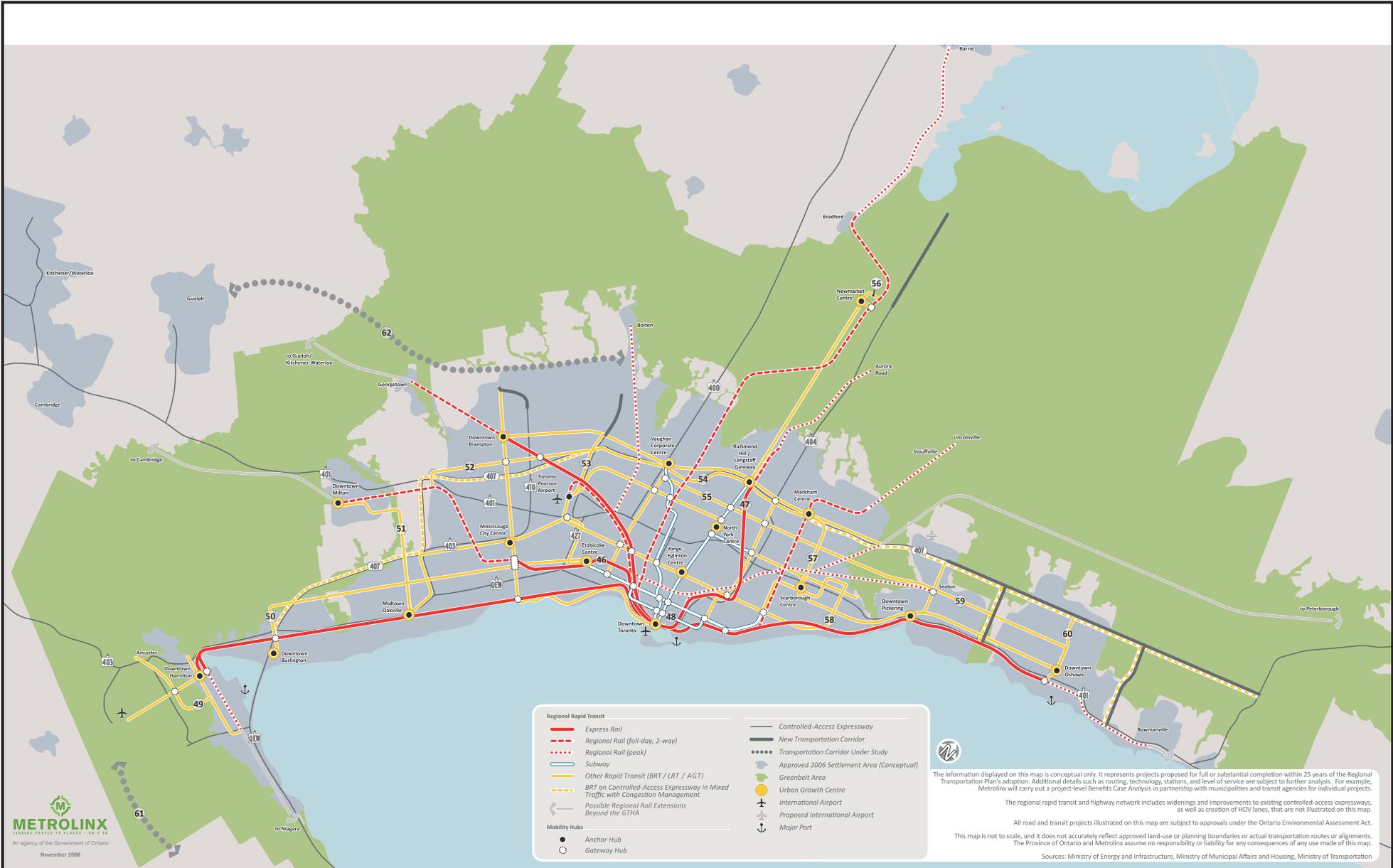
MoveOntario 2020 includes 902 kilometres of new or improved rapid transit that will move people efficiently around the region. It will result in 800 million new transit trips per year, taking 300 million car trips off GTA roads.

### **1.3.7 Metrolinx Regional Transportation Plan (2008)**

The Metrolinx Regional Transportation Plan (RTP) was approved on November 28, 2008 and included the Yonge Subway northerly extension as one of the top 15 priority projects. A plan showing the extent of the Metrolinx plan (The Big Move – 25 Year Plan) is included as Exhibit 1-4. More than 1,200 kilometres (km) of new rapid transit lines are planned in The Big Move. These lines will move people more conveniently and more quickly. More than 80 per cent of people in the GTHA will live within two km of rapid transit, compared to just 42 per cent currently. These additional transit choices will mean that there will be twice as many people taking transit each morning.

Metrolinx will be conducting a Benefits Case Analysis (BCA) for each of the priority projects including the Yonge Subway extension and will make a decision on capital funding based on the BCA results in the summer of 2009.

The Metrolinx 2009/10 capital budget includes \$320 million to support planning, design and engineering work on these transit projects. Budget and capital spending priorities for the 2009/2010 to 2013/2014 budget period will be established in the Fall of 2009 based on the outcomes of the BCA studies.



Yonge Subway Extension - Finch Station to Richmond Hill Centre  
 Transit Project Assessment

**METROLINX - THE BIG MOVE (25 YEAR PLAN)**

EXHIBIT

1-4



### 1.3.8 Transit City Initiative

The City of Toronto has initiated the design and construction of a series of Light Rail Transit (LRT) lines in the Finch West, Sheppard East, Eglinton, Don Mills, Jane, Scarborough-Malvern, and Waterfront West Corridors (See Exhibit 1-5). The initiation of the Transit City network will also have implications for Yonge Subway ridership south of Bloor in the medium term.

**Exhibit 1-5: Transit City LRT Plan**



Specifically, the Finch West, Sheppard East and Eglinton LRT lines have the greatest potential to increase peak point ridership on the Yonge subway south of Bloor followed by the Jane, Don Mills and Scarborough Malvern lines. Key construction and service dates are noted in Exhibit 1-6.

**Exhibit 1-6: Transit City – Key Dates**

Line	Start Construction	Revenue Service
Sheppard East	2009	2013
Etobicoke - Finch West	2010	2014
Eglinton Crosstown (Stage 1)	2010	2016
Waterfront West	2010	2015
Don Mills	2012	2016
Jane	2013	2017
Scarborough Malvern	2014	2019

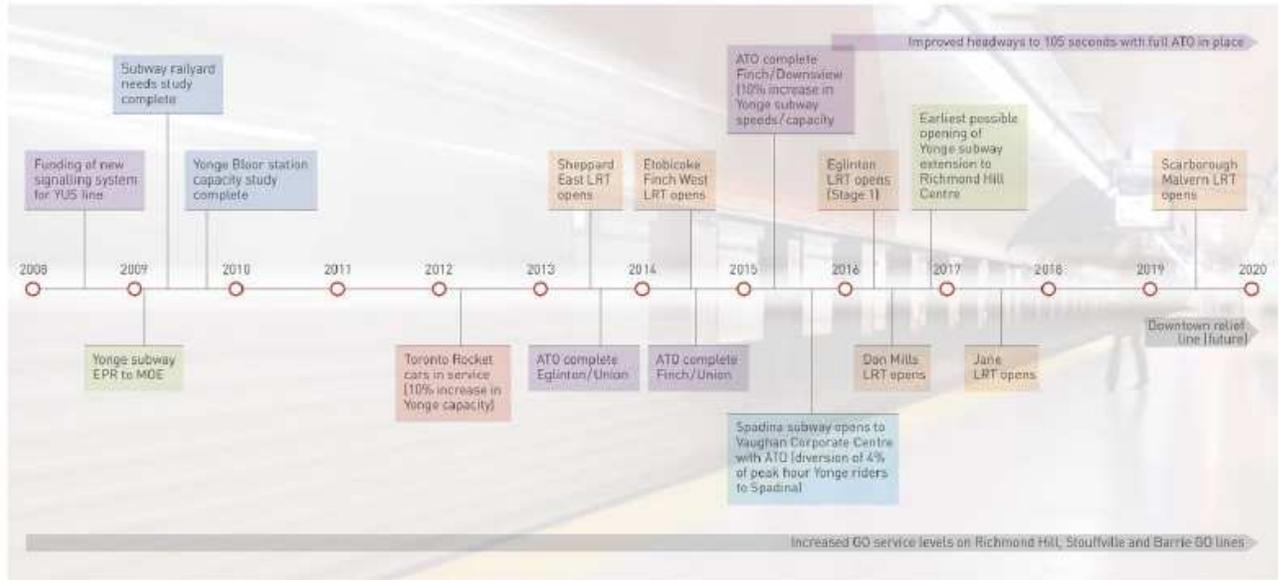
**1.4 Impact of Past Studies/Current Planning on Proposed Yonge Subway Ridership/Capacity**

The proposed extension of the Yonge Subway north of Finch will impact current and future ridership levels along with the Transit City initiative, the implementation of the Metrolinx RTP and population and employment growth/transit ridership growth in the entire GTA network.

Based on previous studies, the theoretical design capacity of the Yonge Subway is 32-34,000 per hour assuming 130 second headways and 27-28 trains per hour. This assumes a loading standard of 1,200 riders/train. However, since the completion of these studies, the TTC has adopted a new loading standard of 1,100 passengers per train. Based on past TTC experience the theoretical capacity of the subway is not sustainable on an on-going basis in part due to uneven passenger loading of trains along the platform. A loading standard of 1,100 per train reflects the actual capacity that can be operated while maintaining acceptable levels of comfort and customer satisfaction. As a result, the actual practical capacity of the subway is 29,700 to 30,800 per hour.

Exhibit 1-7 shows the planned network improvements that could contribute to increased peak point ridership and the timing of the implementation of capacity improvements on the Yonge-University-Spadina Subway line.

**Exhibit 1-7: Timeline for Yonge Subway Capacity / Ridership Milestones**

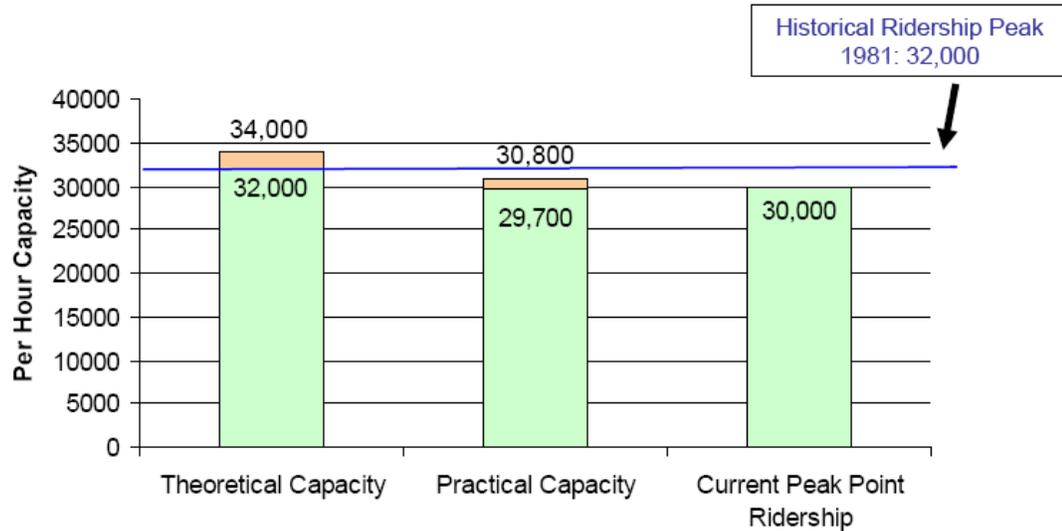


When Yonge Subway ridership south of Bloor peaked in the 1980s, significant operational problems resulted as noted in the RTES Final Report:

- Reliability of service declined;
- Passengers at major transfer stations (particularly Yonge-Bloor Station) were routinely left at platforms and passengers were forced to wait 2 or 3 trains to board;
- Platform congestion during delays reached serious levels;
- Passenger complaints related to congestion and delays rose significantly; and
- Recovery from delays was lengthier and even minor delays caused significant operational reliability problems.

As outlined in Exhibit 1-8, with Yonge Subway ridership south of Bloor approaching historical highs and nearing the practical capacity of the existing system, a further extension of the Yonge Subway has important downstream implications for the TTC as a whole and for existing TTC riders who use the Yonge line.

**Exhibit 1-8: Yonge Subway Capacity**



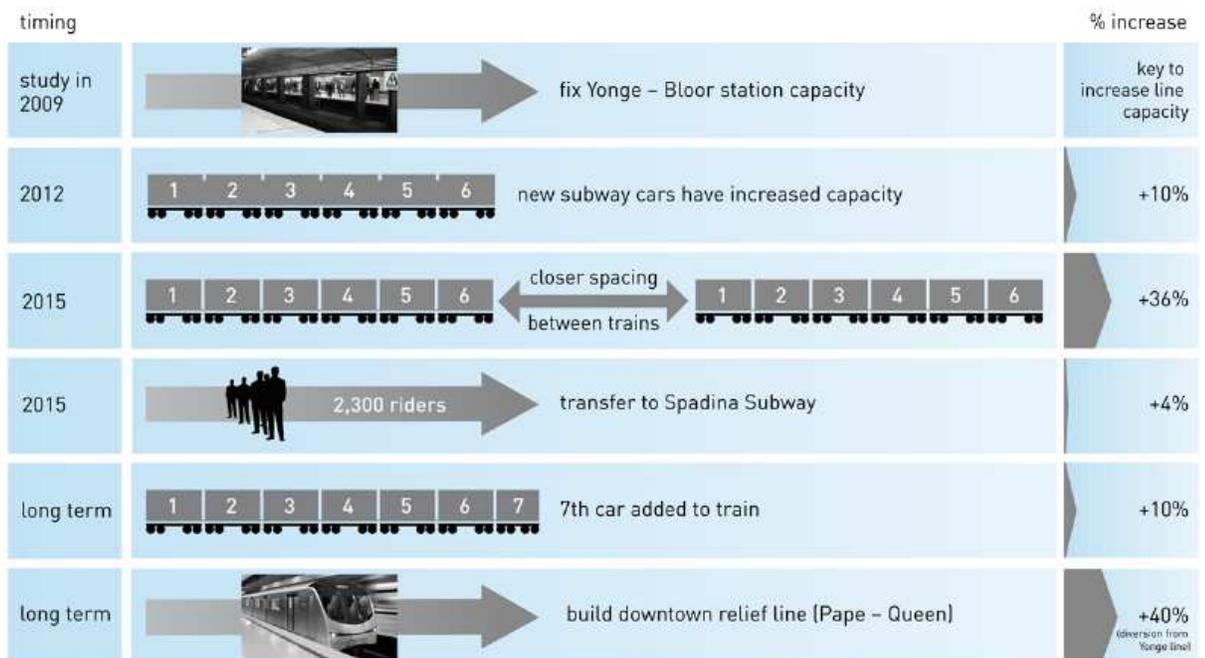
In order to respond to future growth in Yonge Subway ridership, the TTC plans to implement a number of capacity improvements to the existing system as follows:

- To improve the capacity of Yonge-Bloor Station, a study has been initiated in January 2009 and is expected to be completed in Fall 2009;
- The introduction of new Toronto Rocket subway cars will increase Yonge Subway capacity by 10% in 2012;
- A project to implement ATO/ATC on the Yonge-University-Spadina line by 2015 will allow the TTC, in response to increases in ridership, to operate trains as close as 90-105 seconds apart. This represents, based on a 105 second spacing between trains, a 36% increase in system capacity;
- The opening of the Spadina Subway Line to the Vaughan Corporate Centre will divert approximately 1,300 peak hour riders from the Yonge line to the Spadina line. Due to this diversion effect (which will reduce Yonge ridership south of Bloor by 4%), the City/TTC has made it a condition that the Spadina Line open before the extension of the Yonge Subway is in place and current implementation plans are consistent with meeting this condition;
- The TTC is currently undertaking a study to determine the feasibility of operating longer subway trains. Currently, existing TTC subway platforms are 500 feet long served by 450 foot long trains. The 50 foot difference in platform/train length is an allowance for drivers to manually stop the train. With ATO/ATC, a computer will stop the train within a one foot stopping tolerance. This would allow the operation of longer trains and a possible 10% improvement in the capacity of each train. Due to the operational complexity and cost of longer trains, this capacity improvement is considered a longer term option that will be the subject of a TTC staff report in Spring 2009; and,

- In the long term, after maximizing the capacity of the existing system and as a last resort, it would be possible to divert riders from the Yonge Line south of Bloor by constructing the Downtown Relief Line. Metrolinx forecasts indicate that diversion of 40% of Yonge riders south of Bloor would be possible with the implementation of a new line into the downtown core (Pape to Queen).

Exhibit 1-9 summarizes the capacity improvements that are possible to respond to future growth in Yonge Subway ridership. The relationship/timing of these capacity improvements to increased ridership to 2031 is discussed in Section 5.4.6.4 of this report.

**Exhibit 1-9: Capacity Improvements to the Yonge Line**



### 1.5 Subway Rail Yard Needs Study (SRYNS)

Equally important to having the capacity to handle increased ridership on the Yonge Line is the need to be able to accommodate the growth in the subway vehicle fleet as service levels on the Yonge or Spadina Lines increase or either of these lines are extended and additional vehicles are required to operate the extensions.

The TTC is currently undertaking a SRYNS analysis to be completed in Spring 2009. The study will determine the best strategy for accommodating the expansion of the subway car fleet increases attributable to the Spadina and Yonge Subway Extensions, the extension of existing short turn locations to the north, the phased implementation of ATO/ATC and growth in the Sheppard Subway car fleet to 2031.

One of the options for accommodating the Yonge-University-Spadina fleet to 2031 involves the creation of a satellite facility for the storage/light maintenance of subway cars at the north end of the Yonge Subway Extension to Richmond Hill Centre and/or

new yard on the north end of the Yonge Subway Extension. The implementation of either of these options would require an increase in the cost of storage and maintenance facilities currently included in the Yonge Subway Extension capital cost estimate outlined in Section 4.3.3 of this report.

At the conclusion of the SRYNS, the need for a separate TPAP to implement the recommended yard configuration will be determined.

## 2. OUTLINE OF STUDY CONSULTATION PROCESS

### 2.1 Introduction

An extensive consultation process was undertaken to assist in the planning and impact assessment process for this project. The consultation process was designed to address the requirements of *Ontario Regulation 231/08*. In addition to undertaking consultation as part of the Transit Project Assessment and Approvals Process (TPAP), extensive consultation occurred in advance of October 3, 2008, during the Conceptual Design and Functional Planning Study.

Those consulted included potentially affected land owners, Aboriginal communities, government review agencies, heritage preservation groups, technical agencies, local municipalities and the general public.

This section outlines the consultation carried out in advance of and during the formal TPAP. A detailed summary of how the issues noted in Schedule 2 of *Ontario Regulation 231/08* were addressed is included in Appendix N.

Public and stakeholders were able to choose their level of involvement from one or more of the following options:

- Project Website ([www.vivayork.com](http://www.vivayork.com))
- Public Consultation Centres
- Public and Technical Workshops
- E-Consultation, including live web-based access to PCC presentations
- Six public review locations
- Contacting the Project Team directly

Three rounds of Public Meetings were undertaken and seven public and technical workshops were held covering a range of subjects including: assessment and evaluation of alternatives, bus terminal options at the Steeles station and the Langstaff / Longbridge commuter parking lot. In addition to the above public consultation efforts, the TTC/City undertook a public meeting with respect to the ridership/capacity issues associated with the Yonge Subway line. The full details of these events are included in Appendix N.

To notify the general public and property owners within the study area of the Transit Project consultation dates, newspaper advertisements were placed in local and regional newspapers informing the public of the status of the study and providing notices of each round of public meetings / open houses. Similar notices were also placed on the project website at <http://www.vivayork.com>. Some of the public meetings were broadcasted live on the internet and were made available online for future viewing. News releases were issued to the media resulting in press and television newscasters covering the transit project PCCs.

Letters and postcards were sent to members of the general public, affected land owners, and interest groups by regular mail and / or by email. As the study progressed, the mailing lists were updated to include new individuals taking an interest in the transit project. In addition, all property owners within 30 metres of the project were advised on the Notice of Commencement and all public meetings. At the discretion of the proponent, additional property owners and residents in proximity to the project study area (up to 500 metres from Yonge Street) were sent project-related notification.

In advance of the Notice of Commencement, a letter was sent to the MOE Environmental Assessment Approvals Branch (EAAB) Director requesting input for First Nation Consultation. The details of First Nations Consultation are included in Section 2.3.1.3. The Notice of Commencement of the TPAP was done in accordance with the requirements of Section 7(4) of the regulation. Specifically:

- Letters were sent to all property owners within 30 metres of the project
- Letters were sent to the MOE Regional Director and EAAB Director in addition to the government ministries, agencies and local municipalities noted later in this section.
- All members of the public that participated in previous consultation events received notification.
- Newspaper Ads were placed in The Toronto Star and The Metro on October 3 and 4, 2008.
- A notice was posted on the project website.

An additional notice was circulated on November 19 and December 1, 2008, in accordance with the requirements of Section 7(4) of the regulation. The intent of the notice was to inform potentially interested parties that the City of Toronto and the Toronto Transit Commission had become co-proponents of the Transit Project.

## 2.2 Study Organization and Study Stages

The study is being carried out through a partnership between The Regional Municipality of York (York Region), York Region Rapid Transit Corporation (YRRTC), City of Toronto (the City) and Toronto Transit Commission (TTC).

The project included two distinct phases. The first phase was a Conceptual Design and Functional Planning Study. The second phase was the formal TPAP.

The focus of the Conceptual Design and Functional Planning Study was to discuss the planning issues with stakeholders and identify a 'project'. This occurred between January 2008 and October 3, 2008. The consultation undertaken as part of this phase is outlined in Section 2.3.1.

The focus of the TPAP was to consult on the project, the alternatives considered, the potential impacts and proposed mitigation measures. The process commenced on October 3, 2008 as noted in the previous section. The consultation undertaken as part

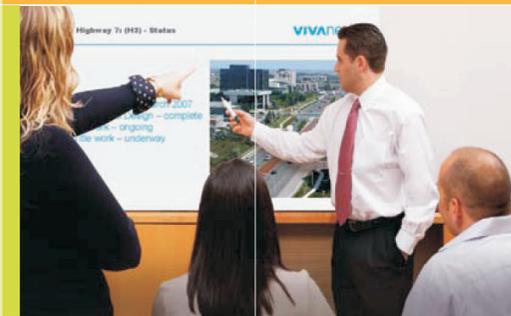
of this phase is outlined in Section 2.3.2. The TPAP followed for the Transit Project is shown in Exhibit 2-1.

Detailed summaries of all consultation activities are included in Appendix N. A summary of the major comments received and how they were addressed as part of the project is included in Section 2.4.

Notice of study commencement

2008  
October

PCC

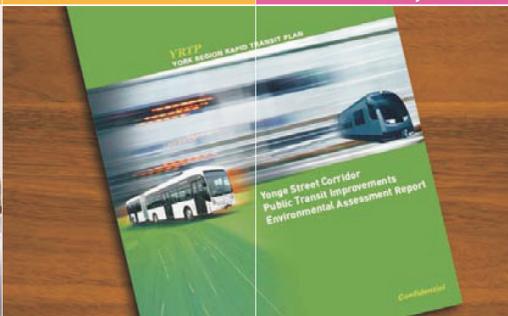


November

PCC

PCC

December



2009  
January

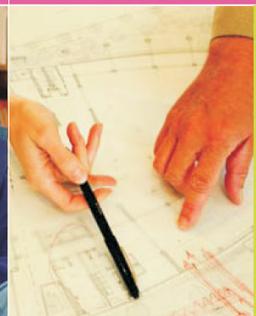
PCC



Public Review

February

Project approval:  
In time for consideration  
with provincial budget



March

MOE review



Design and  
Construction

April

Prepare project report

Toronto report to  
Commission/Council

Submit project report

## 2.3 Consultation Overview

As noted previously, this section focuses on summarizing who and how various stakeholders were consulted. A summary of the major comments received and how they were addressed as part of the project is included in Section 2.4. In addition, Appendix N includes a tracking table which summaries how the issues noted in Schedule 2 of *Ontario Regulation 231/08* were addressed.

### 2.3.1 Conceptual Design and Functional Planning Study

#### 2.3.1.1 Technical Agencies

Extensive notification and consultation was carried out to encourage the involvement of government agencies, technical agencies and municipal staff in the planning phase of the transit project. It has been important to facilitate the involvement of these groups as project elements develop, to assist in better understanding the project study area. Agencies were invited to participate in the public consultation centres and workshops, and focused meetings to address specific concerns and technical requirements were also required.

The following technical review agencies have been invited to be involved in the Yonge Subway Conceptual Design and Functional Planning Study as well as the formal TPAP.

#### Government Review Agencies

- Canadian Environmental Assessment Agency
- Transport Canada
- Indian and Northern Affairs Canada
- Ministry of Aboriginal Affairs
- Ministry of Culture
- Ministry of Community and Social Services
- Ministry of Economic Development
- Ministry of the Environment (EAAB and District)
- Architectural Conservancy of Ontario
- Ministry of Municipal Affairs and Housing
- Ministry of Natural Resources
- Ministry of Energy and Infrastructure
- Ministry of Tourism
- Ministry of Transportation
- Ontario Realty Corporation
- Ontario Heritage Trust
- Heritage Canada Foundation

Technical Agencies

- 407 ETR
- CN Rail
- GO Transit
- Hydro One
- Ontario Power Generation
- Toronto and Region Conservation Authority
- Toronto Transit Commission
- York Region Transit
- Brampton Transit
- PowerStream Inc.
- Enbridge Pipelines Inc.
- Enbridge Gas Distribution Inc.
- Imperial Oil
- Bell Canada
- Rogers Cable
- Futureway Communications Inc.
- Allstream Corporation

Municipal Staff

- City of Toronto
- City of Vaughan
- Town of Markham
- Town of Richmond Hill
- The Regional Municipality of York

In co-ordination with a number of focused meetings related to specific elements of the project, larger technical agency - municipal workshops were held on July 31, 2008, and August 26, 2008.

*Technical Agency / Municipal Workshop #1*

Technical Agency / Municipal Workshop #1 was held on July 31, 2008, in York Region. The objective of the workshop was to review key transit project components and facilitate input from technical agencies and municipal staff regarding the assessment criteria developed to evaluate project alternatives. The format of the technical workshop was a presentation beginning at 3:00 pm, with the opportunity for open questions and discussion throughout the presentation. In addition to general project comments received, feedback was given regarding additional considerations to be incorporated into the project assessment and evaluation process. A detailed summary of this meeting is included in Appendix N.

*Technical Agency / Municipal Workshop #2*

Technical Agency / Municipal Workshop #2 was held on August 26, 2008, in York Region. The objective of the workshop was to present draft technical project recommendations and the preliminary Steeles Station bus terminal concepts. The format of the technical workshop was a presentation beginning at 3:00 pm, with the opportunity for open questions and discussion throughout the presentation. In addition to general project comments, feedback was given regarding the Langstaff / Longbridge commuter parking lot and the preferred alignments into the Richmond Hill Centre. A detailed summary of this meeting is included in Appendix N.

*Issue Specific Workshops*

There were opportunities during the study to bring together municipal staff with potentially affected property owners in proximity to the proposed subway stations and associated facilities. This consultation (described under *General Public and Property Owner*) consisted of:

- Steeles Station Stakeholder Workshop (August 25, 2008)
- Individual Workshops for Steeles Station, East Don River Crossing and the Richmond Hill Centre (September 22, 2008)

*Transit Operators*

A series of meetings were held with service planning staff from the Toronto Transit Commission, York Region Transit, GO Transit and Brampton Transit to discuss each operator’s current and potential future transit operations within the Yonge Street corridor. These meetings are listed in Exhibit 2-2.

**Exhibit 2-2: Meetings with Transit Operators**

<b>Date</b>	<b>Nature of Consultation</b>
November 5, 2007	Meeting with the TTC Service Planning regarding current and potential future bus operations within the study area
November 8, 2007	Meeting with Brampton Transit Service Planning regarding current and potential future bus operations within the study area
November 8, 2007	Meeting with YRT Service Planning regarding current and potential future regular bus and Viva bus operations within the study area
November 9, 2007	Meeting with GO Transit regarding current and potential future GO Train and GO Bus operations within the study area
March 4, 2008	Meeting with the TTC Subway Operation and Signals Engineering regarding Transit Project design and operational issues
September 10, 2008	Meeting with the TTC and YRT regarding Steeles Station bus terminal alternatives

*Technical Agencies / Stakeholders*

Separate meetings were held with key technical agencies / stakeholders to discuss issues related to the Transit Project that were specific to their jurisdiction and concerns. These meetings are listed in Exhibit 2-3.

**Exhibit 2-3: Meetings with Key Technical Agencies / Stakeholders**

<b>Date</b>	<b>Nature of Consultation</b>
May 2, 2008	Meeting with TRCA regarding proposed subway crossing alternatives at the East Don River valley
August 7, 2008	Meeting with 407 ETR and the MTO regarding the proposed Langstaff-Longbridge commuter parking lot and the Richmond Hill Centre subway alignment alternatives
September 15, 2008	Meeting with Hydro One Real Estate Services regarding the proposed Langstaff-Longbridge commuter parking lot and the Richmond Hill Centre subway alignment alternatives

*Municipal Planning Departments*

Members of the study team met with local municipal planners to discuss issues related to the Transit Project that were specific to their jurisdiction and concerns. These meetings are listed in Exhibit 2-4.

**Exhibit 2-4: Meetings with Municipal Planning Departments**

<b>Date</b>	<b>Nature of Consultation</b>
April 21, 2008	Town of Richmond Hill Planning Staff Meeting regarding subway alignment alternatives and bus terminal options in the Richmond Hill Centre area
May 8, 2008	Meeting with City of Toronto, North York District planners to discuss the study and potential implications of the subway extension within the City of Toronto
July 16, 2008	Meeting with City of Toronto, North York District planners to provide an update on the study and discuss land use issues related to potential stations at Cummer/Drewry Avenue and Steeles Avenue
July 18, 2008	Land Use Meeting with Markham, Vaughan, Richmond Hill & York Region regarding coordination of local land use planning policies and density projections

**2.3.1.2 Municipalities**

In addition to the involvement of municipal staff on technical elements of the study, municipal political representatives in York Region were provided with project overview presentations and additional consultation where required. Those involved include York Region CAO’s and Commissioners, The Yonge Subway Advisory Task Force, as well as local and regional councils and committees within the City of Vaughan, Town of Markham and Town of Richmond Hill. The City of Toronto local councillors were invited to attend the Yonge Subway Advisory Task Force meetings and attended the meeting in September. The dates of key conceptual design and function planning meetings are noted in Exhibit 2-5.

### **Exhibit 2-5: Key Conceptual Design and Functional Planning Municipal Consultation**

<b>Date (2008)</b>	<b>Nature of Consultation</b>
April 18	Town of Richmond Hill Planning Staff Meeting
May 7	Town of Richmond Hill ‘Gridlock Meeting’
May 15	Yonge Subway Advisory Task Force Meeting
May 27	Town of Markham / Metrolinx Meeting
June 2	York Region CAO’s and Commissioners Meeting
June 25	York Region CAO’s and Commissioners Meeting
July 14	Markham Langstaff Visioning Workshop
July 15	Langstaff Transportation Mini Summit
July 16	Meeting with City of Toronto, North York District Planners
July 18	Land Use Meeting with Markham, Vaughan, Richmond Hill & York Region
August 19	Meeting with Town of Markham
September 11	Rapid Transit Steering Committee
September 15	City of Vaughan Committee of the Whole Presentation
September 15	Town of Richmond Hill Committee of the Whole Presentation
September 17	Yonge Subway Advisory Task Force Meeting
September 18	York Region Council Presentation
September 19	York Region CAO’s and Commissioners Meeting

#### **2.3.1.3 Aboriginal Consultation**

In addition to consultation with the Director of the EAAB Branch, a number of government agency representatives at the Ontario Ministry of Aboriginal Affairs, Indian and Northern Affairs Canada, and the Ministry of the Environment were contacted as part of the Conceptual Design and Functional Planning Study. The intent of this consultation was to determine the status of potentially affected Aboriginal communities / groups in the project study area and who may hold an interest in this study and should be directly consulted. See Appendix N for an overview of Aboriginal Consultation for the transit project.

#### **2.3.1.4 General Public and Property Owners**

Involvement of the public was an integral component of the study. Key public consultation dates during the Conceptual Design and Functional Planning Study were:

- First round of Public Consultation Centres (PCCs) – June 17 & 18, 2008
- Public Workshop #1 - July 31, 2008
- Steeles Workshop #1 - August 25, 2008
- Public Workshop #2 - August 26, 2008

- Stakeholder Workshop - September 22, 2008
- Second Round of PCCs (Session 1) - September 25, 2008

#### *Public Consultation Centres*

Two rounds of PCCs were held at key points during the Conceptual Design and Functional Planning Study. Each meeting began with a presentation followed by a Question / Answer Session with members of the audience. Display panels were presented for public review, and representatives of York Region, YRRTC, TTC, City of Toronto and the consultants were available to discuss the study on a one-on-one basis with members of the public. Each PCC featured an interactive component which encouraged members of the public to participate in the decision-making process and help guide the study in the selection of the preferred alternatives. Detailed summaries of these activities are included in Appendix N.

- The first round of PCCs was held in York Region on June 17, 2008, and June 18, 2008. The purpose of these meetings was to introduce the study and present a range of subway alignment alternatives and potential station locations being considered by the Team.
- The second round of PCCs was held when the transit project was transitioning into the Transit Project Assessment Process. The first of two sessions was held during the Conceptual Design and Functional Planning Study in York Region on September 25, 2008. The second session was held after the commencement of the Transit Project Assessment Process in the City of Toronto on October 16, 2008. The purpose of these meetings was to present the recommended project.

#### *Public Workshops*

Two rounds of Public Workshops were held during the summer of 2008 between the first and second rounds of PCC. The purpose of the workshops was to provide members of the public with a greater level of detail into the assessment and evaluation of alternatives, to help the project team make informed decisions and to provide an opportunity to comment on the preliminary preferred alternatives as they develop. Similar to the PCCs, each workshop began with a technical presentation supplemented by display panels to facilitate discussion. Representatives of York Region, YRRTC, TTC, City of Toronto and the consultants were available to answer questions. Take-home workbooks were distributed to provide background details on the topics of discussion. Detailed summaries of these activities are included in Appendix N.

- The first round of Public Workshops was held on July 31, 2008, in York Region. Purpose of the meeting was to discuss the number of subway stations that should be planned, method for crossing the East Don River, alignment options in the Richmond Hill Centre area, and criteria of what a subway should look like.
- The second round of Public Workshops was held on August 26, 2008, in York Region. The purpose of the meeting was to discuss the recommended number

of stations, the East Don River bridge, alignment options at Richmond Hill Centre; the Steeles Station bus terminal, and the important features to include in planning subway surface facilities.

### *Steeles Workshop #1*

A Steeles Workshop was held on August 25, 2008, in York Region. The purpose of the workshop was to provide an opportunity for technical agencies and property owners to consult with the project team on interests and concerns they may have regarding the proposed Steeles station bus terminal concepts. The format of the workshop was a presentation beginning at 9:00 am, followed by two break-out working group sessions to discuss bus terminal configurations and constraints. A detailed summary of this meeting is included in Appendix N.

### *Stakeholder Workshop*

A stakeholder workshop was held on September 22, 2008, in York Region. This session was split into three streams of focus: Steeles Station bus terminal, East Don Bridge crossing and Richmond Hill Centre alignments. The purpose of the meeting was to provide an opportunity for technical agencies and property owners to consult with the project team on the preferred elements of the project prior to Public Consultation Centre #2. The format of the workshop was three separate presentations followed by break-out group discussion. A detailed summary of this meeting is included in Appendix N.

### *Stakeholder Meetings*

Meetings were held with stakeholder groups on a one-on-one basis throughout the course of the study in order to discuss specific concerns. These meetings are listed in Exhibit 2-6.

## **Exhibit 2-6: Meetings with Stakeholder Groups**

<b>Date</b>	<b>Nature of Consultation</b>
April 23, 2008	Presentation to “Subway Now” community advocacy group
June 9, 2008	Meeting with Toronto Ladies’ Golf Course and Thornhill Country Club to discuss proposed subway crossing alternatives at the East Don River valley
June 16, 2008	Meeting with Condor Properties regarding Richmond Hill Centre subway alignment alternatives and location of the proposed Langstaff-Longbridge Station
August 14, 2008	Meeting with Catholic Cemeteries Archdiocese of Toronto (Holy Cross Cemetery) regarding Langstaff-Longbridge commuter parking lot layout concepts
August 20, 2008	Meeting with Condor Properties regarding Richmond Hill Centre subway alignment alternatives and location of the proposed Langstaff-Longbridge Station
September 18, 2008	Meeting Metrus Properties regarding Richmond Hill Centre subway alignment alternatives and bus terminal
September 24, 2008	Meeting with Summit Apartments (7811 Yonge Street)

### 2.3.2 Transit Project Assessment Process

As noted in Section 2.1, the Notice of Commencement of the TPAP was done in accordance with the requirements of Section 7(4) of the regulation.

The following outlines how the various stakeholders were involved during the TPAP.

#### 2.3.2.1 Technical Agencies

The involvement of the government agencies, technical agencies and municipal staff outlined in Section 2.3.1 continued into the Transit Project Assessment Process. Agencies were invited to participate in the public consultation centres and technical meetings, as well as focused meetings to address specific concerns and technical requirements where required.

Separate meetings were held with key technical agencies / stakeholders to discuss issues related to the Transit Project that were specific to their jurisdiction and concerns. These meetings are listed in Exhibit 2-7.

**Exhibit 2-7: Meetings with Technical Agencies**

Date	Nature of Consultation
November 19, 2008	Meeting with TRCA regarding natural environment issues related to the construction and operation of the Transit Project
December 19, 2008	Consultation with 407 ETR regarding the proposed Langstaff-Longbridge commuter parking lot traffic analysis
November 27, 2008	Meeting with City of Toronto, North York District planners regarding location of the proposed bus turnaround loop at Cummer / Drewry Station

As part of the technical agency consultation, technical specialist reports were circulated to key agencies as requested. Exhibit 2-8 lists which agencies received the technical specialist reports.

**Exhibit 2-8: Circulation of Technical Specialist Reports to Agencies**

<b>Technical Specialist Report</b>	<b>Circulation Agency</b>
Geotechnical	Toronto and Region Conservation Authority (TRCA) Ministry of the Environment (MOE)
Groundwater	TRCA MOE
Stormwater Management	TRCA MOE
Noise Assessment	MOE
Air Quality	MOE
Natural Environment	TRCA Ontario Heritage Trust (OHT)
Cultural Heritage	OHT
Stage 1 Archaeology	OHT / Ministry of Culture (MCL)
Traffic	MTO and 407 ETR

*Steeles Station and Line Stations Technical Meeting #1*

The Steeles Station and Line Stations Technical Meeting #1 was held on October 9, 2008, in the City of Toronto. The objective of the meeting was to review the feasibility of the Steeles station bus terminal alternatives, as well as review the proposed location of line stations (Cummer / Drewry, Clark, Royal Orchard, Langstaff / Longbridge) and associated surface facilities. The format of the technical meeting was a presentation beginning at 1:00 pm, with the opportunity for open questions and discussion throughout the presentation. In addition to general project comments received, feedback was given regarding the assessment of Steeles bus terminal alternatives, including input on land use considerations and transit operations. A detailed summary of this meeting is included in Appendix N.

*Steeles Station and Line Stations Technical Meeting #2*

The Steeles Station and Line Stations Technical Meeting #2 was held on October 30, 2008, in York Region. The objective of the meeting was to discuss preliminary recommendations on the Steeles station bus terminal alternatives, as well as review the updated line station concepts as a result of previous input. The format of the technical meeting was a presentation beginning at 1:00 pm, with the opportunity for open questions and discussion throughout the presentation. In addition to general project comments received, feedback was given regarding the evaluation of the Steeles bus terminal alternatives. A detailed summary of this meeting is included in Appendix N.

There were opportunities during the Transit Project Assessment Process to bring together municipal staff with potentially affected property owners in proximity to the proposed subway stations and associated facilities. This consultation (described under *General Public and Property Owner*) consisted of:

- Steeles Station Property Owner Session (November 12, 2008)
- Line Station (Cummer / Drewry, Clark, Royal Orchard, Langstaff-Longbridge) Property Owner Session (November 12, 2008)

**2.3.2.2 Municipalities**

There was continual involvement of municipal political representatives in York Region during the Transit Project Assessment Process. As well, Toronto political representatives became involved in the consultation when City of Toronto Council and the Toronto Transit Commission became co-proponents of the transit project on October 30, 2008. All of the local and regional councils have endorsed the Transit Project and the filing of the Environmental Project Report. Key municipal consultation dates are noted in Exhibit 2-9.

**Exhibit 2-9: Key Transit Project Assessment Process Municipal Consultation**

Date (2008)	Nature of Consultation
October 6	Vaughan and Richmond Hill Council Presentations
October 15	Yonge Subway Advisory Task Force Meeting
October 15	Rapid Transit Committee Meeting
October 22	York Region CAO’s and Commissioners Meeting
October 23	York Region Transit Committee
October 23	Toronto Transit Commission (report on proponency)
October 29–30	City of Toronto Council (motion on proponency)
November 13	Rapid Transit Committees of the Whole Presentation
November 17	Richmond Hill Committees of the Whole Presentation
November 17	Vaughan Committees of the Whole Presentation
November 19	Yonge Subway Advisory Task Force Meeting
November 23	Markham Accessibility Committee Meeting
November 23	Markham Development Services Committee Presentation

**2.3.2.3 Aboriginal Consultation**

Although the Government Agencies consulted prior to formal commencement of the process identified that the project does not appear to be located in an area where First Nations may have existing or asserted rights that could be impacted by the project, some Agencies did provide contacts for Aboriginal Communities in the vicinity of the area. This list was reviewed and augmented by York Region and City of Toronto.

These Aboriginal Communities were sent notification upon the commencement of the TPAP. Appendix N provides an overview of Aboriginal Consultation for this project. It should be noted that direct Aboriginal Community interest and response was low. This was likely due to the fact that there are no existing or asserted rights that could be impacted by the project. Additional information on potential effects to constitutionally protected aboriginal or treaty right and lands / resources used for traditional purposes are outlined in Section 5.2.3.3. The Aboriginal Communities also received notification letter for the Notice of Completion of the Environmental Project Report. It is intended that follow-up phone calls will be made to ensure the Aboriginal Communities received the notification letters.

The specific Aboriginal contacted included:

- Alderville First Nation
- Algonquins of Pikwakanagan First Nation
- Beausoleil First Nation
- Chippewas of Georgian Island First Nation
- Chippewas of Mnjikaning (Rama) First Nation
- Curve Lake First Nation
- First Nation of Burleigh
- Hiawatha First Nation Moose
- Huron-Wendat Nation
- Mississaugas of the New Credit First Nation
- Mohawks of the Bay of Quinte
- Moose Deer Point First Nation
- Oneida First Nation
- Scugog Island First Nation
- Six Nations of the Grand River, Lands and Resources
- Six Nations of the Grand River, Confederacy Council Secretary, Six Nations Confederacy Council
- Wahta Mohawks First Nation

#### **2.3.2.4 General Public and Property Owners**

Involvement of the public was an integral component of the study. Key public consultation dates during the Transit Project Assessment Process were:

- Second Round of PCCs (Session 2) – October 16, 2008
- Steeles Station Property Owner Session – November 12, 2008
- Line Station Open House – November 12, 2008
- Langstaff / Longbridge Commuter Parking Lot Community Meeting – December 2, 2008
- Third Round of PCCs – November 26, 2008, and December 3, 2008
- City of Toronto PCC – January 20, 2009

#### *Public Consultation Centres*

Two rounds of PCCs were held during the Transit Project Assessment Process. Each meeting, which was preceded by a two hour open house, began with a presentation followed by a Question / Answer Session with members of the audience. Display panels were presented for public review, and representatives of York Region, YRRTC, TTC, City of Toronto and the consultants were available to discuss the study on a one-on-one basis with members of the public. Each PCC featured an interactive component which encouraged members of the public to participate in the decision-making process and help guide the study in the selection of the preferred alternatives. Detailed summaries of these activities are included in Appendix N.

- The second round of PCCs was held when the transit project was transitioning into the Transit Project Assessment Process. The first of two sessions was held during the Conceptual Design and Functional Planning Study in York Region on September 25, 2008. The second session was held after the commencement of the Transit Project Assessment Process in the City of Toronto on October 16, 2008. The purpose of these meetings was to present the preferred station locations and the preferred method of crossing the East Don River.
- The final round of PCCs was held on November 26, 2008, in York Region and December 3, 2008, in the City of Toronto, where the Project Team presented recommendations on the preferred subway alignment, the preferred layout of each of the proposed subway stations, as well as general principles and methodologies associated with construction of the subway.

#### *Steeles Station Property Owner Session*

The Steeles Station Property Owner Session held on November 12, 2008, in the City of Toronto was a follow-up from the Steeles Station Workshop held during the Conceptual Design and Functional Planning Study. Property owners potentially affected by the preferred Steeles station bus terminal were invited, as well as municipal staff. The purpose of the meeting was to provide an overview of the alternatives considered and present the assessment and evaluation process used to determine the preliminary preferred alternative. The format of the meeting was a presentation beginning at 5:00 pm, with the opportunity for open questions and discussion throughout the presentation. Concerns about specific property impacts were discussed, including a review of why the property is required and the process that will be followed in the next stage of the project. A detailed summary of this meeting is included in Appendix N.

#### *Line Station Open House*

The Line Station Open House was held on November 12, 2008, in the City of Toronto. Residents and property owners in proximity to all line stations were invited, as well as with municipal staff. The purpose of the meeting was to present the preliminary preferred line station concepts, including the location of associated station facilities (location of accesses, entrances and service/utility buildings). The format of the meeting was an open house beginning at 5:00 pm, with members of the project technical team present to answer questions related to the transit project. Concerns about specific property impacts were discussed, including a review of why the property is required and the process that will be followed in the next stage of the project. A detailed summary of this meeting is included in Appendix N.

#### *Langstaff / Longbridge Commuter Parking Lot Community Meeting*

The Langstaff / Longbridge Commuter Parking Lot Community Meeting was held on December 2, 2008, in York Region. Residents in proximity to the proposed commuter parking lot were invited to the meeting. The purpose of the meeting was to provide a project overview, and discuss the design features proposed to mitigate project impacts to the adjacent community. The format of the meeting was an open house beginning at

6:00 pm, followed by a presentation beginning at 7:00 pm. Concerns about noise, visual and traffic effects were discussed. The project team is working with individuals who represent the concerns of the community to ensure adequate mitigation measures are proposed. A detailed summary of this meeting is included in Appendix N.

*Stakeholder Meetings*

Smaller meetings were held with stakeholder groups to provide a project overview and review any potential property impacts, as applicable. These meetings are listed in Exhibit 2-10. The comments and concerns of these stakeholders have been incorporated into the technical analysis for the Transit Project, as summarized in Exhibit 2-11, Stakeholder Comment Tracking Table.

**Exhibit 2-10: Meetings with Stakeholder Groups**

<b>Date</b>	<b>Nature of Consultation</b>
October 7, 2008	Meeting with resident of 7822 Yonge Street
October 7, 2008	Meeting with members of Grandview Residents Association
November 27, 2008	Meeting with The Society for the Preservation of Historic Thornhill
December 4, 2008	Meeting with Catholic Cemeteries Archdiocese of Toronto (Holy Cross Cemetery) regarding Langstaff-Longbridge Station layout commuter parking lot and PPUDO.

*Yonge Subway Ridership/Capacity Meeting*

Following consideration of a December 17, 2008 Commission Report concerning the Transit Project, the TTC requested staff, in light of the public concerns about the capacity of the Yonge Subway south of Finch Station, to arrange additional public meetings in January 2009 to outline the planned capacity improvements that will be made to the Yonge-University-Spadina Subway line in parallel with the implementation of the Transit Project and that the results of these meetings be reported directly to the January 27/28, 2009 City Council meeting.

The meeting regarding Yonge subway ridership and capacity issues as requested by the Commission was held on January 20, 2009.

The project related comments and concerns of the attendees to the January 20, 2009 public meeting have been addressed in the technical documentation; as summarized in Exhibit 2-11, Stakeholder Comment Tracking Table.

**2.4 Coordination with the Ministry of Energy and Infrastructure Class EA**

Property will be required from the Ontario Realty Corporation (ORC) / Hydro One as part the transit project for the construction of the subway tunnel, a PPUDO and a commuter parking lot. ORC received project notification and participated in technical agency consultation.

Typically when ORC disposes or leases land, they have EA requirements under their Class EA Document. Given that the ‘ORC project’ is ancillary to the transit project, it is intended that their EA requirements are addressed as part of the Transit Project

Assessment Process. This is in keeping with direction provided by the Ministry of the Environment and Section 9.7.1 of the Ministry of Energy and Infrastructure (MEI) Class EA.

This following outline how the Transit Project Assessment Process addresses ORC's seven point analysis criteria for a Category B Consultation and Documentation Report.

### **1. Describe the Undertaking**

- The EPR clearly documents the need for provincially owned property which is ancillary to the transit project (refer to Section 4.2.4 and Section 5.2.1).

### **2. Description of Environmental Effects, Mitigation and Monitoring**

- The EPR documents the potential environment effects of the project and the associated mitigation measures and monitoring commitments (refer to Section 5.0). Each factor included in ORC's seven point site-specific analysis (per Section 4.2 of the MEI Class EA) has been addressed. Commitments to Future Work are identified in Section 6.0 of the EPR.

### **3. Consult Directly with Affected Agencies and the Public**

- The EPR documents consultation with directly effects parties including, but not limited to, agencies and the general public (refer to Section 2.0). Stakeholder involvement was a key component throughout the Conceptual Design and Functional Planning Study, as well as the Transit Project Assessment Process.

### **4. Reporting**

- The EPR documents all the issues typically discussed in a Category B Consultation and Documentation Report.

### **5. Confirmation of Category B**

- The EPR clearly identifies the need to acquire provincially owned property. The property requirements have some potential for adverse environmental effects; however, the effects are well understood from a technical perspective and are minor in nature. Consultation with technical agencies has been carried out to ensure adequate mitigation measures are proposed. This is in keeping with a Category B undertaking.

### **6. Notice of Completion and 30 Calendar Day Review**

- The EPR was made available for public and agency review in accordance with the Ontario Regulation 231/08.

### **7. Part II Order Requests (if any)**

- Ontario Regulation 231/08 allows a public and government review period and allows the Minister of the Environment to require further consideration or impose conditions under certain situations based on that review.

## 2.5 Overview of Changes Resulting from Consultation

As summarized above, and documented in the Consultation Plan in Appendix N, the input received from the consultation process undertaken during the Conceptual Design and Functional Planning Study and the Transit Project Assessment Process indicates that there is broad public and stakeholder support for the Transit Project.

Numerous members of the public, affected property owners and stakeholder agencies raised comments and concerns regarding the Transit Project. The key comments raised and how they were addressed are outlined in Exhibit 2-11.

**Exhibit 2-11: Stakeholder Comment Tracking Table**

Project Element	Comment / Issue	How Comment Addressed	Stakeholder Involved
Transit Project Study Area	Stormwater Management	A Stormwater Management Plan has been prepared as part of the study. Given the urban nature of the study area, the areas of interest are impacts on stormwater management in the East Don River Valley and TRCA regulated areas in proximity to Highway 407 at Yonge Street. TRCA has been circulated the preliminary Stormwater Management Plan.  Sustainable measures to be further investigated in Detailed Design are being proposed to mitigate the drainage impacts of the various proposed commuter parking lot locations.	TRCA MOE Local Residents
	Noise and Vibration	A Noise Assessment was completed for the whole corridor, including key site-specific project components and sensitive land uses.	MOE Local Residents and Businesses
	Capacity concerns related to the existing Yonge Subway line	A number of strategies are being implemented to improve the capacity of the existing Yonge Subway line downstream of the proposed extension. Illustrations of the strategies proposed were presented at public meetings and workshops.	Transit Users and the General Public
	Inquiries about project schedule	The tentative transit project schedule was presented at public meetings and workshops.	Local Residents and Businesses Transit Users and the General Public
	Fare integration between York Region and the City of Toronto	This will be addressed in the detailed design phase of the project.	Transit Users and the General Public
	Continued consultation with affected property owners in the Detailed design stage of the project	Affected property owners have been identified and notified of impacts related to the recommended Transit Project. These individuals are part of the contact list being carried forward to the detailed design stage of the project.	Affected Property Owners
Station Locations	Minimize impact to built heritage features in the Thornhill Heritage District	Municipal staff and the public were consulted on the location of station elements and associated facilities. Two potential station locations were examined within the heritage area, Centre Street and Royal Orchard Boulevard.	Ontario Heritage Trust Municipal Staff Local Residents and Businesses

Project Element	Comment / Issue	How Comment Addressed	Stakeholder Involved
		<p>Royal Orchard is the preferred station location as it has a reduced impact to heritage features in the Thornhill Heritage District.</p> <p>An Existing Conditions: Built Heritage &amp; Cultural Heritage Landscapes Report has been prepared as part of this study to identify and mitigate impact to features of cultural importance.</p>	
	Preserving the frontage of Yonge Street for potential future development	<p>Municipal staff we consulted on the location of station elements and associated facilities.</p> <p>Efforts were made to consider impact to redevelopable lands while incorporating technical requirements into the station layouts.</p>	<p>Municipal Staff Local Residents and Businesses</p>
Steeles Bus Terminal	Transit Integration and facilitating fast transfer time for subway users	The preferred underground bus terminal under Steeles Avenue allows for optimal transit integration between the subway and bus terminal.	TTC
	Preserving lands for redevelopment / urban design potential and minimizing nuisance effects on adjacent landowners	The preferred underground bus terminal was chosen in consultation with municipal staff and local Residents and Businesses. This option maximizes land preservation for redevelopment with a setback from the frontage of Yonge Street and Steeles Avenue and minimizes nuisance effects on adjacent land uses.	<p>Municipal Staff Local Residents and Businesses</p>
	Integration with municipal land-use studies	Municipal Planning staff provided input into the subway planning with regard to the direction of the land-use studies currently underway in the City of Toronto, City of Vaughan and Town of Markham.	Municipal Staff
	Consideration of future transit plans in the Underground Bus Terminal at the Steeles Station	The underground bus terminal has been designed to not preclude a potential Light Rail Transit line on Steeles Avenue, proposed as part of the Metrolinx Regional Transportation Plan ( <i>The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area, 2008</i> ).	Transit Users and the General Public

Project Element	Comment / Issue	How Comment Addressed	Stakeholder Involved
East Don River Crossing	Footprint and disturbance in East Don River Valley	TRCA has expressed support for the proposed bridge crossing of the East Don River, as it provides an opportunity to open up the valley as a wildlife corridor.  A Natural Environment Report has been prepared to determine potential impacts and develop mitigation measures in consultation with TRCA.	TRCA Municipal Staff Local Residents and Businesses
	Shallow subway system for operation and maintenance, as well as emergency access	The preferred vertical alignment design of a bridge over the East Don River allows for a more shallow subway station at Royal Orchard Boulevard.	TTC
	Potential Navigable Waters status	Transport Canada has confirmed that the East Don River is navigable at Yonge Street. A permit under the Navigable Waters Protection Act will be pursued in the subsequent detailed design of the project.	Transport Canada
	Potential for archaeological resources in the East Don River Valley	A Stage 1 Archaeological Assessment has been undertaken as part of this study. Areas requiring Stage 2 Archaeological Assessments are being identified as part of this study, which includes a Stage 2 in the East Don River Valley.	Ontario Heritage Trust TRCA
	Preserving access to the Toronto Ladies Golf Club	Two alternative methods of preserving the Ladies Golf Club access during and after construction have been designed. The Ladies Golf Club is in support of the proposed alternatives.	Toronto Ladies Golf Club
Langstaff / Longbridge Commuter Parking Lot in the Hydro Corridor south of Highway 407 / West of Yonge Street	Traffic impact of proposed Langstaff / Longbridge commuter parking on access on / off Highway 407	A Traffic Impact Study completed for the Langstaff / Longbridge commuter parking lot indicates that access on / off Highway 407 will remain satisfactory.	407 ETR MTO Local Residents
	Disturbance to the Holy Cross Cemetery entrance with PPUDO and commuter parking lot. Specific concern regarding PPUDO users waiting at the existing cemetery entrance.	Design alternatives have been circulated during meetings with Holy Cross Cemetery to mitigate disturbance to the cemetery entrance.  Optimizing the PPUDO location and providing adequate capacity for user convenience will also help minimize disturbance to the cemetery entrance.	Holy Cross Cemetery

Project Element	Comment / Issue	How Comment Addressed	Stakeholder Involved
	Noise and Traffic impacts to the residential community south of the proposed commuter parking lot	<p>A Noise Assessment completed for the Langstaff / Longbridge commuter parking lot indicates any additional noise generated as a result of the commuter parking lot can be mitigated through the construction of a berm and noise wall.</p> <p>A Traffic Impact Study completed for Langstaff / Longbridge commuter parking lot indicates that the proposed intersection will operate at an acceptable level of service which would minimize any traffic infiltration to the community south of the proposed commuter parking lot. Access to/from the commuter parking lot will be limited to Yonge Street only.</p>	MOE City of Vaughan Local Residents
	Natural Environment Impacts	<p>The Natural Environment Report completed for the project indicates that impacts to the existing Hydro corridor consist of cultural meadow vegetation removal and early successional habitat for birds and small mammals.</p> <p>Mitigation measures have been developed to delineate <u>vegetation clearing zones</u> and <u>vegetation retention zones</u>.</p>	TRCA
	Impact on ORC-managed lands	It is intended that the Yonge Subway Extension Transit Project Assessment Process will fulfill the requirements of the ORC Class Environmental Assessment.	ORC
Richmond Hill Centre Alignment	Transit integration between TTC subway, 407 Transitway, GO Transit and local transit at RHC	The location of the preferred subway alignment and bus terminal configuration have been guided by the principle of maximizing transit integration.	Transit Operators Local Landowners
	Minimize impact to High Tech Road woodlot	The Natural Environment Report completed for the project documents the existing conditions of the High Tech Road woodlot. No direct impacts to this woodlot feature are anticipated.	TRCA
	Minimizing impact to stormwater management pond between Highway 407 and Highway 7	<p>A Stormwater Management Plan has been prepared as part of the study.</p> <p>The assessment of alignment alternatives into the RHC considered avoiding impact to the stormwater management pond.</p>	TRCA MOE

Project Element	Comment / Issue	How Comment Addressed	Stakeholder Involved
	Minimizing impact to Hydro towers between Highway 407 and Highway 7	The assessment of alignment alternatives into the RHC considered avoiding impact to the hydro towers.	Hydro One
	Preserving lands for redevelopment / urban design potential at the RHC	The preferred alternative preserves the frontage of Yonge Street for redevelopment. Maximizing transit integration has increased the available developable lands.	Town of Richmond Hill Local Landowners
	Potential future subway extension implications with the alignment options	Consultation with the Town of Richmond Hill was undertaken to demonstrate that there are feasible options with the preferred alternative that do not preclude a future extension of the subway as part of a subsequent study.	Town of Richmond Hill Local Landowners
	Servicing the proposed Langstaff development south of Hwy 407	The preferred location of the Langstaff / Longbridge subway station was refined to best serve the proposed Langstaff development as well as the existing community.	Town of Markham Local Landowners

### 3. STUDY AREA CONDITIONS

This chapter highlights the existing conditions of the study area associated with the Transit Project. Existing conditions related to the Natural Environment (Section 3.1), Socio-Economic Environment (Section 3.2), Cultural Environment (Section 3.3), Transportation (Section 3.4) and Utilities (Section 3.5) are highlighted.

Detailed information for these factors is provided in the specialist and technical reports provided as Appendices to this EPR.

#### 3.1 Natural Environment

An inventory and analysis of existing and projected conditions along the project limits was completed from a secondary source data review and verified through site visits by Ecoplans Limited in 2008.

In addition to reviewing pertinent secondary source information from the Toronto and Region Conservation Authority (TRCA), Ministry of Natural Resources (MNR) and Environment Canada (EC), LGL biologists undertook field assessments to characterize natural environmental features in 2003.

The Natural Environment Report is provided as Appendix J. Key existing conditions information is summarized in the following sections.

##### 3.1.1 Fish and Aquatic Habitat

There are four watercourse crossings (3 watercourses) that cross Yonge Street as well as a small secondary tributary/drainage feature located in the vicinity of the project. These watercourses form part of the East Don River watershed. A description of each system is outlined below:

- *The Main Branch of the East Don River:* This watercourse crosses Yonge Street south of Royal Orchard Boulevard, within the vicinity of the Ladies Golf Club and the Thornhill Golf and Country Club.
- *Pomona Mills Creek (Tributary #3):* Tributary of East Don River. This watercourse crosses Yonge Street just north of Highway 7. It flows through a culvert underneath Highway 7, through the N-W Highway 7/407 interchange loop and underneath the existing Highway 407 and Langstaff Road through another culvert.
- *Tributary #2:* Tributary of the East Don River. This watercourse flows underground (enclosed in a pipe) within the vicinity of Yonge Street. This tributary crosses Yonge Street south of John Street and eventually outlets to the Main Branch of the East Don River, at Steeles Avenue.

A secondary tributary/drainage feature of Pomona Mills Creek also lies within the study limits. This watercourse is within the vicinity of the large Stormwater Management Pond and hydro corridor north of Highway 7 and east of Yonge Street. This water feature is a poorly defined drainage feature, which lies adjacent to the steep road embankment of Highway 7.

Aquatic habitat information for the watercourses found within the vicinity of the project is provided in Appendix J.

### 3.1.1.1 Fisheries

In 2004, available fish community and thermal regime information for the watercourses within the study area was provided to LGL by TRCA. The information provided by TRCA was deemed sufficient in the LGL Natural Sciences Report (2005) investigation, and therefore fisheries sampling at each watercourse was not conducted.

Fisheries data obtained by Ecoplans Limited, from TRCA in 2008 are compiled in Appendix J. Fish station data includes information from stations as far as 6 km from Yonge Street.

The East Don River supports a variety of warmwater and coldwater baitfish and sportfish species. Coldwater species include:

- Mottled Sculpin (*Cottus bairdi*)
- Brown Trout (*Salmo trutta*)
- Rainbow Trout (*Oncorhynchus mykiss*)

The majority of the trout species sampled were found upstream, near Highway 407 and Bathurst Street. However, Rainbow Trout was sampled recently (2005), immediately upstream of Yonge Street. In addition, the following species have been captured in the East Don River within the vicinity of Yonge Street:

- Blacknose Dace (*Rhinichthys atratulus*)
- Common Shiner (*Luxilus comutus*)
- Creek Chub (*Semotilus atromaculatus*)
- Darter sp. (*Etheostoma* sp.)
- Fathead Minnow (*Pimephales promelas*)
- Johnny Darter (*Etheostoma caeruleum*)
- Longnose Dace (*Rhinichthys cataractae*)
- Mottled Sculpin (*Cottus bairdi*)
- Northern Redbelly Dace (*Phoxinus eos*)
- White Sucker (*Catostomus commersoni*)

Although Pomona Mills Creek is classified as coldwater, TRCA fisheries records for stations located approximately 780 m (1949 database) downstream of Langstaff Road (closest station to study area), captured only warmwater fish species, specifically:

- Brook Stickleback (*Culaea inconstans*)
- Fathead Minnow (*Pimephales promelas*)
- Creek Chub (*Semotilus atromaculatus*)

More current information (1984) is available for a fish station located closer to the East Don River mouth (approximately 2.44 km downstream of Langstaff Road). Species captured here include:

- Brook Stickleback (*Culaea inconstans*)
- Johnny Darter (*Etheostoma caeruleum*)
- Common Shiner (*Luxilus comutus*)
- Pumpkinseed (*Lepomis gibbosus*)
- Northern Redbelly Dace (*Phoxinus eos*)
- Fathead Minnow (*Pimephales promelas*)
- Blacknose Dace (*Rhinichthys atratulus*)
- Creek Chub (*Semotilus atromaculatus*)

There is no fisheries information available for the smaller tributaries (Tributary 2, and the drainage feature draining to Pomona Mills Creek) within the study area. Tributary 2 is piped underground within the study limits and both features will not be impacted by the Transit Project. ,

### **3.1.1.2 Fish Habitat**

Ecoplans completed a detailed habitat survey on the East Don River from approximately 100 m upstream to 200 m downstream of Yonge Street. Detailed aquatic mapping was completed within 50 m upstream and downstream of Yonge Street. Data collection and mapping encompassed the following aquatic habitat parameters:

- flow condition, clarity, general gradient and velocities
- channel dimensions and general character
- morphology (e.g. riffles, pools)
- cover opportunities (i.e. woody debris, undercut banks, boulders, aquatic vegetation)
- substrate type
- bank height, character and stability/evidence of erosion
- riparian vegetation
- physical barriers to fish movement
- potential specialized and important habitat areas including potential spawning habitat, good nursery cover, holding habitat (deeper refuge pools)
- evidence of groundwater discharge
- disturbances, habitat limitations and potential habitat enhancement opportunities

A reconnaissance level habitat assessment was also conducted on Tributary 3 of the East Don River as well its two secondary tributaries which also lie within the project limits. Details are provided in Appendix J.

### 3.1.2 Terrestrial Habitat

#### 3.1.2.1 Overview and Policy Designations

Given the urban nature of the project area, natural areas are limited within the Yonge Street Subway Extension project limits. The most predominant areas are in the vicinity of the East Don River and along Pomona Mills Creek north of Highway 407.

There are no Areas of Natural and Scientific Interest (ANSIs) within the project limits. The closest ANSI is Baker's Woods Provincial Life Science ANSI which is approximately 2 km northwest of the project area. Baker's Woods ANSI is a mature, managed sugar maple bush at the northwest corner of Langstaff Road and Bathurst Street.

Very few woodlots or forest areas exist within the primary project area. Those noted include:

- A very small, fragmented woodlot located in the southeast corner of Yonge Street and High Tech Road.
- A forested tract on the east side of Yonge Street south of Royal Orchard Boulevard along the main branch of the East Don River.
- A wooded area located west of Yonge Street along Pomona Mills Creek of the East Don River.

The lands surrounding the East Don River and some of its tributaries have been identified and designated as part of the Regional Greenlands Natural Heritage System in the York Region Official Plan. These natural heritage features are connected to other regional natural heritage features and provide linkages that facilitate wildlife movement. Within the project limits, only the East Don River is part of the Greenlands System. The main branch of the East Don River provides a relatively uninterrupted valley and stream corridor stretching from the Oak Ridges Moraine to Lake Ontario through a heavily urbanized area.

Under Schedule 'A' Land Use of the Town of Markham Official Plan, the lands surrounding the East Don River are identified as 'Hazard lands'. These lands are part of an Environmental Protection Area (Valleylands) as well as an Activity Linkage corridor. The City of Vaughan Official Plan identifies these same lands as 'Valley Lands' and a Hydrogeologically Sensitive Area.

#### 3.1.2.2 Vegetation Communities

Within the Study Area, vegetation communities were classified according to the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee et al. 1998). Communities documented were assessed using a plotless method for the purposes of determining the general composition of the vegetation.

Due to the urban nature of in the project area, much of the vegetation is of anthropogenic origin, resulting from past and present land uses. Six types of vegetation communities

were identified within the vicinity of the project. These communities are cultural meadow, cultural woodland, coniferous plantation, deciduous plantation, and two types of lowland deciduous forest. A description of the identified vegetation communities is provided in Appendix J.

### **3.1.2.3 Flora**

Within this Study Area, a total of 177 vascular plant species were recorded by LGL Limited during their 2003 field work and by Ecoplans Limited during their 2008 field work. More than half of these species are considered introduced and non-native to southern Ontario. A combined LGL Limited and Ecoplans Limited working plant list of species recorded in the vegetation communities within the project area is provided in Appendix J.

### **3.1.2.4 Wildlife and Wildlife Habitat**

Field investigations were conducted by LGL Limited in 2003 to document wildlife habitat and characterize the nature, extent and significance of animal usage within the project area. Wildlife was recorded through direct observation, vocalization or other evidence including tracks, scat, odours or browse. Significant Wildlife Habitat was characterized using the *Significant Wildlife Habitat Technical Guide* (OMNR 2000). The conclusions reported by LGL were reviewed by Ecoplans Limited during their field investigations in 2008.

Due to the urban nature of the project area, wildlife habitat is primarily limited to open habitat of anthropogenic origin with few natural heritage features. Species within this urban habitat are typically very tolerant of human disturbance. Due to the disturbed nature of the study area, and its setting in a very busy urban core, it is not expected to provide habitat for sensitive or rare wildlife. The natural areas surrounding the main branch of the East Don River Valley are the most noteworthy habitats within the project area. They are comprised of lowland deciduous forest, cultural woodland and cultural meadow.

### **3.1.3 Wetlands**

There are no provincially significant or non-provincially significant wetlands located within the project area. No unevaluated wetlands were observed during field investigations.

### **3.1.4 Species at Risk**

#### **3.1.4.1 Aquatic Species at Risk**

Background fisheries records indicate that two Species at Risk (SAR), Redside Dace (*Clinostomus elongates*) and Northern Brook Lamprey (*Ichthyomyson fossor*) have been collected within the general study area, but outside of the Yonge Subway project limits.

Redside Dace (*Clinostomus elongates*) is designated as Threatened by the Ministry of Natural Resources and has a Provincial Rank of Rare to Uncommon (S3). Its federal status, designated by the Committee on the Status of Endangered Wildlife in Canada

(COSEWIC), has recently been elevated to Endangered. Although not yet listed on Schedule 1 of the Species at Risk Act (SARA), this listing is pending.

The fish records obtained from TRCA in 2008 indicate that Redside Dace have been collected at 8 stations in the East Don River watershed, within the secondary study area. Recent records (within last 10 years) indicate that Redside Dace have been collected at 3 stations, all of which are located north of Highway 407.

Older records indicate Redside Dace was collected in the main East Don River in 1995 at a station located approximately 2.3 km upstream of Yonge Street. Downstream of Yonge Street, records do exist but date back to 1985 and 1949, at two stations located approximately 2.55 km downstream and 1.42 km downstream of Yonge Street respectively.

Another SAR, the Northern Brook Lamprey (*Ichthyomyzon fossor*), was collected by the TRCA in the main branch of the East Don River west of the study area in 2002 and 2005, approximately 5.3 km upstream of Yonge Street, between Bathurst Street and Carville Road. The Great Lakes - Upper St Lawrence populations of this species are designated as Special Concern by COSEWIC, and have a Provincial Rank of S3. This species is not listed under the SARA.

The records for both of these species are recent, however they were collected a considerable distance from Yonge Street.

#### **3.1.4.2 Vegetation Species at Risk**

No provincially or federally designated vegetation SAR were documented during the field surveys conducted in 2003 or 2008. Species identified as being locally uncommon or rare (i.e York Region or Greater Toronto Area (GTA)), or species ranked by TRCA as species of concern listed, are noted and referenced in Appendix J.

#### **3.1.4.3 Wildlife Species at Risk**

Records of wildlife species at risk within the project limits from the MNR (NHIC 2008) were reviewed by LGL Limited in 2003 using on-line databases; this review was updated by Ecoplans Limited in 2008. No terrestrial wildlife listed under the SARA or the *Endangered Species Act* were recorded in the project area. No terrestrial wildlife species of management concern beyond the local level (upper tier municipal jurisdiction) were identified during field investigations. LGL Limited observations reported that Milk Snake, a reptile species designated as Special Concern by the COSEWIC, was recorded outside the project area in the Herpetofauna Atlas (Oldham and Weller 2000). Milk Snake was not observed in the project area during field investigations by LGL Limited in 2003 and Ecoplans Limited in 2008.

During field investigations completed by LGL in 2003, 37 bird species and 13 mammal species were observed in proximity to the project area between 19<sup>th</sup> Avenue and Steeles Avenue. Of these, 12 birds are considered local species of concern. Since no locations of these wildlife observations were provided in LGL's report, these species may or may not use habitats within the Transit Project study area. These species are listed in Appendix J. These species have also been identified by Bird Studies Canada (BSC) as species of conservation priority (Couturier 1999).

Five birds (Sharp-shinned Hawk, Great Blue Heron, Black-throated Blue Warbler, Wilson's Snipe, and White-throated Sparrow) and one mammal (weasel) have been identified by TRCA as species of concern within TRCA's jurisdiction (TRCA 2004). Three birds (Red-tailed Hawk, Belted Kingfisher and Blue Jay) are protected under the *Fish and Wildlife Conservation Act* and 31 birds are protected under the *Migratory Birds Convention Act*.

### **3.1.5 Soil and Groundwater**

A preliminary geotechnical assessment was undertaken as part of this Transit Project. The detailed report is provided as Appendix F to this document, and key information is summarized below.

#### **3.1.5.1 Alignment Topography**

The surficial topographic relief within and surrounding the study area is flat to gently sloping, with a southward decrease in elevation towards Lake Ontario. The average ground surface elevation ranges from 230 m above sea level (ASL) in the north portion of the study area, to approximately 185-190 m ASL in the south.

Within the East Don River valley area, the ground surface elevation is about 175 m, and in the vicinity of the main East Don River channel the Yonge Street road surface is at about 165 m. The river bed is at approximately 160 m.

#### **3.1.5.2 Regional Geology**

The soil deposits in the Toronto region consist predominantly of glacial till, glaciolacustrine and glaciofluvial sand, silt, and clay deposits. The soil deposits overlie the Georgian Bay Formation bedrock which consists primarily of shale with interbeds of limestone and siltstone. This bedrock formation is generally found about 30 to 60 m below the ground surface in the vicinity of the proposed subway alignment except in the immediate vicinity of the East Don River, where it is 15 to 20 m below ground surface.

The study area is located within the physiographic region known as the Peel Plain. One of the significant glacial features north of the study area is the east-west trending Oak Ridges Moraine.

#### **3.1.5.3 Hydrogeology**

Groundwater conditions are expected to vary considerably along the alignment. Several water-bearing deposits may be encountered within the region, depending on the final depth of construction.

It is expected that groundwater will be encountered within 1 to 2 m of the ground surface in all areas of this study. Groundwater conditions through this region are complex since major deposits of fine grained soils (silt and clay) and granular soils (silt, sand, and gravel) commonly alternate in their vertical sequence. Therefore, the "groundwater level" may not be a single static water level, but will depend on the stratigraphic sequence and regional drainage conditions. It is common in the region to have multiple groundwater "levels" and a complex profile of groundwater pressures.

### **3.1.5.4 Subsurface Conditions Related to Proposed Alignments**

Subsurface conditions were investigated along the proposed subway alignment, and 13 boreholes were completed. The detailed subsurface soil and groundwater conditions encountered in the boreholes are detailed in Appendix F.

The soil types relevant to this project include:

- Sand and Gravel to Gravelly Sand (Type 4)
- Sand to Silty Sand (Types 5 and 6)
- Sand and Silt to Silt (Types 7 and 8)
- Clayey Silt to Silty Clay (Types 9 and 10)
- Clayey Silt to Silty Clay Till (Type 11)
- Sandy Silt to Sand and Silt Till (Type 12)

### **3.1.6 Drainage and Stormwater Management**

A preliminary assessment of existing drainage and stormwater management conditions was completed. The report is provided as Appendix G, and key points are summarized below.

The study area is located within the Don River Watershed. The East Don River crosses Yonge Street approximately 1.5 km south of the Highway 407 interchange, with a tributary crossing directly through (underneath) the interchange. Another tributary of the East Don River is enclosed in a pipe and flows southeast underneath Yonge Street north of Steeles Avenue.

On a local scale, water runoff and precipitation is discharged to roadside drainage ditches, storm sewers, or local watercourses.

The existing Yonge Street roadway in the project area typically consists of the following:

- Right-of-way between 33 m wide in the City of Toronto and 36 m in York Region;
- Sidewalks on each side – each 2.0 m wide;
- Outside curb and gutter – each 0.5 m wide;
- Two traffic lanes in each direction – each 3.5 m wide;
- HOV lanes (1 in each direction) from approximately 300 m south of Arnold Avenue / Elgin Street to the south project limit
- Centre turning lane – 4.5 m wide; and
- Right-of-way is 65% impervious.

There is a large storm water management facility located in the northeast quadrant of Yonge Street and Highway 7. The drainage area for this facility includes the location for the Intermodal Station and a 2.5 km section of Yonge Street from Garden Avenue northward to south of Weldrick Road. The site for the Intermodal Station is currently a

paved parking area and construction of the terminal will not change the runoff to the storm water management facility.

There are no other existing storm water management facilities along the Yonge Street corridor. Current runoff discharges uncontrolled to the various watercourses that cross Yonge Street.

The Yonge Street corridor is mostly urbanized and there are generally limited opportunities to provide storm water management for the Yonge Street/subway runoff. In addition, only a small section of the overall corridor currently outlets to a storm water management facility.

### **3.1.7 Air Quality**

An Air Quality Analysis Report was prepared as part of the Transit Project assessment and is included as Appendix L. The existing ambient air quality conditions for the project area are based on the most recent measurements (2007) from the closest monitoring stations to the project area for which data was available. The closest monitoring station to the project area is the Toronto North station located near Yonge Street and Finch Avenue. Pollutants relevant to this study that are monitored at this location are nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>2.5</sub>). Data used to represent carbon monoxide (CO) concentrations are based on the measurements at the Toronto Downtown Station approximately 15 km south of the project area.

As detailed in Appendix L, both the 1-hour and 24-hour 2007 NO<sub>2</sub> levels, as well as the 1-hour and 8-hour 2007 levels for CO were well below the applicable criteria. The measured 24-hour PM<sub>2.5</sub> concentrations in 2007 were at 60 percent of the proposed Canada-wide standards (CWS), based on the 90<sup>th</sup> percentile concentration.

The background concentrations in the project area are well below the Ontario Ambient Air Quality Criteria (Ontario AAQC) for CO and NO<sub>2</sub>, and the CWS PM<sub>2.5</sub>.

### **3.1.8 Contaminated Properties**

A Contamination Overview Study (COS) was undertaken to provide a broad level assessment of actual and potential sources of site contamination within the study area. The COS was based solely on the known current and former land uses/activities and secondary source information. The detailed report is provided as Appendix I to this EPR.

Based on the information collected through COS, areas of actual site contamination were identified within the study area. However, areas of potential environmental concern (APEC) were noted. The areas identified are discussed in more detail in Appendix I, and summarized below:

#### **3.1.8.1 Potential Sources of Contamination**

##### *3.1.8.1.1 Commercial and Industrial Land Use*

Potential soil and groundwater contamination may exist within the study area as a result of current and historical commercial/industrial land uses. Below is a list of operations and activities associated with commercial/industrial land uses identified within the study area.

- *Fuel Storage Tanks* – Automotive centres and gas stations may operate pump islands (USTs for storing fuel), small storage areas, and occasionally service areas for changing engine oil. Gasoline and diesel fuel are transferred from bulk container trucks to large USTs. Spills at transfer areas and pumps, along with overfilling of and leakage from the USTs, are potential sources of site contamination.
- *Manufacturing Facilities, Registered Waste Generators and PCB Storage Sites* – A wide range of chemicals are used at facilities that manufacture and distribute parts/products for industrial and commercial use. These chemical products may include acids and bases, dyes and pigments, PCBs, polymers, plastics, surfactants, solvents, soaps, and waxes. These manufacturing processes are highly variable, depending on the product being produced. There are, however, certain types of process components that are frequently encountered in these facilities, including bulk storage for gaseous, liquid and solid materials, blending and packaging equipment, storage areas for drums, waste piles and disposal pits.

The fact that an activity or operation appears on the above list does not mean hazardous substances are used or stored on all sites occupied by that activity or operation, nor that the land used will have hazardous substances present.

#### 3.1.8.1.2 *Historical Agricultural Operations*

A large proportion of the study area was dominated by agricultural operations until the mid-1950's. Since then, significant development has occurred around the study area. The pesticides used in these agricultural operations can accumulate in the environment and remain for long periods of time. These contaminants can be transported through surface water runoff, wind and dust generation, and groundwater. However, it is believed that due to a decrease in the intensity of the agricultural operations and the change in land use overall, there is a low potential for soil and groundwater contamination associated with historical agricultural operations.

#### 3.1.8.2 **Contaminant Mobility**

Contaminants on or in the soils may move within and beyond the study area through a number of different routes. The soils themselves retain contaminants through adsorption. The movement of contaminants from soil occurs through evaporation and dust generation, intake into plants through their roots, and by flushing or dissolution into water seeping into the soil. Water transport of chemicals will usually result in contamination of surface water bodies through surface water drainage, and by way of groundwater aquifers.

In general, contaminant mobility will be greatest when:

- Overburden deposits consist of sand and gravel, or other permeable deposits.
- Fractured bedrock is located at or near the surface, or is overlain by a thin layer of permeable deposits.
- Distance to surface water courses is less than 50 m.
- Water table is less than 5 m below ground surface (bgs).

- Preferential flow pathways (e.g. trenches, tree roots, ditches) exist in the soils above the water table.

#### 3.1.8.2.1 *Significance of Mobility Within the Study Area*

The surficial geology is largely composed of Halton Till, which is made up of varying proportions of silt and clay. These deposits tend to act as confining materials, inhibiting the lateral and vertical movement of contaminants. This can result in increased time for natural attenuation process to occur. The bedrock geology of the study area is primarily composed of shale associated with the Georgian Bay Formation. Shale bedrock is considered to be a poor source of potable water, and is not likely tapped as a significant source of water within the study area. In addition, the bedrock is overlain by alternating layers of silt and clay with low permeability. This will significantly hinder the movement of contaminants into the bedrock aquifer system.

Also, the large extent of paved surfaces will direct most runoff to storm sewers, and will further act as a barrier to contaminant migration. Overall, based on the known geologic and hydrogeologic conditions present within the study area, the inferred mobility of any contamination will likely be low.

## 3.2 **Socio-Economic Environment**

The Yonge Street Corridor for the purpose of this Transit Project commences at Finch Station and extends northerly to the vicinity of Richmond Hill Centre at Yonge Street and Highway 7 in the Town of Richmond Hill. This segment of Yonge Street encompasses a variety of land uses. Yonge Street has historically been a focal point for mixed use development consisting of residential, institutional, and commercial land uses. The combination of the recently developed mixed-use areas with the historical centres of the past, such as the Newtonbrook neighbourhood in the City of Toronto and Thornhill Village in York Region, creates a variety of land uses and densities that contribute to the unique character of Yonge Street.

### 3.2.1 **Official Plans**

North of Steeles Avenue, land use designations along Yonge Street are subject to change in order to accommodate growth in a more sustainable manner. The Province's *Places to Grow: Growth Plan for the Greater Golden Horseshoe* encourages new development to occur within existing built areas and designated Urban Growth Centres throughout the GTA. One of the Growth Centres is the Richmond Hill/Langstaff Gateway which is located along Highway 7 and adjacent to the subway extension route. Due to existing transit linkages, planned transit improvements and the *Growth Plan's* target of 200 jobs and residents per hectare, there are significant opportunities for transit oriented development. In support of provincial legislation, York Region and its municipalities are evaluating and updating their policies.

#### 3.2.1.1 *City of Toronto Official Plan*

The City's Official Plan (OP), dated 2002, places major emphasis on increasing transit ridership and has identified Yonge Street in the study area as a "higher order transit corridor" (Exhibit 3-1). The Official Plan identifies Yonge Street north of Finch Avenue

as a street where a dedicated transit corridor should be established. The City’s OP promotes measures to reduce car dependency and rush hour congestion by increasing trips made by transit, walking and cycling.

**Exhibit 3-1: City of Toronto Higher Order Transit Corridors (Official Plan Map 4)**



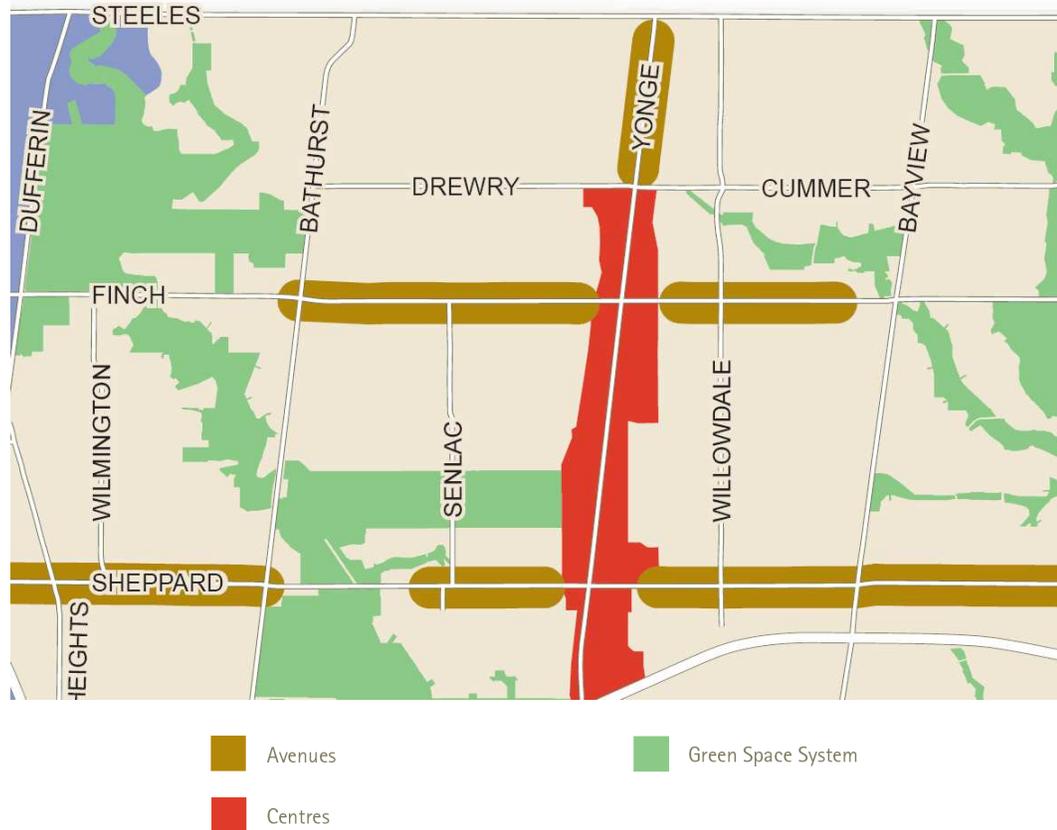
The northern part of Yonge Street between Cummer Avenue to Steeles Avenue is classified in the OP as an “Avenue” (Exhibit 3-2) which is characterized as a re-urbanizing arterial corridor. The identification of “Avenues” is a key part of the City’s re-urbanization strategy that promotes higher density, mixed-use, frontage redevelopment and an enhanced pedestrian environment. The Official Plan also identifies the following goals for the reurbanization of Avenues:

- Support and promotion of the use of transit;
- Mixed-use redevelopment that supports the major streets as focal, community places for the adjoining neighbourhoods;
- Increasing the range of housing options in the community; and
- High quality pedestrian environments including streetscape improvements and tree planting that encourage walking and strengthen local retail.

In the Avenues section of the City’s Official Plan, the directions for the built-form and design of the public realm are general statements of guidance and policy. The specifics

for each Avenue are to be developed through an “Avenue Study”. No such study has been completed for Yonge Street and given the Transit Project, a planning study will be necessary.

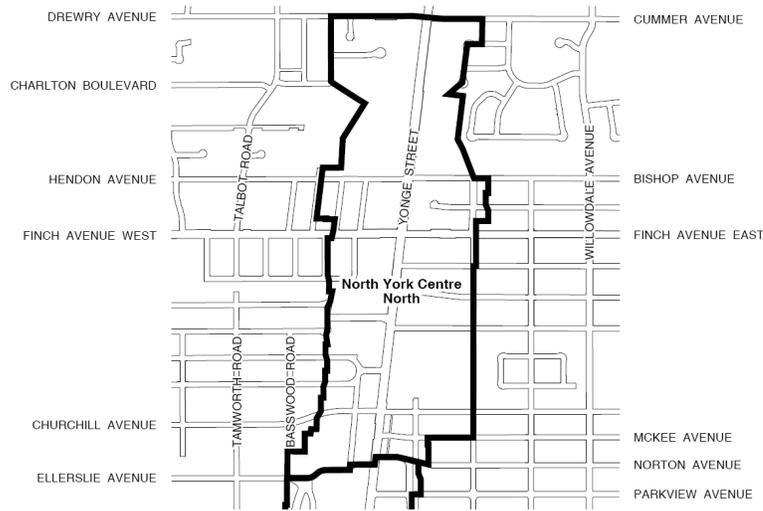
**Exhibit 3-2: City of Toronto Urban Structure (Official Plan Map 2)**



### **3.2.1.2 North York Centre Secondary Plan**

The portion of Yonge Street between Finch Avenue and Cummer Avenue falls within the area of the North York Centre Secondary Plan identified as “North York Centre North” (Exhibit 3-3). In this area, Yonge Street is seen as the “spine” and the principal pedestrian “promenade” of the Centre for which specific built-form and design parameters are defined.

**Exhibit 3-3: North York Centre North**



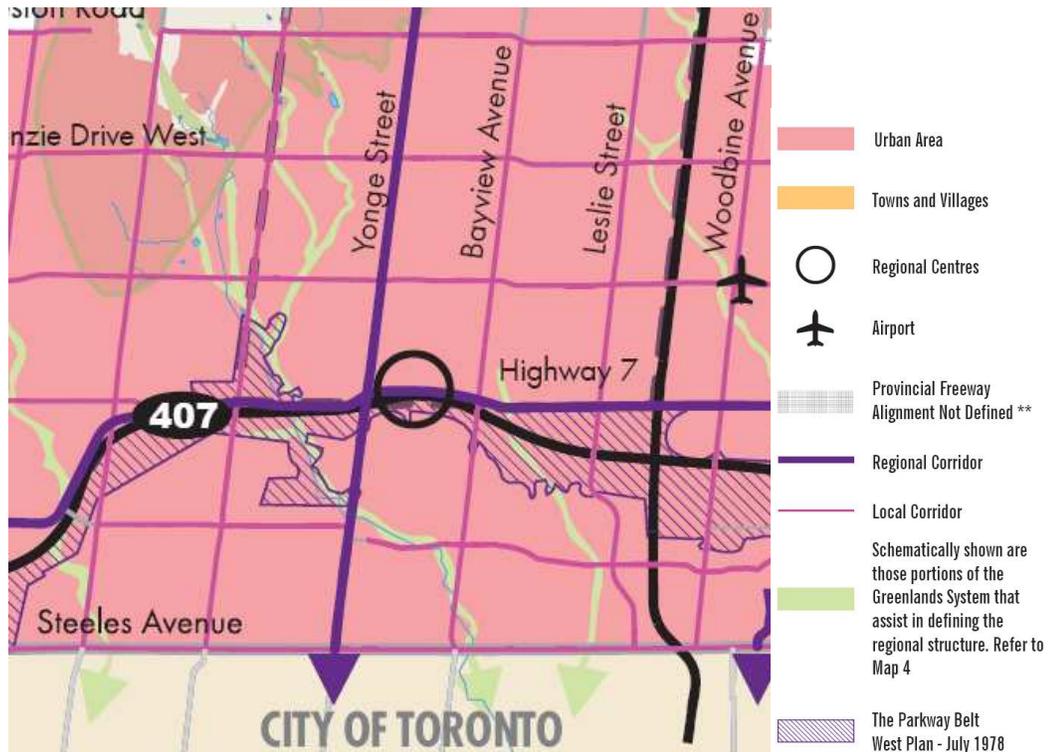
Both the Avenues and the North York Centre policies place an emphasis on the pedestrian environment, in terms of the design of the public realm of Yonge Street and the supportive role of buildings and other development. In the Avenues section of the OP, the directions for the built-form and design of the public realm are general statements of guidance and policy. The specifics for each Avenue are to be developed through an “Avenue Study”. No such study has been completed for Yonge Street and given the Transit Project, a planning study will be necessary.

Both the Official Plan and North York Centre Secondary Plan contain policies regarding land use which would be supported by improving the transit, pedestrian and cycling environments. There is an opportunity to implement these policies with the reconstruction of Yonge Street as part of the Transit Project.

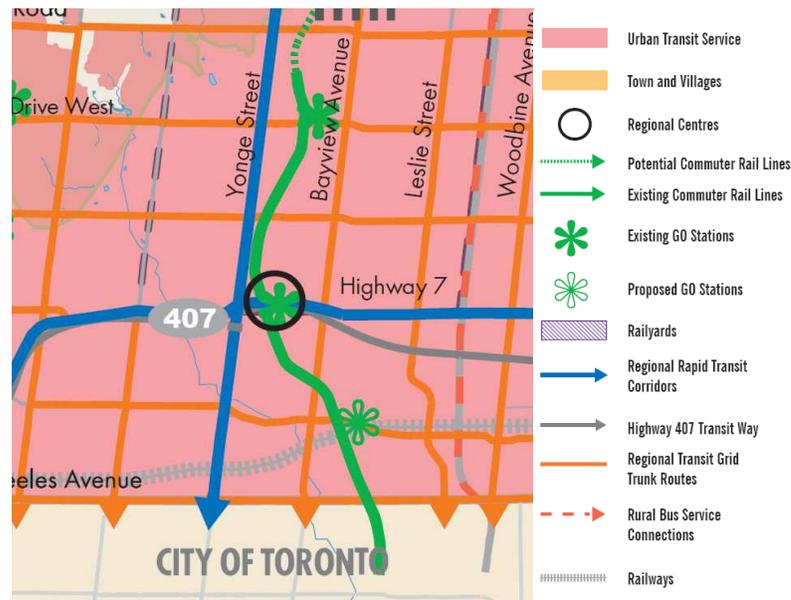
**3.2.1.3 York Region Official Plan**

The Regional Municipality of York’s Official Plan (OP) establishes an urban structure for the Region which consists of Regional Centres that are connected by Regional Corridors. The OP promotes the intensification of these Centres and Corridors, which maximize land and infrastructure in a matter that supports rapid transit. Regional Centres and Corridors are identified on Map 5 of the OP (Exhibit 3-4), while the Conceptual Rapid Transit Network is identified on Map 10 of the OP (Exhibit 3-5).

**Exhibit 3-4: York Region Regional Structure (Official Plan Map 5)**



**Exhibit 3-5: York Region Conceptual Transit Network (Official Plan Map 10)**



The structure of the OP designates lands located to the east of the Highway 407 and Yonge Street interchange as a Regional Centre. Richmond Hill Centre/Langstaff

Gateway is one of the four Regional Centres intended to act as hubs and equivalent to ‘downtowns’ for business, cultural, government and social activity. These Regional Centres act as focal points since they contain the highest concentrations and intensities of residential, social service, commercial and office activities. In addition, these Regional Centres are to be compact, pedestrian oriented, safe and accessible.

*Regional Official Plan Amendment 43* to the Official Plan (ROPA 43), adopted in December 2004, permits intensified land uses up to 2.5 floors space index (FSI) within designated areas along the Yonge Street and Highway 7 corridors. The land uses along these corridors are subject to the studies conducted by local municipalities, specifically Markham, Newmarket, Richmond Hill, and Vaughan.

The Region’s OP designates Yonge Street as a Regional Corridor and the Region envisions rapid transit service will be provided on Yonge Street to serve this Corridor. The development of high-density uses along the corridor will support the introduction of a rapid transit system along the Yonge Street Corridor.

### **3.2.2 Land Use Studies**

There are several land use planning studies along the Corridor that are currently underway or will commence upon completion of this study.

#### **3.2.2.1 Town of Markham**

The Town of Markham’s planning framework for the Thornhill district (the east side of the Yonge Street Corridor) provides for the transformation of certain areas to more intensive and mixed-use development that will support transit improvements. These areas are found along Yonge Street and at nodes near Steeles Avenue and in the former Langstaff industrial area.

Two studies that were recently completed were the Thornhill Yonge Street Study, which focused on design and policy framework and the Thornhill Markham Heritage Conservation District Study, which focused on policy development for a Conservation Plan. The boundaries of the studies are between Elgin Street to Bay Thorn Drive along Yonge Street.

The Yonge Steeles Corridor Study was recently completed and findings will be used to update the design and policy framework for a Secondary Plan Amendment. The boundaries of this study are from Steeles Avenue to south of Elgin Street and Yonge Street to Dudley Avenue.

The Langstaff Area Study is also underway – the study area is bounded by Langstaff Road to the north and Yonge Street to the west. The purpose of this study is to create a new land use master plan for the Langstaff Gateway area and is expected to be completed by May 2009.

#### **3.2.2.2 Town of Richmond Hill**

The study limit of the Transit Project is located at the end of the tail track immediately north of the Richmond Hill Centre Station. The entire station area is expected to eventually act as an inter-modal transit hub and the Town’s land uses are integral to supporting transit ridership. The Regional Centre Land Use Design study is ongoing and

new policies developed through this study will be included in the Town's OP. The area currently being assessed is bounded to the north by Beresford Drive, Highway 7 to the south, to the west by Yonge Street and Red Cedar Avenue to the east. The design and land use options for the preferred design is expected to be completed in the spring of 2009 and implementation could occur as early as late 2009 to early 2010.

### **3.2.2.3 City of Vaughan**

The City of Vaughan is currently undertaking the Yonge Street Study (South and North) initiated in June 2008. The study area covers the southern portion of Yonge Street from Steeles Avenue to Arnold (just south of the Thornhill Public School) and the northern portion from the southern edge of the East Don River Valley to Highway 407. The purpose of the study is to determine an urban design and land use framework for the lands within the study area. The results of the study will be used to provide a policy framework for Official Plan Amendment 669.

Vaughan has completed the Thornhill Vaughan Heritage Conservation District Study which was used for developing policies for the updated Thornhill Vaughan Heritage District Plan in 2007. The area under the plan starts from just south of Elgin Street to Thornhill Avenue along Yonge Street.

### **3.2.3 Land Use Patterns**

An overview of existing land use patterns is provided in this section. Detailed land use information for the station areas is provided in Appendix B, Station Location Analysis.

#### **3.2.3.1 City of Toronto**

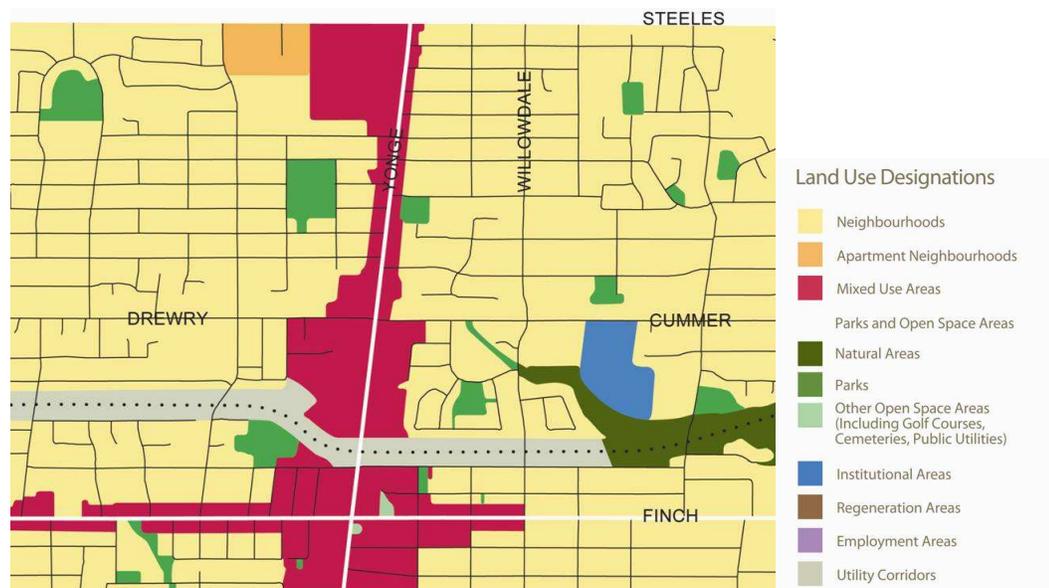
Land use along the Toronto portion of Yonge Street, between Finch Avenue and Steeles Avenue, consists of low-density mixed retail, office and high rise residential uses. There are also key transit facilities including the TTC Finch Bus Terminal; the GO Bus Terminal at Yonge Street/Bishop Avenue/Hendon Avenue; and the TTC Finch commuter parking facilities within the Finch Hydro Corridor.

Other features along Yonge Street include a listed heritage building on the northwest corner of Yonge Street and Drewry Avenue, Centerpoint Mall in the southwest quadrant of Yonge Street and Steeles Avenue, as well as several strip malls.

There are various uses within the neighbourhoods adjacent to the Yonge Street corridor. These include parks, community centres, schools and the St. John's Rehabilitation Hospital on Cummer Avenue.

Exhibit 3-6 illustrates the general land use designations within the Toronto portion of the study area.

### Exhibit 3-6: Land Use Designations along the Yonge Street Corridor – City of Toronto (Official Plan Map 16)



#### 3.2.3.2 York Region

Adjacent to and north of Steeles Avenue on Yonge Street is primarily commercial and some low-density residential uses. Further north, there are several high-rise residential developments within the Clark Avenue area.

The Thornhill Heritage Conservation District, between Arnold Avenue/Elgin Street and Thornhill Avenue/the East Don River, consists of a wide variety of low-density commercial and residential uses.

Within and north of the heritage district, the Toronto Ladies' Golf Course and the Thornhill Country Club are located adjacent to the East Don River. Several high-rise residential towers are located within the Royal Orchard Boulevard area.

North of Royal Orchard Boulevard to Highway 407, existing land use includes low-density commercial, low-density residential, as well as a large cemetery, Holy Cross Catholic Cemetery situated on the east side of Yonge Street south of Langstaff Road.

North of Highway 407 to High Tech Road, land use is comprised of primarily low-density residential on the west side of Yonge Street and low-density commercial and entertainment uses on the east side of Yonge Street.

### 3.3 Cultural Environment

#### 3.3.1 Built Heritage and Cultural Heritage Landscapes

A cultural heritage resource survey of built heritage resources and cultural heritage landscapes older than 40 years of age was undertaken along Yonge Street within the study corridor. Key findings, including photographs, are provided in Appendix H and summarized below.

The study area is characterized by 20<sup>th</sup> century urban development, principally commercial, residential and light industrial. Yonge Street dates back to 1795 when work began on surveying and marking a small trail from Eglinton Avenue northward to the Holland River. The route was selected for a new military road north from York to Lake Simcoe and then to a military garrison at Penetanguishene. The road became a principal settlement and transportation route in Upper Canada, and small hamlets and villages were established along its length including Thornhill and Newtonbrook around Finch Avenue. In the late 19<sup>th</sup> century the Toronto Radial Railway was built along the east side of Yonge Street. In the 20<sup>th</sup> century Yonge Street became a major transportation artery for vehicular traffic.

Examples of 20<sup>th</sup> century commercial development of 40 years of age and older, such as strip malls and older plazas, exist along both sides of Yonge Street, in particular from north of Finch Avenue to north of Steeles Avenue.

Heritage features noted include:

- The Ontario Heritage Trust has acquired a conservation easement for the Robert West House and surrounding property at No. 7780 Yonge Street on November 20, 2008. The house is one of the oldest surviving buildings in the City of Vaughan still located on its original site.
- No. 7951 Yonge Street is listed on the Town of Markham Register of Property of Cultural Heritage Value or Interest;
- No. 8210 Yonge Street is listed as a heritage resource by the City of Vaughan;
- The former Newtonbrook Store at No. 5926 Yonge Street is listed as a heritage property by the City of Toronto;
- Two heritage conservation districts (HCD) designated under Part V of the *Ontario Heritage Act* are located within the Yonge Street corridor – the Vaughan Thornhill Heritage Conservation District and the Markham Thornhill Heritage Conservation District. These districts contain numerous properties of heritage importance included on the Markham Register of Property of Cultural Heritage Value or Interest, the City of Vaughan's Register of Property of Cultural Heritage Value, and/or the Vaughan Thornhill Heritage Conservation Inventory 2007.
- The Society for the Preservation of Historic Thornhill (SPOHT) has erected a number of historic bronze plaques in Thornhill, including six along Yonge Street. A former City of North York Plaque commemorating the Village of Newtonbrook is located at No. 5800 Yonge Street.
- The Holy Cross Cemetery, opened in 1954, is located at No. 8361 Yonge Street. The Holy Trinity Burying Ground is located within the Vaughan Thornhill HCD.

There are no provincially or federally designated properties within the study corridor along Yonge Street.

These preliminary findings of the cultural heritage resource survey of the Yonge Street corridor, with emphasis on the area around the proposed subway station facilities are included in Appendix H.

### 3.3.2 Archaeological Features

A Stage 1 Archaeological Assessment of the study area was completed by Archaeological Services Inc. (ASI). The key findings are summarized below.

Ten archaeological sites have been registered within 2 km of the study corridor, two of which are located adjacent to the Yonge Street corridor. A review of the general physiography and local nineteenth century land use of the study corridor suggest that it has potential for the identification of Aboriginal and Euro-Canadian archaeological sites.

The majority of the proposed Yonge Street subway extension will follow the existing Yonge Street right-of-way. With the exception of the East Don River crossing, the entire Yonge Street right-of-way has been previously disturbed, and no further archaeological assessment is required.

Beyond the disturbed right-of-way, a few areas have exhibited minimal disturbances. Areas with archaeological potential are in vicinity of facilities associated with the proposed stations at Cummer Avenue/Drewry Avenue, Steeles Avenue, and Longbridge Road/Langstaff Road. Additional information, including areas that may require a Stage 2 Archaeological Assessment, is provided in Section 5.2.3.2.

## 3.4 Transportation

This section summarizes various aspects of the existing transportation environment in which the Transit Project is proposed to take place. The project area includes the Yonge Street corridor from Finch Station to Highway 7.

### 3.4.1 Local/Regional Transit Network

#### 3.4.1.1 Subway

The Yonge-University-Spadina (Y-U-S) Subway is a continuous U-shaped part of the subway network. The YUS line provides north-south rapid transit service in the City of Toronto. The Yonge Line presently terminates at Finch Station in the north, where two major bus terminals with a total of 30 bus bays, a 3,350-car commuter parking lot, and a passenger pick-up/drop-off facility are provided. Current service levels are described in Exhibit 3-7.

**Exhibit 3-7: Existing Service Levels on the YUS Line at Finch Station**

Line	Weekday Service Levels (Headway)		Daily Usage at Finch Station
	Peak Period	Off-Peak Period	
Yonge-University-Spadina	2.5 minutes	4 minutes	92,610**

\*November 23, 2008, to January 3, 2009, TTC Service Summary

\*\*TTC 2007-2008 Subway Ridership, typical number of users boarding/alighting at station

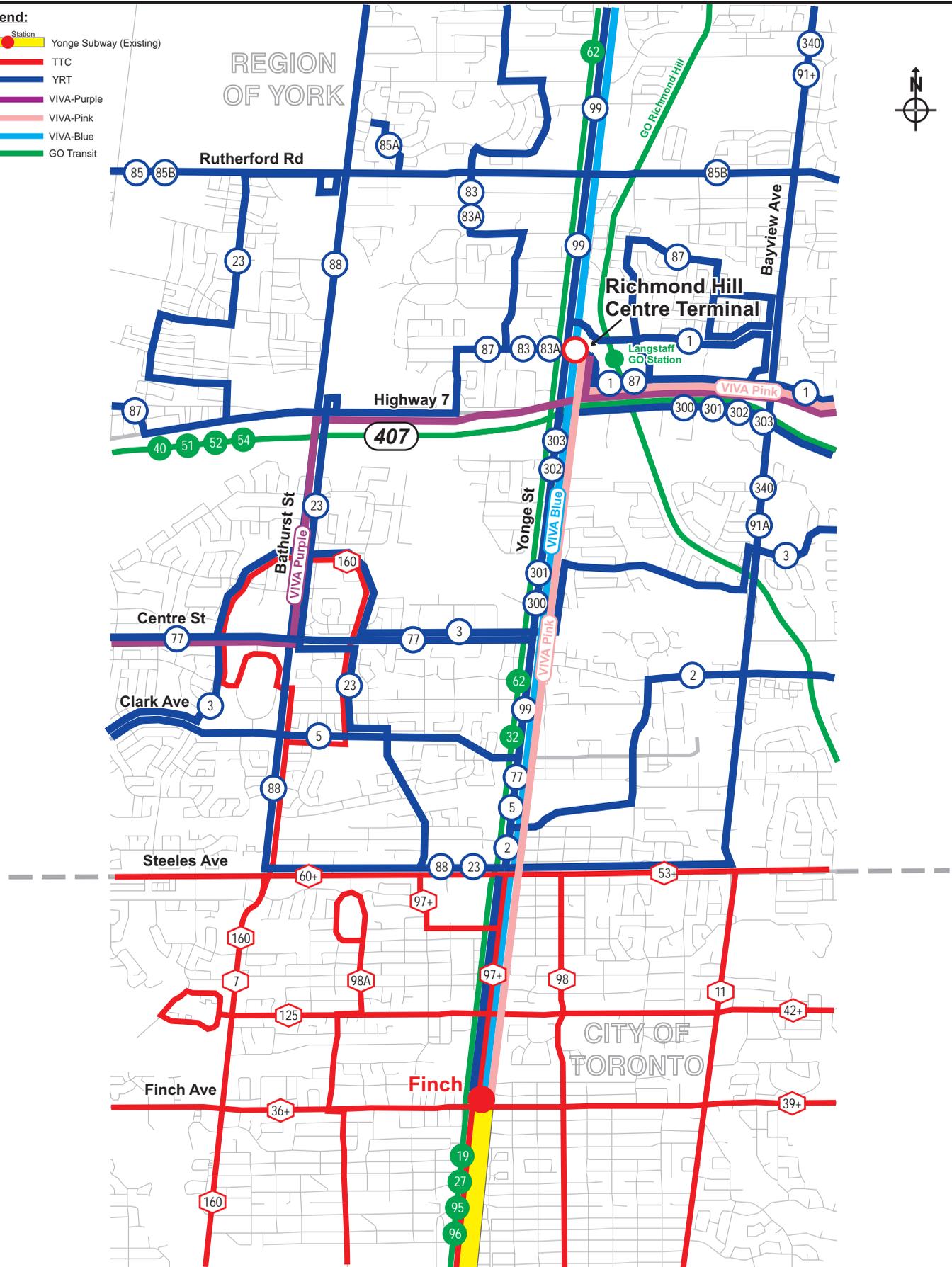
#### 3.4.1.2 Surface Routes

The Toronto Transit Commission (TTC), York Region Transit (YRT), GO Transit, and Brampton Transit operate a total of 33 bus routes within the Yonge Street corridor from Finch Avenue in the City of Toronto and 16<sup>th</sup> Avenue in the Town of Richmond Hill,

connecting with the two existing bus terminals at Finch Station as well as the Richmond Hill Centre Terminal at Yonge Street / Highway 7. The existing bus services are illustrated in Exhibit 3-8.

**Legend:**

-  Station Yonge Subway (Existing)
-  TTC
-  YRT
-  VIVA-Purple
-  VIVA-Pink
-  VIVA-Blue
-  GO Transit



Yonge Subway Extension - Finch Station to Richmond Hill Centre  
Transit Project Assessment

EXISTING BUS SERVICE

EXHIBIT

3-8



### **Toronto Transit Commission**

Presently, the TTC operates 7 bus routes within the Yonge Street corridor between Finch Avenue and Steeles Avenue, offering both express as well as local services on Yonge Street. With the exception of Route 97 Yonge, all of the TTC bus routes operating in the Yonge Street corridor are east-west routes. Existing service levels are described in Exhibit 3-9.

**Exhibit 3-9: TTC – Existing Service Levels in the Yonge Street Corridor**

Route	Weekday Service Levels (Headway)		Daily Ridership (2005-06)*
	Peak Period	Off-Peak Period	
36 Finch West (all branches)	3 minutes	5 to 7 minutes	37,000
39 Finch East (all branches)	1 to 2 minutes	2 to 4 minutes	38,300
53 Steeles East (all branches)	2 to 3 minutes	5 to 6 minutes	19,600
60 Steeles West (all branches)	3 minutes	4 to 12 minutes	27,500
97 Yonge	30 minutes	30 minutes	3,600
42 Cummer (all branches)	5 to 7 minutes	10 to 15 minutes	7,200
125 Drewry	8 to 10 minutes	15 to 30 minutes	2,500

\*TTC 2005-06 Ridership and cost statistics for bus and streetcar routes

### **York Region Transit / Viva / Brampton Transit**

Presently, YRT operates 9 regular routes and 4 express routes within the Yonge Street corridor between Finch Avenue in the City of Toronto and 16<sup>th</sup> Avenue in the Town of Richmond Hill. In addition, there are 3 Viva Bus Rapid Transit routes operating out of Finch GO Bus Terminal as well as Richmond Hill Centre Terminal. YRT currently operates Route 77 Highway 7-Centre jointly with Brampton Transit. With the exceptions of YRT Route 99 Yonge South and Viva Blue, all of the YRT/Viva bus routes operating in the Yonge Street corridor are east-west routes. Existing service levels are described in Exhibit 3-10.

**Exhibit 3-10: YRT / Viva – Existing Service Levels in the Yonge Street Corridor**

Route	Weekday Service Levels (Headway)		Daily Ridership (2007)	Terminal(s) Served
	Peak Period	Off-Peak Period		
2 Milliken	15 to 30 minutes	30 to 60 minutes	2,300	Finch
5 Clark	15 minutes	30 minutes	1,800	Finch
23 Thornhill Woods	30 minutes	40 minutes	750	Finch
77 Highway 7/Centre	15 minutes	15 to 30 minutes	2,850	Finch
88 Bathurst	20 minutes	30 to 45 minutes	2,450	Finch
91/91A Bayview South	10 to 30 minutes	60 minutes	4,000	Finch
300 Business Express	6 trips peak direction only	n/a	300	Finch
301 Markham Express	8 trips peak direction only	n/a	400	Finch
302 Unionville	4 trips peak	n/a	200	Finch

Route	Weekday Service Levels (Headway)		Daily Ridership (2007)	Terminal(s) Served
	Peak Period	Off-Peak Period		
Express	direction only			
303 Bur Oak Express	2 trips peak direction only	n/a	100	Finch
Viva Purple	10 minutes	15 minutes	7,350	Richmond Hill Centre
83/83A Trench	30 to 60 minutes	60 minutes	950	Richmond Hill Centre
87 Langstaff Maple	30 to 40 minutes	60 minutes	1000	Richmond Hill Centre
Viva Blue	5 to 10 minutes	12 to 15 minutes	16,700	Finch / Richmond Hill Centre
Viva Pink	10 minutes	n/a	2,450	Finch / Richmond Hill Centre
99 Yonge South	12 minutes	30 minutes	3,800	Finch / Richmond Hill Centre

\*YRT Draft PLAN09 Service Plan

### **GO Transit**

Presently, GO Transit operates 10 bus routes within the Yonge Street corridor from Highway 401 to the Town of Newmarket, offering both peak-only and all-day services on weekdays. The Highway 407 East GO bus operates on Sundays in addition to weekdays. The Airport Express bus operates 7 days a week year round. The Highway 407 East GO bus serves the south lot of Langstaff GO Station on Langstaff Road (south of Highway 407). The Airport Express bus operates out of the Richmond Hill Centre Terminal. With the exception of Route 62 Newmarket ‘B’, all of the GO bus routes operating in the Yonge Street corridor are east-west routes serving as far east as Oshawa and as far west as Milton. Existing service levels are described in Exhibit 3-11.

#### **Exhibit 3-11: GO Transit – Existing Service Levels in the Yonge Street Corridor**

Route	Weekday Service Levels (Headway)		Terminal(s) Served	Average Daily Ridership (Oct. 2008)
	Peak Period	Off-Peak Period		
62 Newmarket ‘B’	10 minutes	n/a	Finch	805
32 Brampton Trinity Common	20 minutes	n/a	Finch	706
19 Oakville Hwy 403	15 minutes	n/a	Finch	683
96 Oshawa Hwy 401	20 minutes	n/a	Finch	811
95 Oshawa Hwy 2 Express	20 minutes	30 minutes	Finch	1,645
27 Milton Hwy 401	20 minutes	n/a	Finch	1,134
40 Airport Express	60 minutes	60 minutes	Richmond Hill Centre	286
52 Hwy 407 East (Oshawa)	30 to 60 minutes	60 minutes	Langstaff GO Station	1,211
51 Hwy 407 East (Pickering)	30 minutes	30 minutes	Langstaff GO Station	3,013
54 Hwy 407 East (Mount Joy)	30 minutes	30 minutes	Langstaff GO Station	1,091

\*GO Transit Public Schedules

## Commuter Rail

GO Transit currently operates peak-only commuter rail services on the Richmond Hill Line (CN Bala Subdivision) between Union Station and Richmond Hill GO Station. Current service levels are described in Exhibit 3-12.

### Exhibit 3-12: GO Transit – Existing Service Levels on the GO Richmond Hill Line

Line	Weekday Service Levels (Headway)		Terminal Served	Average Daily Ridership (Oct. 2008)
	Peak Period	Off-Peak Period		
Richmond Hill GO Train	4 southbound trains in the AM	n/a	Langstaff GO Station	4,800
	5 northbound trains in the PM			
Richmond Hill GO Bus	n/a	60 minutes	Langstaff GO Station	624

\*GO Transit Public Schedules

## 3.4.2 Existing Roadway Network

### 3.4.2.1 Arterial and Collector Roadways

Yonge Street is an arterial roadway extending from Lake Ontario in the City of Toronto to north of York Region and beyond. Within the project area, the City of Toronto's jurisdiction is from Finch Avenue to Steeles Avenue. This segment of the corridor is a 7 lane road within a 33 m (110 feet) right-of-way. This section consists of 4 basic lanes, an HOV lane in the north and south directions, and 1 centre left-turn lane.

Yonge Street from Steeles Avenue north to Highway 7 is an arterial road under the jurisdiction of York Region. North of Steeles Avenue, Yonge Street consists of four basic lanes with an additional HOV lane in the north and south directions that extend from Steeles Avenue to just north of Clark Avenue.

North of Clark Avenue, Yonge Street narrows to four basic lanes until Langstaff Road.

Through the Yonge Street and Highway 407 interchange, Yonge Street operates as a six lane facility to High Tech Road where it narrows to four basic lanes. Arterial and major collector east-west roadways from Steeles Avenue to north of Highway 7 are listed in Exhibit 3-13.

**Exhibit 3-13: East – West Arterials and Major Collectors (Finch Avenue to north of Highway 7)**

<b>Arterials and Major Collectors</b>	<b>Through Lanes on Yonge Street</b>	<b>Through Lanes on Cross Street</b>
Finch Avenue	3N 3S	2E 2W
Hendon Avenue/Bishop Avenue	3N 3S	1E 1W
Drewry Avenue/Cummer Avenue	3N 3S	1E 1W
Steeles Avenue	3N 2S	2E 3W
Doncaster Avenue	3N 2S	2E 1W
Clark Avenue	3N 2S	1E 1W
John Street	2N 2S	1E 1W
Centre Street	2N 2S	1E 1W
Royal Orchard Boulevard	2N 2S	1E 1W
Highway 7	3N 3S	3E 3W
High Tech Road	3N 2S	2E 2W
Bantry Avenue	2N 2S	2E 1W

**3.4.2.2 Intersection Control**

The primary intersections and their type of control are summarized in Exhibit 3-14.

**Exhibit 3-14: Primary Intersections and Type of Control**

<b>Intersection</b>	<b>Signalized</b>	<b>Unsignalized (stop sign on minor street)</b>
Finch Avenue	x	
Hendon Avenue/Bishop Avenue	x	
Drewry Avenue/Cummer Avenue	x	
Patricia Avenue	x	
Moore Park Avenue/Madawaska Avenue	x	
Athabasca Avenue	x	
Steeles Avenue	x	
Highland Park Boulevard		x
Woodward Avenue		x
Crestwood Road		x
Grandview Avenue		x
Doncaster Avenue	x	
Glen Cameron Road	x	
Morgan Avenue		x
Clark Avenue	x	
Arnold Avenue/Elgin Street	x	
Thornridge Drive		x
John Street	x	

Intersection	Signalized	Unsignalized (stop sign on minor street)
Jane Street		x
Colbourne Street		x
Thornhill Summit Drive/Centre Street	x	
Royal Orchard Boulevard	x	
Bay Thorn Drive/ Thornhill Avenue		x
Helen Avenue		x
Uplands Avenue	x	
Kirk Drive		x
Bunker Road		x
Longbridge Road		x
Langstaff Road/Hwy407 EB Ramp	x	
S-E 407 On Ramp		x
N-E 407 On Ramp		x
S-W 407 On Ramp		x
SE-NS 407 Off Ramp	x	
N-W 407 On Ramp		x
Highway 7 Connection Ramp/Garden Avenue	x	
High Tech Road	x	
Roosevelt Drive		x
Beresford Drive/Westwood Lane	x	
Mackay Drive		x
Bantry Avenue/Scott Drive	x	

### 3.4.2.3 Traffic Volume and Composition

Yonge Street within the limits of the study area serves a mixture of traffic and pedestrian movements associated with neighbourhood access, retail/commercial development demands, and through commuter traffic demands. The highest concentrations of traffic primarily fall within an 8-hour peak period. This peak period is between 7:30 am to 6 pm. Peak times within the 8 hour period are from 7:30 am to 9:30 am, 11 am to 3 pm, and 4pm to 6pm, and are generally associated with commuter/work related travel. Off-peak and weekend traffic levels are considerably less than weekday peak periods.

The average annual daily traffic (AADT) from Finch Avenue to Steeles Avenue is approximately 40,000 to 61,000 vehicles and from north of Steeles Avenue to Highway 7 is 32,000 to 46,000 vehicles.

Exhibits 3-15 and 3-16 summarize 8-hour peak period traffic volumes (northbound and southbound) entering and exiting each link on Yonge Street. Traffic volumes consist of cars, trucks, and buses. Each link is composed of two intersections, which are the locations of the proposed subway stations. Traffic volumes entering or exiting each link approach an intersection and either continue through to the following link or turn left or right on adjacent streets.

**Exhibit 3-15: Northbound Link Volumes on Yonge Street During Peak Periods**

Link	Northbound (8-Hour)	
	Entering	Exiting
Finch Avenue to Cummer Avenue/Drewry Avenue	12,370	12,340
Cummer Avenue/Drewry Avenue to Steeles Avenue	11,810	8,670
Steeles Avenue to Clark Avenue	10,250	15,520
Clark Avenue to Royal Orchard Boulevard	13,800	12,860
Royal Orchard Boulevard to Longbridge Road	12,200	15,680
Longbridge Road to High Tech Road	15,800	13,770

Note: Based on Turning Movement Counts (TMC) provided by the City of Toronto and York Region and adjusted based on 2006 Statistics Canada growth factors.

**Exhibit 3-16: Southbound Link Volumes on Yonge Street During Peak Periods**

Link	Southbound (8-Hour)	
	Entering	Exiting
High Tech Road to Longbridge Road	15,180	14,710
Longbridge Road to Royal Orchard Boulevard	14,400	11,560
Royal Orchard Boulevard to Clark Avenue	12,700	13,960
Clark Avenue to Steeles Avenue	18,030	16,150
Steeles Avenue to Cummer Avenue/Drewry Avenue	16,410	11,120
Cummer Avenue/Drewry Avenue to Finch Avenue	10,930	10,630

Note: Based on Turning Movement Counts (TMC) provided by the City of Toronto and York Region and adjusted based on 2006 Statistics Canada growth factors.

Exhibit 3-17 contains a summary of AADT volumes during 8 hour peak travel along the Yonge Street Corridor.

**Exhibit 3-17: Summary of Peak Periods (8-Hour) Traffic Volumes along the Yonge Street Corridor**

Intersections on Yonge Street	Annual Average Weekday Peak Period Travel (8-Hour)				Total
	NB	EB	SB	WB	
Finch Avenue	12,520	7,520	10,600	6,390	37,030
Cummer Avenue/Crewry Avenue	12,320	2,720	11,100	2,650	28,790
Steeles Avenue	8,670	10,360	16,150	9,110	44,290
Clark Avenue	13,030	7,100	11,720	1,720	33,570
Royal Orchard Boulevard	11,030	20	9,920	2,220	23,180
High Tech Road	10,720	170	11,520	2,650	25,060

Note: Based on Turning Movement Counts (TMC) provided by the City of Toronto and York Region and adjusted based on 2006 Statistics Canada growth factors.

During weekday 8-hour peak period travel heavy vehicles (trucks and buses) make up approximately 5% to 14% of traffic volumes south of Steeles Avenue and 2% to 3% of the vehicle composition north of Steeles. Exhibit 3-18 outlines the percentage of heavy vehicles operating during peak period travel.

**Exhibit 3-18: Summary of Annual Average Heavy Vehicle Movements Along the Yonge Street Corridor During Peak Periods (8-Hour)**

Intersections on Yonge Street	Weekday Heavy Vehicle Peak Period Travel (8-Hour) Percentage	Annual Average Weekday Heavy Vehicle Peak Period Travel (8-Hour)
Finch Avenue	5%	1,780
Cummer Avenue/Drewry Avenue	14%	3,950
Steeles Avenue	5%	1,990
Clark Avenue	2%	550
Royal Orchard Boulevard	2%	600
High Tech Road	3%	1,430

Note: Based on Turning Movement Counts (TMC) provided by the City of Toronto and York Region and adjusted based on 2006 Statistics Canada growth factors. Heavy vehicles in York Region, north of Steeles Avenue, do not include bus movement counts.

**Pedestrian and Cycling Demand**

Although cyclists currently operate in the curb HOV lanes, particularly south of Steeles Avenue, bicycle traffic on Yonge Street is very limited.

Pedestrian activity varies considerably along the Yonge Street corridor and is generally a function of adjacent land use. There tends to be higher pedestrian activity south of Steeles Avenue to Finch Avenue due to higher densities and existing mixed uses. Intersections along Yonge street that experience moderate to high levels of pedestrian activity are generally influenced by factors such as proximity to offices, commercial uses (such as Centerpoint Mall at Steeles Avenue), and high rise residential buildings.

Exhibit 3-19 provides a summary of annual average daily pedestrian volumes from Finch Avenue north to High Tech Road on the Yonge Street Corridor during 8-hour peak periods.

**Exhibit 3-19: Summary of High or Active Pedestrian Locations Along the Yonge Street Corridor**

Intersections on Yonge Street	Annual Average Weekday Peak Period Travel (8-Hour)				Annual Average Daily Pedestrian Volumes (8-hour peak period)
	NB	EB	SB	WB	
Finch Avenue	1,030	2,700	790	1,200	5,720
Cummer Avenue/Drewry Avenue	160	400	220	280	1,060
Steeles Avenue	1,250	920	7,860	1,570	11,600
Clark Avenue	380	400	50	240	1,070
Royal Orchard Boulevard	80	130	40	n/a	250
High Tech Road	160	100	50	80	380

Note: Based on Turning Movement Counts (TMC) provided by the City of Toronto and York Region and adjusted based on 2006 Statistics Canada growth factors.

**3.4.2.4 Neighbourhood Traffic Concerns**

Based on field investigations and through discussions with area municipal staff, a number of roadways and neighbourhoods were identified as having existing neighbourhood traffic concerns. A summary of some of the primary locations/neighbourhoods are discussed in this section.

**South Richvale Neighbourhood:** The South Richvale Neighbourhood is bounded by Highway 7, East Don River, Carrville Road and Yonge Street. Traffic speed and volume concerns are generally associated with Garden Avenue, Roosevelt Drive, Spruce Avenue, Oak Avenue and Edgar Avenue. As the East Don River precludes east-west travel from Yonge Street to Bathurst Street, the traffic concerns on Garden Avenue and Roosevelt Drive are generally associated with traffic generated by the neighbourhood, schools and community facilities.

The volume and speed concerns on the neighbourhood roadways in the northern portion of the South Richvale Neighbourhood are generally a result of congestion at the Yonge Street/Carrville Road/16<sup>th</sup> Avenue intersection.

During the weekday and weekend peak hours the Yonge Street/Carrville Road/16<sup>th</sup> Avenue intersection operates at capacity. As a result of these congested conditions, motorists choose to use the neighbourhood streets to circumvent the Carrville Road/16<sup>th</sup> Avenue intersection.

**Langstaff / Longbridge:** During consultation with the property owners in the vicinity of the Langstaff/Longbridge station concerns regarding traffic impacts on Yonge Street as a result of the commuter parking lot and PPUDO were expressed. Residents on the west side of Yonge Street are concerned that cars will use the local residential streets to pick-

up and drop-off passengers resulting in additional traffic within the community. Holy Cross Cemetery on the east side of Yonge Street are concerned that vehicles will use their entrance road as a more convenient location to wait for transit passengers than turning into the PPUDO on the west side of Yonge Street.

**Grandview Avenue Neighbourhood:** The Grandview Avenue Neighbourhood includes the areas bounded by Doncaster Avenue, Henderson Avenue, Steeles Avenue and Yonge Street. Under existing conditions, traffic diverts to these local roadways during the peak hours to avoid congestion along Steeles Avenue, specifically the Steeles Avenue/Yonge Street intersection. Motorists attempting to negotiate a southbound left turn at the Steeles Avenue intersection may use Highland Park Boulevard, Woodward Avenue and Grandview Avenue to gain access to the southbound left at the Steeles/Willowdale or Steeles/Henderson intersections.

**City of Toronto:** During the City of Toronto's Class Environmental Assessment Study for Surface Transit Improvements on Yonge Street between Finch Avenue and Steeles Avenue, the neighbourhoods immediately east and west of Yonge Street within the study area identified concerns with current congestion levels in the Yonge corridor and the effect of traffic infiltration on to local streets. Current measures to reduce traffic infiltration through these neighbourhoods include turning restrictions at access points from Steeles Avenue, however, these are perceived by residents to be insufficient. There are concerns that even small to moderate changes on arterial and collector roadways may spill over into much more significant changes on local streets immediately adjacent to Yonge Street. There are also concerns that the changes may also exacerbate current traffic infiltration problems caused by existing congestion on Yonge Street, and by additional constraints to traffic entering the Yonge street corridor through the Yonge/Steeles intersection.

### 3.5 Utilities

#### 3.5.1 Services and Utilities

The major utilities located in the vicinity of the Yonge Street alignment have been identified through direct contact with the respective companies or providers. These utilities are:

- PowerStream Inc. (formerly Markham Hydro, Vaughan Hydro, and Richmond Hill Hydro);
- Toronto Hydro
- Hydro One
- Enbridge Pipelines Inc.;
- Enbridge Gas Distribution Inc.;
- Imperial Oil;
- Bell Canada;
- Rogers Cable;
- Futureway Communications Inc.; and

- Allstream Corporation (formerly AT&T Canada); and
- Municipal storm sewers, watermains and sanitary sewers.

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.

### **3.5.1.1 PowerStream Inc.**

Along Yonge Street an extensive network of hydro service is provided by PowerStream Inc. PowerStream operates the following within the York Region portion of the study corridor:

- Aerial facilities along the west side of Yonge Street from Steeles Avenue to Longbridge Road, just south of Highway 407.
- Both aerial and buried facilities along the east side of Yonge Street from Steeles Avenue to Langstaff Road, just south of Highway 407.
- Both aerial and buried facilities along Yonge Street from Highway 407 to Gamble Road/19th Avenue.

### **3.5.1.2 Hydro One**

Hydro One operates transmission lines running in an east-west direction in two locations across the study area.

In the City of Toronto, the Richview-Cherrywood Hydro Corridor runs 350 m to 450 m north of Finch Avenue and approximately 150 m south of the end of the existing subway. It has three 230 kV tower lines. Toronto Hydro also has a low voltage transmission line in this corridor. The corridor right-of-way is approximately 100 m and is owned by Hydro One with some easements and licenses to gas and oil pipelines. In the vicinity of Yonge Street, there are several licenses and leases to the TTC for commuter parking lots.

Several pipelines are located within the Hydro One Richview-Cherrywood Corridor right-of-way, including:

- Interprovincial Pipe Line operates a 30" diameter oil pipeline within a 10' easement;
- Sarnia Products Pipeline has a 10" diameter pipeline;
- Sun-Canadian Pipe Line operates 8" and 12" diameter, high-pressure oil pipelines; and
- Trans-Northern Pipelines operates a 10" diameter pipeline within a 20' to 30' easement.

At Highway 407, Hydro One has three tower transmission lines (500 kV, 500 kV, and 230 kV) that run adjacent to Highway 407. At Yonge Street, the transmission lines cross from the southwest quadrant of the Highway 407 / Yonge Street interchange to the northeast quadrant.

### **3.5.1.3 Watermains**

The City of Toronto operates two watermains within the Yonge Street right-of-way, from Cummer Avenue north to Steeles Avenue and from Finch Avenue north to Bishop Avenue. There is only one watermain on the west side of Yonge Street from Bishop Avenue to Cummer Avenue. In addition, the City of Toronto operates a watermain that crosses Yonge Street at Arnold Avenue/Elgin Street in Thornhill.

York Region operates two major watermains within the Yonge Street project limits. These are:

- From Langstaff Road to Major Mackenzie Drive, a watermain travels east-west along the north side of Langstaff Road, turns north at Ruggles Avenue to cross Highway 407 and Highway 7 to meet Yonge Street. The watermain then travels north along the east side of Yonge Street, crosses over to the west side at 16<sup>th</sup> Avenue/Carrville Road and continues north to join the Major Mackenzie watermain.
- Watermain that crosses Yonge Street at Highway 7.

### **3.5.1.4 Sewers – Storm and Sanitary**

The City of Toronto has two storm sewers from Steeles Avenue south to Madawaska Avenue within the Yonge Street right-of-way, and from Madawaska Avenue to Finch Station (one sewer in the centre and another on the east side). Between Finch Station to just south of Finch Avenue a storm sewer runs on the west side of the corridor.

The City of Toronto has sanitary sewers which run approximately 40 m east of Yonge Street from Steeles Avenue south to Centre Avenue. Along Yonge Street, a sanitary sewer runs on the west side of Yonge Street from Madawaska Avenue to Finch Station. From Centre Avenue to Wedgewood Drive and from Cummer Avenue to Finch Station there are two sewers running on both sides of Yonge Street. On the east side of Yonge Street there is a sanitary sewer from Bishop Avenue south to Finch Avenue.

There are several sanitary sewers ranging in diameter from 250 mm to 600 mm located under arterial roads. Of significance is the 1.8 m diameter York-Durham Trunk sewer which runs under Steeles Avenue at an average depth of 10 m to 12 m along the northern half of the road, from Keele Street to east of Yonge Street.

York Region operates three major sanitary sewers within the Yonge Street corridor. These sanitary sewers cross Yonge Street at:

- Steeles Avenue;
- North of the Little Don River; and
- Highway 7.

The sanitary sewer at Highway 7 also crosses beneath Highway 407 and runs parallel to Langstaff Road south of Highway 407.

### **3.5.1.5 Enbridge Pipelines Inc. and Enbridge Gas Distribution Inc.**

Enbridge Pipelines owns and operates a 760 mm diameter crude oil pipeline on the south edge of the hydro corridor, approximately 15 m north of Hendon Avenue. The existing subway tunnels cross underneath this pipeline. The pipeline is approximately 150 metres south of the north end of the existing subway tunnels and will not be impacted by the Transit Project as currently configured.

Enbridge Gas Distribution has several pipelines along the Yonge Street corridor. From Steeles Avenue to Finch Avenue these include:

- A 12” high pressure steel pipe runs east-west along the north side of Steeles Avenue at Yonge Street, approximately 4 m outside the property line.
- The section of Yonge Street from Cummer Avenue to Steeles Avenue is served by a 6” intermediate pressure steel pipe that changes to a 4” intermediate pressure steel or plastic pipe commencing at the intersection of Cummer Avenue and Yonge Street. This gasmain runs less than 1.5 m from the curb on the Yonge street northbound lanes and branches off to several adjacent streets in various sizes (1 ¼”, 2”, and 4”).
- From south of Finch Avenue a 6” intermediate pressure steel pipe serves a section of Yonge Street from Finch Avenue to south of Cummer Avenue. From Cummer Ave north to Bishop Avenue, a 12” intermediate pressure steel pipe runs approximately 1 m from the curb on the Yonge Street northbound lanes.
- Between Bishop Avenue and Finch Avenue the same 6” intermediate pressure steel pipe runs approximately 1.2 m from the curb on the Yonge street southbound lanes and splits east and west with 2” intermediate pressure steel and plastic pipes on Bishop Avenue.
- There are 4” intermediate pressure steel and plastic pipes that run east-west on the westbound and eastbound lanes of Finch Avenue at Yonge Street. These gas lines are part of the previously mentioned 6” intermediate pressure steel pipe that run south of Finch Avenue.
- A number of gas lines will be abandoned at an unspecified date, east of Yonge Street between Steeles Avenue and Madawaska Street.

Enbridge Gas Distribution pipelines from Highway 407 to Steeles Avenue:

- A 26” high pressure steel gas distribution line runs east-west within the CN Railway right of way. In the same corridor another 16” high pressure steel pipe running from the west splits into a 12” intermediate pressure steel pipe that runs north on Yonge Street and a 12” high pressure steel pipe that runs south on Yonge Street. In general, these two gas mains run on the northbound lanes of Yonge Street.
- The 12” intermediate pressure steel pipe that runs south of the CN Railway serves several adjacent side streets with 2” and 4” high pressure steel pipes on both sides of Yonge Street and splits into two 12” high pressure steel pipes running east-west on Steeles Avenue.

### **3.5.1.6 Imperial Oil**

Imperial Oil operates an east-west high-pressure pipeline in the study area. The pipeline crosses beneath Yonge Street just north of Bishop/Hendon Avenue within the Finch Hydro Corridor. The existing subway tunnels cross underneath this pipeline. The pipeline is approximately 150 metres south of the north end of the existing subway tunnels and will not be impacted by the Transit Project as currently configured.

### **3.5.1.7 Bell Canada/Rogers Cable/Futureway Communications Inc./Allstream Corporation**

In the southern portion of the corridor, Bell Canada has two lines running on the west side of Yonge Street from Steeles Avenue south to Goulding Avenue. Bell Canada also has three lines from just north of Goulding Avenue to Patricia Avenue (two on the west and one on the east side) and from Patricia to Finch Avenue (one on the west and two on the east side).

### **3.5.1.8 Telus Communications Inc.**

Telus Communications Inc. is proposing to install fibre-optic cables throughout the Yonge Street corridor within the study area. The cables are proposed to be located approximately 2 to 2.5 m west of the east curb line, beneath the existing northbound HOV lane.

## 4. ALTERNATIVES CONSIDERED AND FEATURES OF THE RECOMMENDED TRANSIT PROJECT

This chapter highlights the alternatives that were considered (Section 4.1) and the features of the recommended Transit Project (Section 4.2). Implementation methods for the recommended Transit Project are also discussed (Section 4.3).

Section 4.1 is structured to provide an overview of the alternatives considered and the rationale for the preferred alternative. The detailed evaluation of these alternatives is outlined in the technical reports for each of the key components. These technical reports are provided as Appendices to this EPR.

### 4.1 Alternatives

#### 4.1.1 Profile Alternatives – East Don River Crossing

The East Don River is one of the two main branches that form the Don River Watershed: a significant watercourse system and an environmentally-sensitive feature. The river is situated in a valley with wide open embankments on both sides. The Ladies' Golf Club of Toronto is located on the east side of Yonge Street, while the Thornhill Country Club is situated on the west side. Yonge Street currently follows the natural valley terrain and crosses the river with a 14 metre span concrete arch culvert.

The analysis, evaluation and consultation undertaken with respect to the East Don River Crossing alternatives, including the identification of the preferred alternative and proposed construction staging, are detailed in Appendix C, East Don River Crossing. Key information is summarized below.

##### 4.1.1.1 East Don River Crossing Alternatives

Three alternatives were generated for the East Don River Crossing. These were:

- Bridge Alternative – an above ground alternative comprised of an elevated structure for both the subway and the roadway with the roadway running on top. The subway crosses the river and continues underground.
- Embankment Alternative – an above ground alternative comprised of an embankment structure which contains the subway crossing over the existing concrete arch culvert with the roadway running along the top of the embankment. The subway crosses the river and continues underground north and south of the river valley.
- Tunnel Alternative – a below ground alternative which tunnels under the river, leaving Yonge Street, the concrete arch culvert and the valley undisturbed.

##### 4.1.1.2 Assessment and Evaluation of East Don River Crossing Alternatives

The study team undertook a detailed technical assessment of the three alternatives based on assessment factors, indicators and measures identified for the categories of Social-Economic Considerations, Transportation Opportunities, Technical / Constructability, Cultural Environment and Natural Environment. The analysis is included in Appendix C.

#### **4.1.1.3 Rationale for the Preferred East Don River Crossing Alternative**

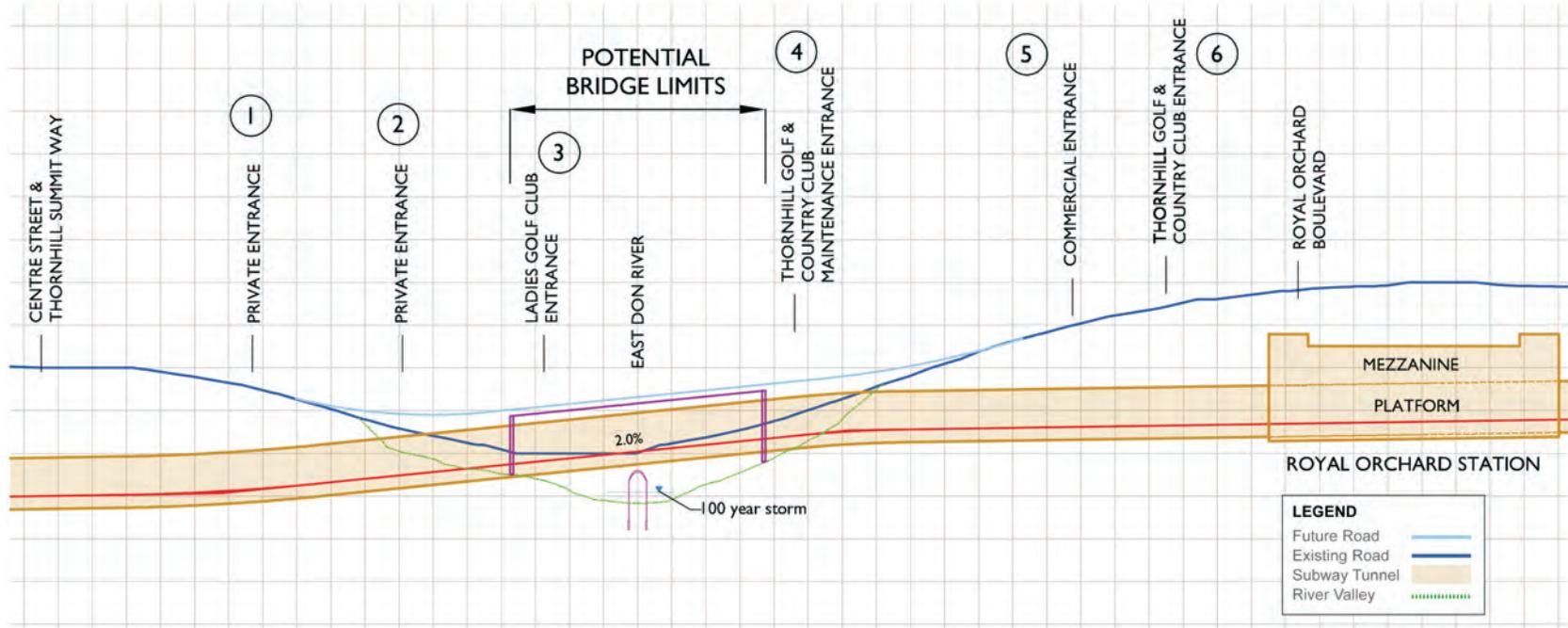
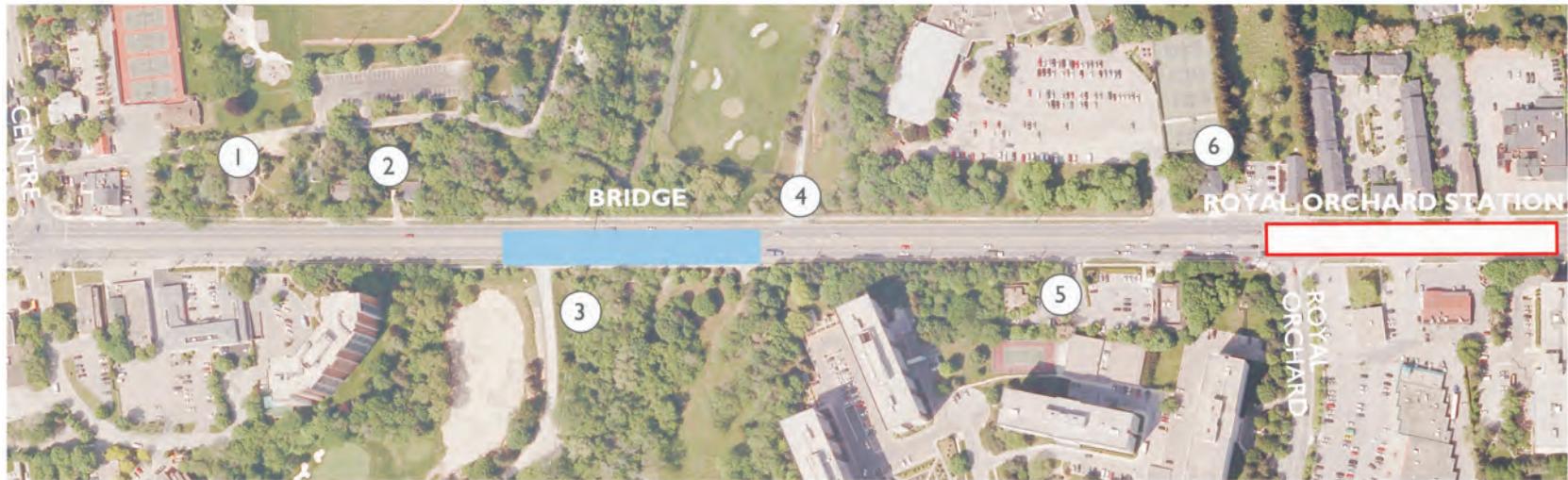
Based on the assessment and evaluation detailed in Appendix C, as well as public input received through consultation, the recommended crossing is a bridge over the East Don River. Exhibit 4-1 illustrates the profile of the river crossing. The advantages of the bridge alternative over the embankment and tunnel alternatives include:

- Shallower subway stations and emergency exit buildings on either side of the East Don River. This allows for better transit and user integration during operations and easier and quicker tunnel evacuations in the event of an emergency.
- Improvement of the Yonge Street road vertical alignment, reducing the gradients which cause pedestrian and traffic hazards in winter and affect bus operations.
- Removal of existing culvert structures within the East Don River. This creates opportunities to naturalize the river valley, re-establish wildlife corridors and improve east / west access through the valley for recreational purposes.
- Improved vertical alignment of the subway with associated benefits to subway operations.
- Reduced effect on groundwater during and post construction as well as a reduction in groundwater pumping requirements from subway tunnels that are at shallower depth.

The vertical profile of the bridge indicated in Exhibit 4-1 will be refined as design progresses.

Through consultation, it has been determined that the characteristics of the bridge should reflect the heritage nature of the surrounding area, address noise concerns and preserve access to the local golf clubs and other entrances along Yonge Street.

The specific design and mitigation measures will be refined as design progresses and will continue to be subject to public, municipal and stakeholder review and consultation going forward.



#### 4.1.2 Alignments – Richmond Hill Centre

The Richmond Hill Centre / Langstaff Gateway area is identified in the Province of Ontario's *Places to Grow Plan (2008)* as one of four Regional Centres in York Region, and is intended to provide a focus for residential, commercial, and employment growth. The Richmond Hill Centre (RHC) is subject to a number of constraints. These include:

- Operational constraints of the Yonge subway system, such as tunnel alignment, track geometry and connectivity to station/bus facilities of other transit modes;
- Foundations of the Highway 407/Highway 7/Yonge Street interchange;
- The Highway 407 ETR-MTO Legal Agreement which excludes the potential for at-grade activity within their right-of-way;
- The Hydro One corridor which includes several major transmission towers with deep foundations;
- The municipal utility corridor;
- Adjacent land uses, including environmentally sensitive areas (wood lots, protected trees and the Holy Cross Cemetery);
- Storm water collectors and management ponds; and
- The CN Rail corridor.

A primary objective is to promote transit integration by locating the proposed subway station as close as possible to the future bus terminal(s), future Highway 407 transit corridor, GO Transit and other transit modes. This will facilitate the ease of transfer between modes as well as pedestrian/passenger connectivity with planned transit-oriented developments in this important regional growth centre and intermodal transit hub.

Another objective is to be consistent with the Richmond Hill master planning study for the RHC and not preclude future northerly extensions of the subway in the Yonge Street corridor if it is ever required.

Development of the RHC Subway Station Alignment component, including the alternative generation and evaluation process, the rationale for the Preferred Alternative, and recommended issues for consideration in subsequent design stages, is detailed in Appendix D, Richmond Hill Centre Alignments. Key information is summarized below.

##### 4.1.2.1 Richmond Hill Alignment Alternatives

Two primary route alternatives were identified, as shown in Exhibit 4-2.

**Yonge Street Route Alternative:** The Yonge Street route (shown in yellow) continues north on Yonge Street, crossing under Highway 407 / Highway 7. This places the Subway Station on Yonge Street adjacent to the existing large theatre/restaurant block.

**Langstaff Route Alternative:** The Langstaff route (shown in blue) swings easterly from the Yonge Street right-of-way on the south side of Highway 407, travels under the Langstaff lands and crosses under Highway 407 / Highway 7 to a central location in the RHC lands. A range of horizontal alternatives were explored to place the Subway Station

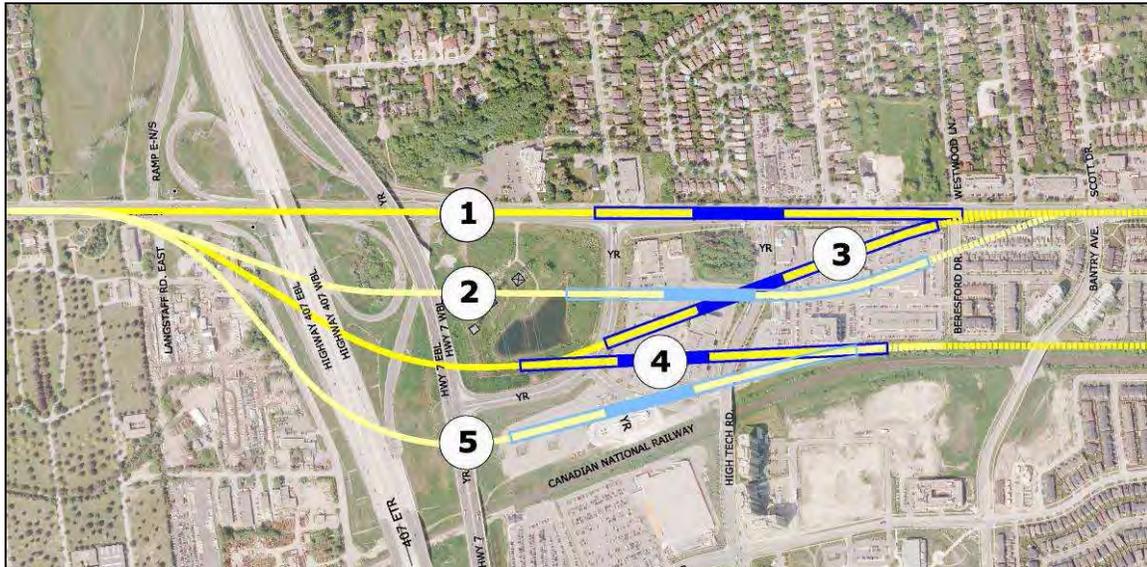
centrally in the RHC lands within proximity of the planned RHC bus terminal, Langstaff GO Station, and the future Highway 407 Transitway.

### Exhibit 4-2: Two Primary Route Alternatives



After giving due consideration to constraints, in particular the constraint of the Holy Cross Catholic Cemetery in the south as well as opportunities for future extension of the Yonge Subway beyond the RHC site to the north, five alignment alternatives as shown in Exhibit 4-3, were selected by the technical team for further assessment. The alignment alternatives are detailed in Appendix D and summarized below.

### Exhibit 4-3: Five Alignment Alternatives



### **Alternative 1 – Yonge Street Only**

This alternative was considered with the objective of utilizing the existing Yonge Street right-of-way to the greatest extent possible. The subway alignment would continue north on Yonge Street, crossing under Highway 407 / Highway 7, placing the subway station on Yonge Street south of High Tech Road, adjacent to the protected woodlot owned by the Town of Richmond Hill.

### **Alternative 2 – Yonge \ Central RHC \ Bantry Ave Connection**

This alternative was considered with the objective of locating the subway station centrally on the RHC site and returning the alignment to Yonge Street north of the RHC, while maximizing the opportunity for an alignment parallel to Yonge Street to best accommodate the architectural arrangement of future transit-oriented development.

### **Alternative 3 – Yonge \ Central RHC \ Beresford Drive Connection**

This alternative was considered with the objective of locating the subway station centrally on the RHC site and returning the alignment to Yonge Street north of the RHC while minimizing impacts on residential properties on the north side of Beresford Drive.

### **Alternative 4 – Yonge \ Central RHC \ CN Bala Richmond Hill GO Line**

This alternative was considered with the objective of locating the RHC subway station centrally on the RHC site and utilizing the existing transit corridor on the west side of the CN Bala Richmond Hill GO Line before reconnecting to Yonge Street north of the RHC.

### **Alternative 5 – Yonge \ East RHC \ CN Bala Richmond Hill GO Line**

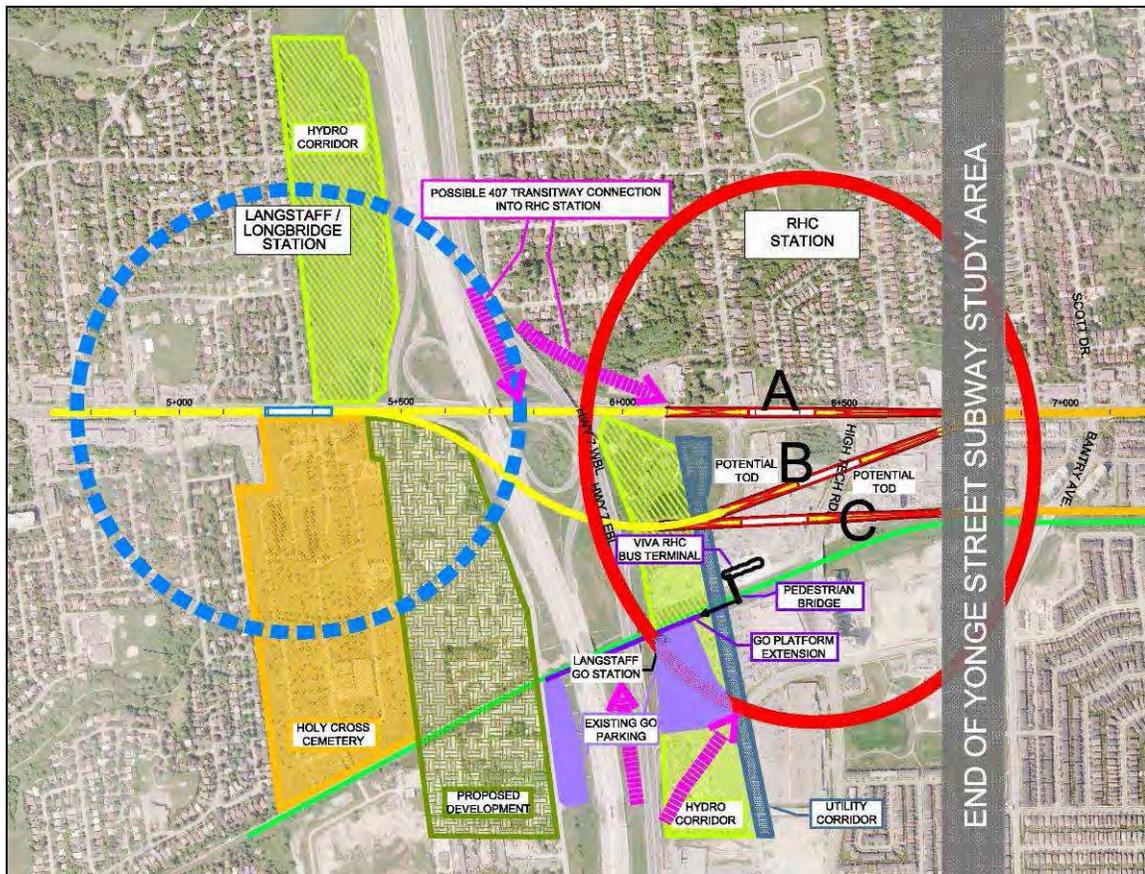
This alternative was considered with the objective of locating the subway station as close as possible to the existing Viva bus terminal and GO Train facilities (i.e. as far east as practicable on the RHC site but west of the CN railway).

#### ***4.1.2.2 Assessment and Evaluation of Richmond Hill Centre Alternatives (Long-List)***

The assessment and evaluation of alternatives was undertaken in two stages. The first stage comprised of a higher level assessment and screening of the five alternatives based on a set of evaluation criteria established by the Technical Team. Evaluation was undertaken in consultation with local municipalities, major stakeholders, agencies and the public.

Based on that assessment, Alternative 1 (Yonge Street Route) and Alternatives 3 and 4 (Langstaff Route) were carried forward for further evaluation (see Appendix D for details). These three alternatives were developed to a higher level of detail and evolved into Alternatives A, B and C, as shown in Exhibit 4-4.

### Exhibit 4-4: Richmond Hill Centre Alignment Alternatives A, B, C



- Alternative A – Yonge Street Only
- Alternative B – Yonge \ Central RHC \ Beresford Drive Connection
- Alternative C – Yonge \ Central RHC \ CN Bala Richmond Hill GO Line

#### Alternative 2 – Yonge \ Central RHC \ Bantary Ave Connection

Alternative 2 was removed from further consideration for the following primary reasons:

- Positioning of the cross-over track and subway station (which require cut-and-cover construction) to minimize impacts to the stormwater management pond, the Hydro One transmission towers and residential properties to the north, resulted in an alignment which could not accommodate the TTC Standard Design Speed (80kph).
- Tunnel construction beneath the foundations of a Hydro One transmission tower and the foundations of Highway 407 / Highway 7 bridges would be problematic and unacceptable to those stakeholders.

#### Alternative 5 – Yonge \ East RHC \ CN Bala Richmond Hill GO Line

Alternative 5 was removed from further consideration for the following primary reasons:

- Given the southern constraint of the Holy Cross Cemetery and the objective of positioning the subway station adjacent to the existing Viva bus terminal and GO

Train facilities, it was not possible to create a horizontal alignment which avoided the Holy Cross Cemetery and satisfied the minimum curve radii requirements associated with the TTC Standard Design Speed (80kph).

#### *Highway 407 / Highway 7 Corridor Subway Station Alternatives*

Alignment alternatives that would accommodate a RHC subway station under or near the Highway 407 / Highway 7 corridor, between the Langstaff lands and the RHC lands, were generated and assessed by the technical team early during development of alignment alternatives and eliminated prior to selection of Alternatives 1 – 5 for further assessment. Subsequent to the initial screening the Town of Markham requested a meeting to discuss such alternatives and five alternatives were presented for discussion at a workshop with stakeholders on September 22, 2008. The alternatives and the rationale for removing them from further consideration are detailed in Appendix D.

As a result of screening out Options B1, B2, C1, C2 and D, the remaining evaluation focused on selecting the preferred alignment from among the previously short-listed Options A, B and C.

#### **4.1.2.3 Assessment and Evaluation of Richmond Hill Centre Alternatives (Short-List)**

Alternatives A, B and C were subject to a detailed assessment based on the factors, indicators and measures identified for the categories of Social-Economic Considerations, Transportation Opportunities, Technical / Constructability, Cultural Environment and Natural Environment. The results of the assessment are detailed in Appendix D.

#### **4.1.2.4 Rationale for the Preferred Richmond Hill Centre Alignment Alternative**

As detailed in Appendix D, key constraints that were considered in determining the preferred alignment alternative included:

- Operational constraints of the subway system (e.g. tunnel alignment and track geometry), the Hydro One corridor (including several major transmission towers with deep foundations), adjacent land uses and storm water management ponds;
- Close integration with the future bus terminal(s), the future Highway 407 Transitway, GO Transit, and other transit modes in order to facilitate ease of transfer between modes and pedestrian and passenger connectivity with planned transit-oriented developments;
- Consistency with the Richmond Hill master planning study for the Richmond Hill Centre;
- Facilitate future northerly extensions of the subway in the Yonge Street corridor.

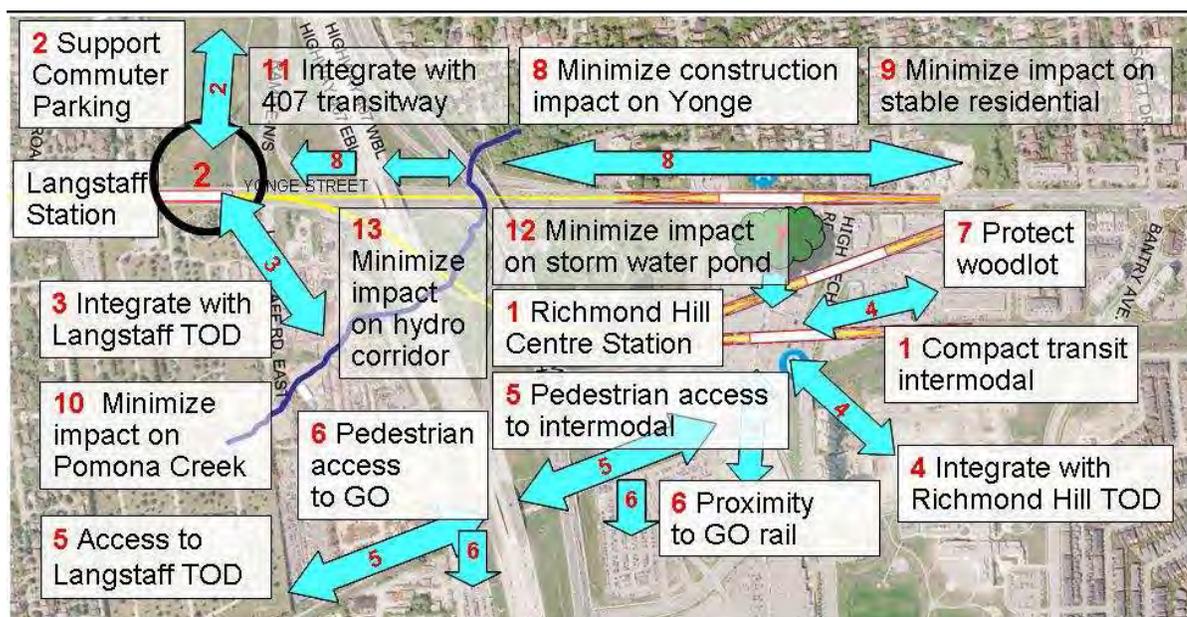
Based on public input and the assessment and evaluation undertaken, it was concluded that Alternative C was preferred for the following reasons:

- Provides the most compact integrated inter-modal transportation hub connecting the subway, the bus terminal (YRT, Viva, GO Bus), the GO Train and the 407 Transitway and therefore achieves the shortest walking distances between all transit modes.

- Provides for larger land parcels with frontage on Yonge Street for redevelopment than Alternative B.
- Provides better opportunities for transit supportive development north and south and west of the RHC station. Optimizes development potential both east and west of the CN rail corridor as the station catchment area extends to the east side of the corridor.
- Minimizes construction impacts to Yonge Street and the adjacent stable residential low-density neighbourhood, similar to Alternative B
- Farthest away from the protected woodlot at Yonge Street and High Tech Road with minimal impact.
- Does not preclude future extension along Yonge St. right-of-way.

The advantages of the preferred alternative are shown in Exhibit 4-5.

**Exhibit 4-5: Richmond Hill Centre – Advantages of Alternative C**



### 4.1.3 Station Location Analysis

#### 4.1.3.1 Potential Station Locations

Using 500 metres as the practical walking distance to a subway station, the minimum spacing between stations should be approximately 1 km. The most recent TTC subway stations, found on the Sheppard subway line, are spaced approximately 1 km to 2 km apart. Average station spacing on the Yonge-University-Spadina subway line varies from 1.3 km to 1.7 km north of St. Clair Avenue, while average station spacing on the proposed Spadina subway extension to the Vaughan Corporate Centre (VCC) is 1.4 km.

A minimum density threshold of 100 people and jobs per hectare was used to determine whether a potential station location can be considered viable and justified. The threshold

calls for a minimum average of 100 people per hectare based on population and employment within 500 metres of the station. This minimum criterion was initially developed by the TTC as part of the Rapid Transit Expansion Study (RTES) report in 2001. From the TTC's perspective, densities of over 100 jobs and residents per hectare are required to support a higher-order transit service, considering both the existing density and the increased density that is possible in the future.

The technical study informing this EPR examined a number of station location alternatives and determined that a six station alternative would be preferred based on the guiding principle of 1 km station spacing, as well as taking into account the local land use context and potential transportation opportunities. Seven station location options were identified with a choice to be made as part of the TPAP between Centre Street and Royal Orchard, in the Thornhill heritage area. Detailed descriptions of the potential station locations are provided in Appendix B, Station Location Analysis. Key points are summarized below.

#### 4.1.3.1.1 *Cummer Avenue / Drewry Avenue*

This potential station would be located at the intersection of Yonge Street and Cummer / Drewry Avenue in the City of Toronto, approximately 800 metres north of the current terminus at Finch Station. The station's zone of influence covers an area bounded approximately by Hilda Avenue to the west, Willowdale Avenue to the east, Finch Hydro Corridor to the south, and Centre Avenue to the north.

Key considerations for the site include:

- The station would be situated in a built-up urban area.
- Current population and employment density within the catchment area is approximately 84 people per hectare<sup>1</sup>.
- There are several high-rise apartment blocks located within a two to three-minute walk from the Yonge Street / Cummer Avenue / Drewry Avenue intersection, with low density commercial uses fronting both sides of Yonge Street and low density residential uses beyond the frontage. Some of the apartment blocks have ground floor commercial uses.
- Newtonbrook Plaza, the largest commercial site in the vicinity, is located in the southeast quadrant of the intersection and within the North York Centre Secondary Plan area. This site has potential to redevelop.
- It is anticipated that the City of Toronto will initiate a Yonge Corridor Planning Study from Cummer/Drewry Avenue(s) north to Steeles Avenue in the near future to examine possibilities and confirm the extent of redevelopment potential in the area. From Cummer/Drewry Avenue(s) south, the policies of the North York Centre Secondary Plan apply.
- 5926 Yonge Street at Drewry Avenue is a former Newtonbrook Store; it is currently a coffee shop outlet. The building is listed on the City of Toronto Heritage Properties Inventory.

<sup>1</sup> Existing population and employment density in Toronto provided by the City of Toronto City Planning

- It is expected that a large majority of future passengers for a station at Cummer / Drewry Avenues will result from transfers from connecting east-west bus routes on Cummer and Drewry Avenues.

#### 4.1.3.1.2 *Steeles Avenue*

A station at Steeles Avenue would be situated at the cross roads of the Town of Markham, the City of Vaughan, and the City of Toronto, approximately 1.2 km north of Cummer/Drewry Avenues. It is likely that the station and the associated surface facilities could be located in all three municipalities. The station's zone of influence covers an area bounded approximately by Hilda Avenue to the west, Willowdale Avenue to the east, Moore Park / Madawaska Avenues to the south, and the CN York Subdivision to the north.

Key considerations for the site include:

- The station would be situated in a built-up urban area.
- In the City of Toronto, land use is comprised of low density commercial uses fronting both sides of Yonge Street. Beyond the frontage, land use is predominantly low density residential.
- Centerpoint Mall in the southwest quadrant of the Yonge Street / Steeles Avenue intersection is a major shopping destination with approximately 100 stores and services covering 625,000 square feet of retail space.
- It is anticipated that the City of Toronto will initiate a Yonge Corridor Planning Study in the near future from Cummer/Drewry Avenue(s) north to Steeles Avenue.
- In the Town of Markham, land use is predominantly residential with low density commercial activities fronting Yonge Street. The northeast corner of the Yonge Street / Steeles Avenue features a major Imperial Oil gas station. A mid-rise apartment building is located adjacent to the gas station fronting Steeles Avenue East.
- In the City of Vaughan, land use is dominated by single-storey commercial plazas and car dealerships along the north side of Steeles Avenue West and the west side of Yonge Street. Beyond the frontages, land use is predominantly residential.
- High redevelopment potential within the station's zone of influence.
- There are no significant cultural heritage features in the area.
- It is expected that a large majority of future passengers for a station at Steeles Avenue will result from transfers from east-west transit routes.

An inter-regional bus terminal is also proposed at the Steeles Avenue site. Preliminary requirements for the bus terminal at Steeles Avenue include 25 bus bays

for Viva/YRT and TTC vehicles. Bus bay requirements at this location have been discussed with the service providers and have been sized to meet existing and future needs. The bus terminal layout has also considered future rapid transit services along Steeles Avenue.

#### 4.1.3.1.3 *Clark Avenue*

This potential station would be situated on the municipal boundary between the City of Vaughan and the Town of Markham. The station would be located at the intersection of Yonge Street and Clark Avenue, approximately one kilometre north of Steeles Avenue. The station's zone of influence would cover an area bounded approximately by Springfield Way to the east, Willowdale Boulevard to the west, CN York Subdivision to the south, and Arnold Avenue / Elgin Street to the north.

Key considerations for the site include:

- The station would be situated in a built-up urban area.
- Current population and employment density within the catchment area is approximately 110 people per hectare<sup>3</sup>. Current land use is comprised of mid-rise condominium blocks, commercial plaza, and low density residential on the Markham side of Yonge Street; high rise condominium, townhouses, commercial plaza, and low density residential on the Vaughan side. A gas station is located at the northeast corner of the intersection. Thornhill Public Secondary School is an identified major trip generator within the catchment area.
- There is moderate redevelopment potential within the station's zone of influence.
- There are no significant cultural heritage features within the area.
- Several east-west transit routes, provided by YRT and Brampton Transit, could provide a feeder connection to a subway station at Clark Avenue.

#### 4.1.3.1.4 *Centre Street*

This potential station would be situated on the municipal boundary between the City of Vaughan and the Town of Markham. The station would be located at the intersection of Yonge Street and Centre Street, approximately one kilometre north of Clark Avenue. The station's zone of influence would cover an area bounded approximately by Elmbank Road to the west, Sumner Lane to the east, Arnold Avenue / Elgin Street to the south, and the East Don River to the north. The station would be situated entirely within the historic Thornhill community.

Key considerations for the site include:

- The station would be situated in a built-up urban area south of the East Don River Valley and beyond the TRCA Regulatory Limits for the East Don River. There are no significant natural environment features in the vicinity of the potential station.

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<sup>3</sup> Existing population and employment figures in York Region are based on the 2007 Municipal Property Assessment Corporation (MPAC) and the 2007 York Region Employment Survey data, respectively.

- Current population and employment density within the catchment area is approximately 50 people per hectare<sup>4</sup>. Current land use is comprised of low density commercial activities at four corners of the Yonge Street / Centre Street intersection, and along the Yonge Street frontage south of Centre Street. Beyond the Yonge Street frontage, land use is predominantly low density residential mixed with institutional uses. There are no significant trip generators in the area.
- There is low redevelopment potential within the station's zone of influence given the heritage and historic natures of the Thornhill community. The only re-developable parcels in the area are not expected to generate significant levels of activities.
- The station would be situated within Thornhill Markham and Thornhill Vaughan Heritage Conservation Districts. There are several heritage buildings fronting both sides of Yonge Street.
- Several east-west transit connections operate in the potential station area.

#### 4.1.3.1.5 *Royal Orchard Boulevard*

This station would be situated on the municipal boundary between the City of Vaughan and the Town of Markham. The station would be located at the intersection of Yonge Street and Royal Orchard Boulevard, approximately 800 metres north of Centre Street. The station's zone of influence would cover an area bounded approximately by Riverside Boulevard to the west, Silver Aspen Drive to the east, the East Don River to the south, and Uplands Avenue to the north.

Key considerations for the site include:

- The station would be situated in a built-up urban area.
- Current population and employment density within the catchment area is approximately 80 people per hectare<sup>5</sup>. In the Town of Markham, current land use is comprised of high-rise condominium towers and low density commercial activities surrounded by low density residential uses. In the City of Vaughan, land use is predominantly low density residential with a few institutional and recreational uses. Royal Orchard Shopping Centre, at the northeast corner of Yonge Street and Royal Orchard Boulevard, is a major trip generator.
- There is low to moderate redevelopment potential on the Markham side of Yonge Street within the station's zone of influence. Redevelopment potential on the Vaughan side of Yonge Street is minimal given that the lands are within the boundaries of Thornhill Vaughan Heritage Conservation District.
- The station would be situated on the edge of Thornhill Vaughan Heritage Conservation District. There are a number of heritage buildings and one cemetery on the Vaughan side of Yonge Street between the East Don River and Thornhill Avenue.

<sup>4</sup> Existing population and employment figures in York Region are based on the 2007 Municipal Property Assessment Corporation (MPAC) and the 2007 York Region Employment Survey data, respectively.

<sup>5</sup> Existing population and employment figures in York Region are based on the 2007 Municipal Property Assessment Corporation (MPAC) and the 2007 York Region Employment Survey data, respectively.

- An east-west transit connection that operates in the potential station area is YRT Route 3 Thornhill-York University.

Although both Centre and Royal Orchard Stations have been described in this section, they were alternatives to each other, and Centre Station was subsequently screened out.

#### 4.1.3.1.6 Langstaff Road / Longbridge Road<sup>6</sup>

This station would be situated on the municipal boundary between the City of Vaughan and the Town of Markham. The station would be located between Longbridge Road and Langstaff Road, approximately one kilometre north of Royal Orchard Boulevard. The station's zone of influence would cover an area bounded approximately by Riverside Boulevard to the west, Ruggles Avenue to the east, Uplands Avenue to the south, and Highway 407 to the north. This station would be adjacent to the *Richmond Hill / Langstaff Gateway Urban Growth Centre* which has been designated as an *Anchor Hub* by Metrolinx.

Key considerations for the site include:

- The station would be situated in a built-up urban area.
- Current population and employment density within the catchment area is approximately 30 people per hectare<sup>7</sup>. In the Town of Markham, current land use is dominated by light industrial activities within the Langstaff Gateway lands, Holy Cross Catholic Cemetery fronting the east side of Yonge Street, and commercial / residential uses south of the cemetery. In the City of Vaughan, land use is predominantly low density residential with commercial activities fronting the west side of Yonge Street. A significant portion of the station's potential catchment area is occupied by Highway 407 and the Hydro One high voltage transmission facilities. There are no existing major trip generators in the area.
- Within the designated urban growth centre area, there is medium to high redevelopment potential.
- There are no local east-west transit services within the area
- Provision for commuter parking due to proximity to Highway 407 and available land under the hydro transmission lines (see operating couplet discussion in next section).

#### 4.1.3.1.7 Richmond Hill Centre (Highway 7)

The Richmond Hill Centre Station would be the proposed terminus of the Yonge Street subway extension. The proposed station, based on the preferred alignment of the Yonge Street subway extension north of the Langstaff / Longbridge Station as discussed in Section 4.1.3.1.6, would be located east of Yonge Street traversing High Tech Road, west

<sup>6</sup> During Study process this station was also referred to as Helen and / or Bunker Station

<sup>7</sup> Existing population and employment figures in York Region are based on the 2007 Municipal Property Assessment Corporation (MPAC) and the 2007 York Region Employment Survey data, respectively.

of the CN rail corridor, and north of Highway 7. A future extension of the subway line north from the Richmond Hill Centre is not precluded.

Key considerations for the site include:

- The station would be situated in an urban area, with no change to natural environment features in the vicinity.
- Current population and employment density within the catchment area is approximately 40 people per hectare<sup>8</sup>. The station would be situated within the Richmond Hill Urban Growth Centre.
- Mainly low-residential development on the west side of Yonge Street, and entertainment / mixed-used development on the east side.
- There is high development and redevelopment potential primarily on the east side of Yonge Street in the immediate vicinity of the site. Opportunities are to be determined by the Richmond Hill Centre Land Use Master Plan and Urban Design Study, being undertaken by the Town of Richmond Hill.
- Provide opportunities for transit supportive development north, south and west of the station. The station should also optimize development potential both east and west of the CN rail corridor as the station catchment area extends to the east side of the rail corridor.
- Provide for a compact, walkable transit hub connecting the subway, the bus terminal (YRT, Viva, GO Bus), the GO Richmond Hill line, and the proposed Highway 407 Transitway.

As detailed in Appendix D, Richmond Hill Centre Alignments, the Langstaff / Longbridge and RHC subway stations are proposed as an operating couplet. Together, both stations deliver the full functions of a multimodal hub and terminal arrangement including:

- Ease of movement for passengers between the various transit modes including: subway, Viva bus rapid transit along Highway 7 and Yonge Street, GO rail services, the future 407 Transitway, and commuter parking;
- Pedestrian access to the subway system from the Richmond Hill / Langstaff Gateway;
- Commuter parking to relocate the majority of parking and transit users now parking at the Finch Station commuter parking lot.

#### **4.1.3.2 Assessment and Evaluation of Potential Station Locations**

As part of the prioritization of various proposed rapid transit initiatives in the 2001 Rapid Transit Expansion Study, the TTC collected empirical data of what created a “successful” subway station. This involved assessing the transit mode splits around each station on the existing TTC subway/SRT system versus the surrounding land use densities. From the TTC’s perspective, development densities of over 100 jobs and residents per hectare

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<sup>8</sup> Existing population and employment figures in York Region are based on the 2007 Municipal Property Assessment Corporation (MPAC) and the 2007 York Region Employment Survey data, respectively.

are required to support a higher order transit service and only when densities exceed 250 jobs / residents per hectare, in combination with physical restrictions on parking availability, is rapid transit successful in consistently attracting mode splits of 40% or more to transit.

A preliminary screening of the potential station locations was carried out prior to the generation and evaluation of detailed station layouts. The preliminary analysis was intended to eliminate options that do not meet the minimum criteria of a successful subway station.

Given that Steeles Station and Richmond Hill Centre Station are considered ‘mandatory’ stations, they were not subject to the screening process.

The key factors used are listed below, and the preliminary screening of the potential station locations is detailed in Appendix B.

- Social-Economic / Land Use
- Transportation
- Technical / Constructability / Cost
- Cultural Environment
- Natural Environment

#### **4.1.3.3 Preferred Station Locations**

Based on the preliminary screening of the potential station locations detailed in Appendix B, the following potential station locations were carried forward.

- Cummer / Drewry
- Clark
- Royal Orchard
- Langstaff / Longbridge

Centre Station was not carried forward primarily due to the following considerations:

- There is low future redevelopment potential within the immediate area due to the constraints of being within the two Heritage Conservation Districts; and
- There is potential for impact to cultural heritage features as the Centre Station would be located within the two Heritage Conservation Districts.

#### **4.1.4 Station Layout Concepts**

As described in Section 4.1.3, and detailed in Appendix B, the following six stations are proposed:

- Cummer/Drewry Avenue
- Steeles Avenue
- Clark Avenue

- Royal Orchard Boulevard
- Langstaff/Longbridge Road
- Richmond Hill Centre

Each of the six stations has unique features. Development of these options is described below with a summary of the features, as described in Appendix E, Station Layout Concepts.

Based on TTC design standards each station consists of station entrances from the surface, subway platforms, a concourse, ventilation shafts, bicycle facilities and are designed to be barrier free.

The following are elements that could be included at a station:

- Taxi Facilities
- Bus Facilities
- Passenger Pick-up and Drop-Off (PPUDO)
- Commuter Parking
- Electrical Substations

The issue of electrical substations is an overall project need considered separately from individual station facilities (see Section 4.2.2.2).

For each of the stations identified, Exhibit 4-6 summarizes the key station elements required.

**Exhibit 4-6: Key Station Elements**

Station	Pedestrian Entrances	Bus Terminal	PPUDO	Commuter Parking	Summary
Cummer / Drewry	Yes	Bus turn around loop	No	No	Line station with minimal surface requirements
Steeles	Yes	Yes	Yes	No	Transit Hub
Clark	Yes	No	No	No	Line station with minimal surface requirements
Royal Orchard	Yes	No	No	No	Line station with minimal surface requirements
Langstaff / Longbridge	Yes	No	Yes	Yes	Commuter Hub
Richmond Hill Centre	Yes	Yes	Yes	No	Transit Hub

Key criteria for locating station features at each of the line stations (Cummer / Drewry, Clark, Royal Orchard and Langstaff / Longbridge) include:

- Ease of bus to subway transfer;
- Impact on existing land use fabric;
- Ease of Integration into Future Development;
- Ease of Integration into Future Development; and
- Land Ownership.

For the two main transportation/transit hubs (Steeles and Richmond Hill Centre), the key project objectives include:

- Provide subway service to the station area;
- Provide improved connections between the subway and York Region Transit (YRT) and TTC buses;
- Support local population and employment growth;
- Minimize adverse environmental / engineering effects; and
- Achieve reasonable capital and operating costs.

Additional criteria to support the above objectives include:

- Potential for riders to walk to local station;
- Convenience for transfers from bus and train operations;
- Convenience for access from other travel modes;
- Maximize redevelopment potential in support of the subway extension;
- Maximize the potential to create a high quality urban/pedestrian environment;
- Potential effects on socio-economic features;
- Potential effects on pedestrian and traffic access / flow;
- Potential effects on the environment;
- Potential impacts on utilities; and
- Minimize the capital costs, costs of property acquisition, operational and maintenance costs.

The layouts of the preferred station locations were evaluated based on the criteria outlined above. The evaluation is based on their ability to minimize impacts to the surrounding environment, while providing future transportation needs as identified.

#### **4.1.4.1 Cummer / Drewry Station**

The Cummer / Drewry Station location provides good transit connections to local routes and a stimulus for future live/work development in the station area. The south end of the

proposed station location for the Cummer/Drewry station box is at the intersection of Cummer Avenue / Drewry Avenue and Yonge Street.

When determining the locations for the terminal entrances at Cummer / Drewry Station many different factors were taken into account. This included:

- The preferred bus loop located on the north side of Drewry Avenue is designed to allow westbound bus services to the station to be short turned at this location.
- The Newtonbrook Shopping Centre, strip malls and apartment buildings on the quadrants of the intersection will be an important source of station ridership. Easy access for passengers should be considered in the placement of entrances.
- The opportunity for future development increases the possibility of integrating a station entrance within the development and makes for a more attractive station entrance.
- High quality bus to subway transfer should be maintained since two bus routes will be passing through this intersection.
- Minimizing large impacts on stable residential lands and high density lands

The analysis and evaluation process is detailed in Appendix E. Key factors leading to the selection of the preferred alternative include:

- The entrance buildings situated at northeast and southwest quadrants of the intersection of Cummer Avenue / Drewry Avenue and Yonge Street are proposed as main entrances for the Cummer / Drewry station. These entrance buildings allow residents and pedestrian easily access to the station from the Newtonbrook Shopping Centre, area strip malls, and apartment buildings from all corners of the intersection.
- Being situated along Cummer Avenue / Drewry Avenue, the entrance building also allows the buses that run along Cummer Avenue / Drewry Avenue to pick up and drop-off passengers directly in front of the entrance buildings.
- The northwest corner of Drewry Avenue and Yonge Street was not considered as a potential entrance location due to the historical stage coach station building at that location.
- An entrance location at north end of the station and on the west side of Yonge Street anticipates future development in the area.

The preferred station layout is illustrated in Exhibit 4-7.



**Legend**

- Subway station
- Subway line
- Entrance
- Limit of surface elements
- Underground walkway
- Full property acquisition
- Partial property acquisition for surface elements only
- Vent structure
- Bus loop



Yonge Subway Extension - Finch Station to Richmond Hill Centre  
Transit Project Assessment

**CUMMER / DREWRY STATION -  
PREFERRED LAYOUT**

EXHIBIT

**4-7**

#### **4.1.4.2 Steeles Station**

The Steeles Station location provides a high potential for intensification and numerous connections between bus and subway movements. The proposed station location for the Steeles station box is at the intersection of Steeles Avenue and Yonge Street.

In developing the Steeles Station alternatives, the following key planning considerations were taken into account:

- Due to its high volume of existing and future transit routes for both TTC and YRT and availability of potential development lands, the intersection of Steeles Ave. and Yonge St. proves to be an ideal location for the incorporation of additional station elements such as a 25 bus bay terminal, PPUDO and off street entrances.
- The station should accommodate all potential passengers by providing the quickest and most efficient transfer between all different modes of transit including subway, bus terminal, PPUDO and walk-in traffic.
- Bus movements / entrances will be signalized. It is necessary that there is a 200 m spacing between signalized intersections for shared signal transit / cars and 100 m spacing for transit only signals.
- Feasibility of integrating station facilities with development on opening day.
- Provide approximately 50 metre minimum buffer to Yonge Street and potentially Steeles Avenue to preserve developable frontage.
- Minimize property impacts and try to integrate the structure with potential future developments (i.e. new access, ring roads), as well as any plans for re-development within the area.

A short-list of bus terminal options at Steeles Avenue was developed for consideration, and includes:

- Southwest quadrant
- Northwest quadrant
- Underground Station in the Steeles / Yonge right-of-way (L-shaped and linear)
- Split configuration using northwest and southwest quadrant
- Hybrid option (surface and underground station)

The analysis and evaluation process is detailed in Appendix E. After assessing the above listed options, the linear underground option was determined to provide the quickest and most convenient transfer between the bus terminal and the subway.

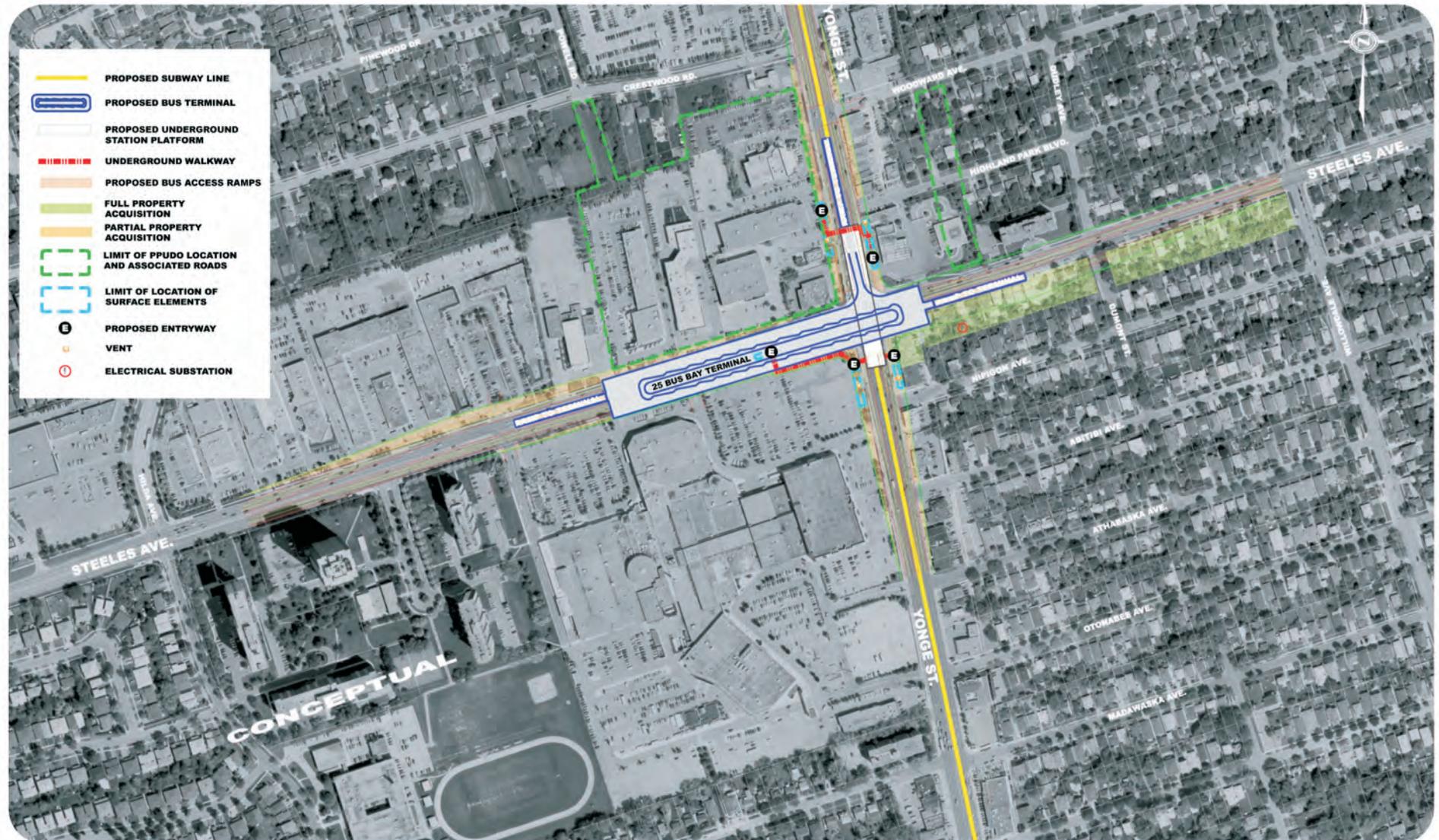
Key factors leading to the selection of the preferred alternative include:

- The option for a surface bus terminal in the south west quadrant meant there were potentially significant capital costs associated with acquiring the long-term leases of current businesses at Centerpoint Mall and the resulting unacceptable

built form if the terminal was built on the parking lot immediately adjacent to Steeles Avenue and Yonge Street.

- The option for a surface bus terminal in the northwest quadrant meant there were significant capital costs associated with acquiring properties as well as business losses; the remaining development land would be severed and less desirable for redevelopment. In addition the walking distances for passengers transferring to the subway would be greater.
- Given the importance of this gateway intersection of three municipalities and the identified location as a transportation hub where significant intensification can occur, it was determined that the below grade terminal provided a superior transportation solution by confining buses to Steeles Avenue and Yonge Street and away from the adjacent emerging communities and significantly reduces the volume of buses moving through the Steeles Avenue and Yonge Street intersection.
- In terms of property impacts this alternative posed minimal impacts on the surrounding developable lands and did not completely displace any existing businesses.
- Driveway restrictions caused by centre access ramps can be mitigated by providing for U-turns at nearby signalized intersections.

The preferred station layout is shown in Exhibits 4-8 and 4-9.

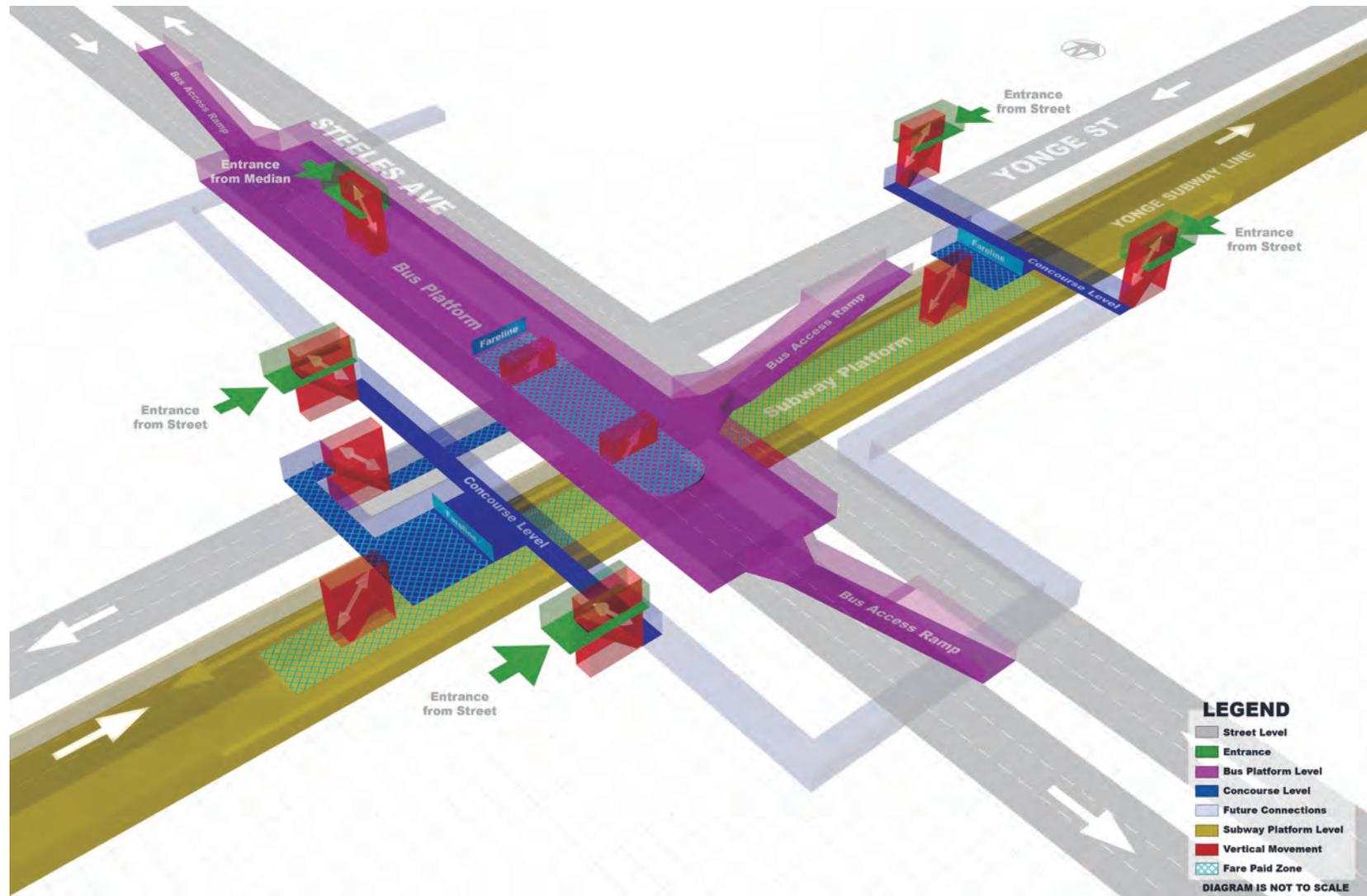


Yonge Subway Extension - Finch Station to Richmond Hill Centre  
Transit Project Assessment

STEELES STATION - PREFERRED LAYOUT

EXHIBIT

4-8



#### **4.1.4.3 Clark Station**

The Clark Station location provides an opportunity for intensification along with the existing medium and high density development. The south end of the proposed Clark station box is at the intersection of Clark Avenue and Yonge Street.

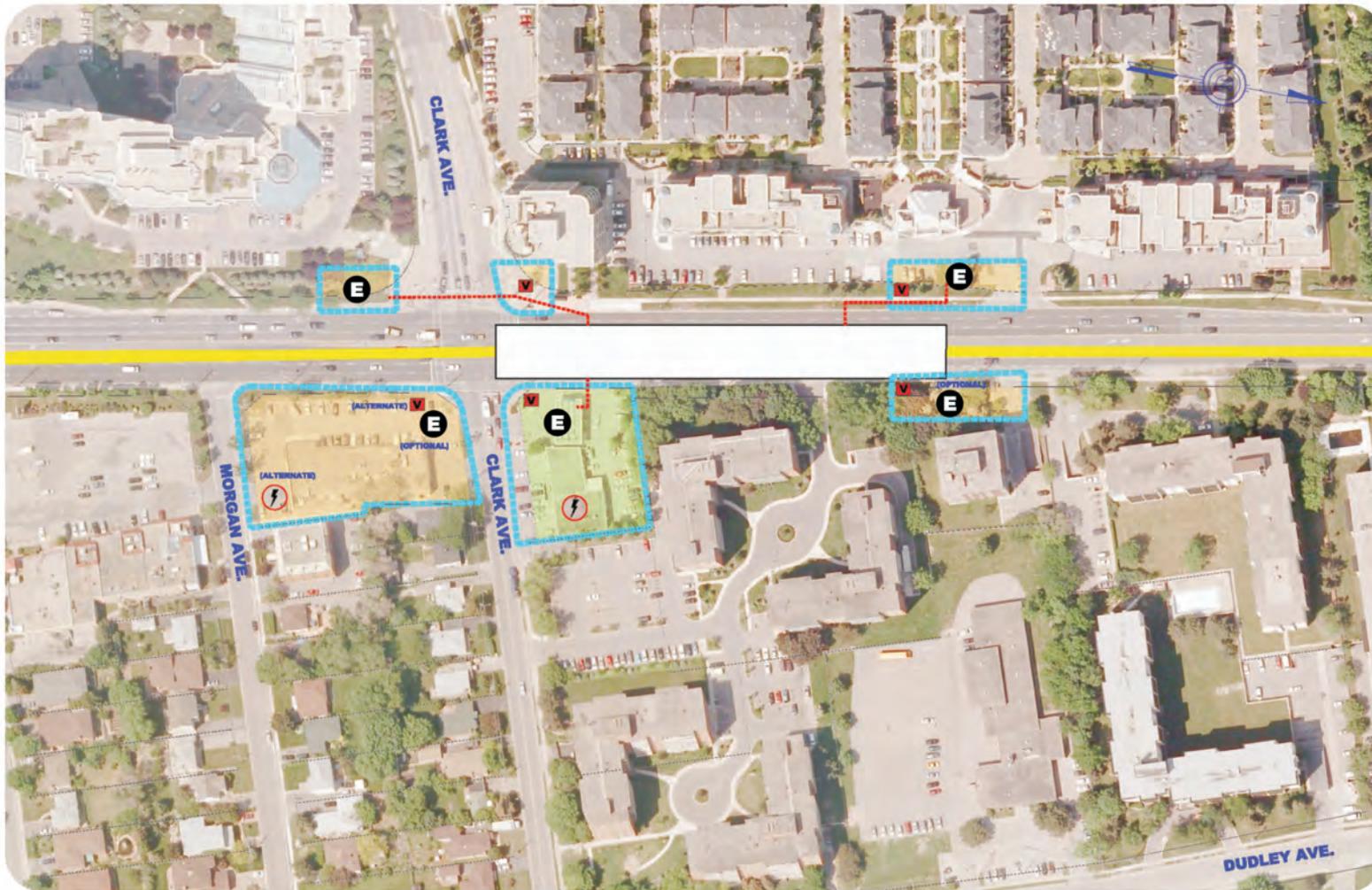
When determining the locations for the terminal entrances and substation at Clark Station many different criteria were taken into account. This included:

- Providing optimum transfers between the three bus lines and the subway entrances;
- Placement of entrances in high-density areas indicated by the location of high density, stable residential areas. This includes the numerous condominium and apartment buildings located on the northeast, southeast, and southwest quadrants
- Opportunity for future development, thus increasing the possibility of integrating a station entrance within the development and making for a more attractive station entrance.
- Minimizing large impacts on stable residential lands and high density lands.
- Sub station must be located as close to station box as possible.

The analysis and evaluation process is detailed in Appendix E. Key factors leading to the selection of the preferred alternative include:

- One of the proposed main entrance buildings is at the southwest corner of Clark Avenue and Yonge Street, serving existing density. The building envelope will be designed to integrate into existing urban fabric to create only a minimal impact to the urban fabric of the neighbourhood. This proposed entrance building provides pedestrians from nearby bus stops and shopping malls with easy access to the station's entrance.
- The other main entrance building will be situated at the northeast corner of Clark Avenue and Yonge Street. This entrance would require full acquisition of the existing gas station and adjoining repair garage facility but would allow for the redevelopment of the site along with providing a location for the required substation at this station. This entrance would allow for easy connections to future developments south of this location.
- An entrance location at north end of the station and on the west side of Yonge Street will service the existing density. An entrance on the east side of Yonge Street is also viable, given both will serve existing density in its vicinity.
- An alternate location for a main entrance on the east side of Yonge Street is the strip mall at the southeast corner of Clark Avenue and Yonge Street if redevelopment was to occur in conjunction with the station development.

The preferred station layout is shown in Exhibit 4-10.



### Legend

-  Subway station
-  Subway tunnel
-  Electrical substation
-  Entrance
-  Surface elements
-  Underground walkway
-  Full property acquisition
-  Partial property acquisition
-  Vent structure



#### **4.1.4.4 Royal Orchard Station**

The Royal Orchard Station location provides an opportunity for intensification of the existing medium density development. The south end of the proposed Royal Orchard station box is at the intersection of Royal Orchard Boulevard and Yonge Street.

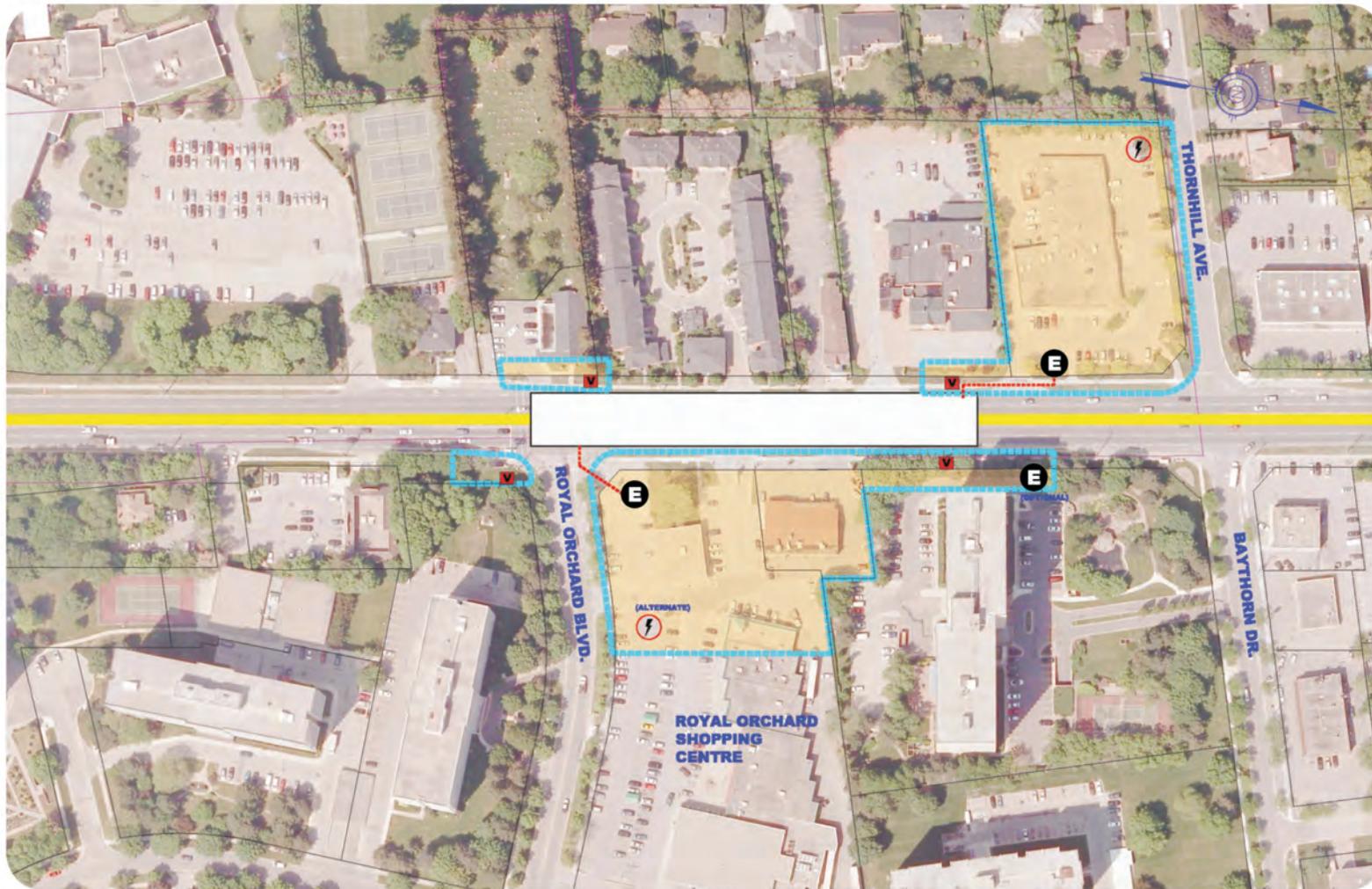
When determining the locations for the terminal entrances and substation at Royal Orchard Station, many different criteria were taken into account. This included:

- Providing optimum transfers between the three bus lines and the subway entrances;
- Placement of entrances in high-density areas indicated by the location of high density, stable residential areas. This includes the numerous condos and apartment buildings located on the northeast, southeast, and southwest quadrants;
- Opportunity for future development, thus increasing the possibility of integrating a station entrance within the development and making for a more attractive station entrance;
- Minimizing large impacts on stable residential lands and high density lands;
- Historical land and buildings not to be impacted;
- Sub station must be located as close to station box as possible.

The analysis and evaluation process is detailed in Appendix E. Key factors leading to the selection of the preferred alternative include:

- The proposed main entrance building at the northeast corner of Royal Orchard Boulevard and Yonge Street will be designed to be integrated into potential future development of the site (Royal Orchard Shopping Centre). An entrance on the west side of Yonge at this intersection was not considered due to the historical designation of the buildings along this stretch.
- An entrance on the southwest corner of Yonge Street and Thornhill Avenue would serve the west side of Yonge Street and respect the historical fabric as well as serve the development parcels immediately to the north of the entrance. **Only partial acquisition of the property has been identified at this time** for the entrance and the required substation to be integrated into the redevelopment of the site.

The preferred station layout is shown in Exhibit 4-11.



### Legend

-  Subway station
-  Subway line
-  Electrical substation
-  Entrance
-  Surface elements
-  Underground walkway
-  Full property acquisition
-  Partial property acquisition for surface elements only
-  Vent structure



#### **4.1.4.5 Langstaff / Longbridge Station**

The Langstaff / Longbridge Station location provides a high potential for intensification and a key location for a commuter parking lot that works in tandem with the proposed Richmond Hill Centre Station. The south end of the proposed Langstaff / Longbridge station box is at the intersection of Longbridge Road and Yonge Street.

In developing Langstaff / Longbridge station alternatives, the following key planning considerations were taken into account:

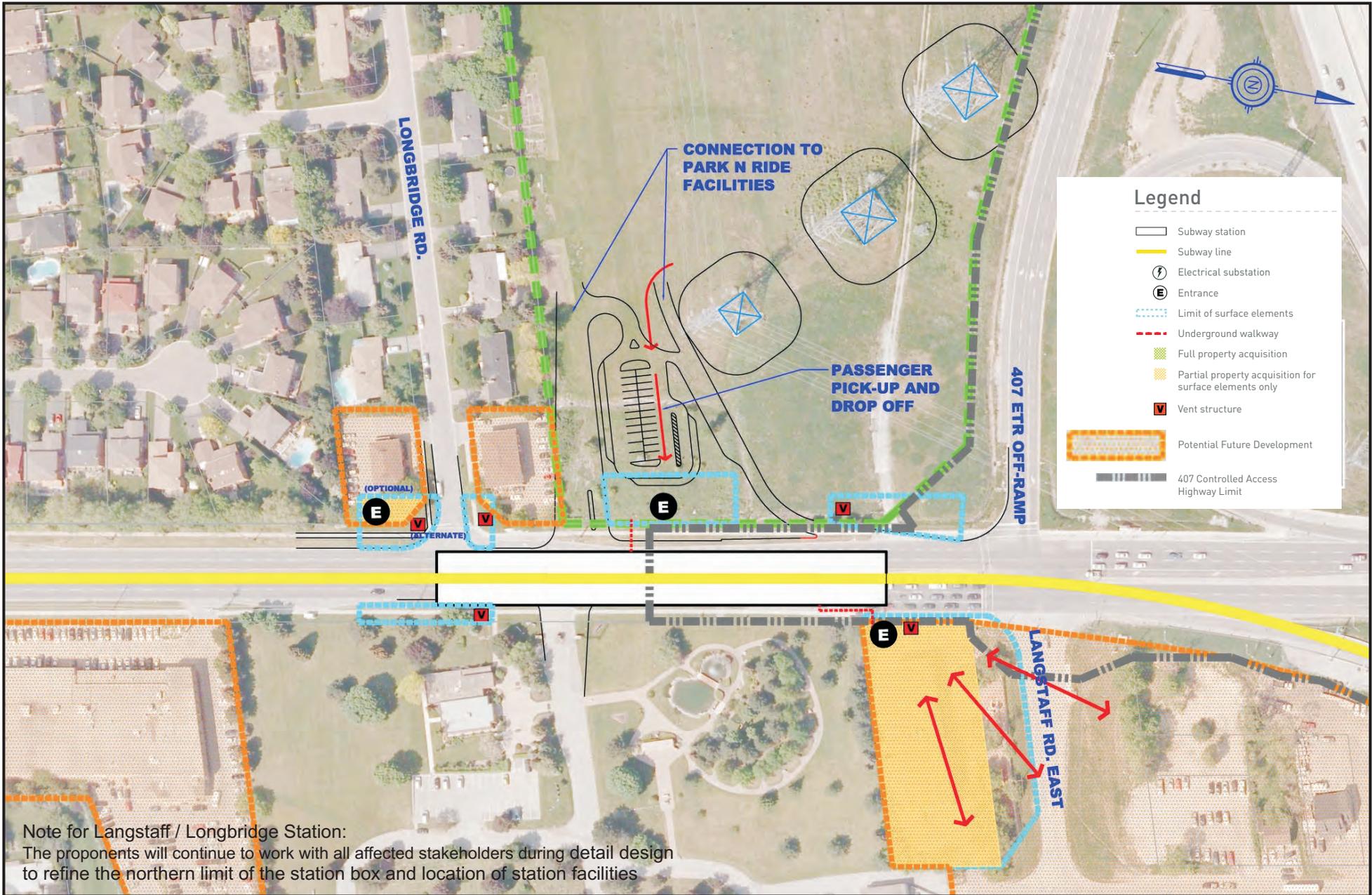
- Protection of Holy Cross Cemetery;
- Significant future development site on east side of Yonge Street;
- Provision of commuter parking facility;
- Passenger pick-up and drop off facility;
- Minimize impact to Hydro One's 230/500 kV transmission facilities (public land); and
- Protection of existing stable residential areas.

A traffic analysis was undertaken for the Langstaff / Longbridge Station with respect to the proposed commuter parking lot and PPUDO. Findings are summarized in Section 5.4.4.1 and detailed in Appendix M.

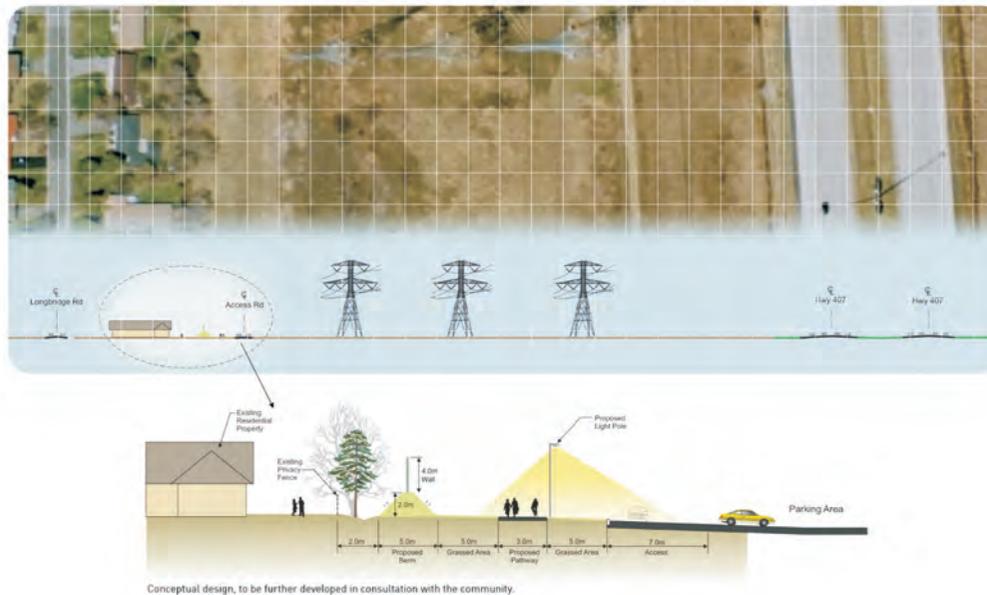
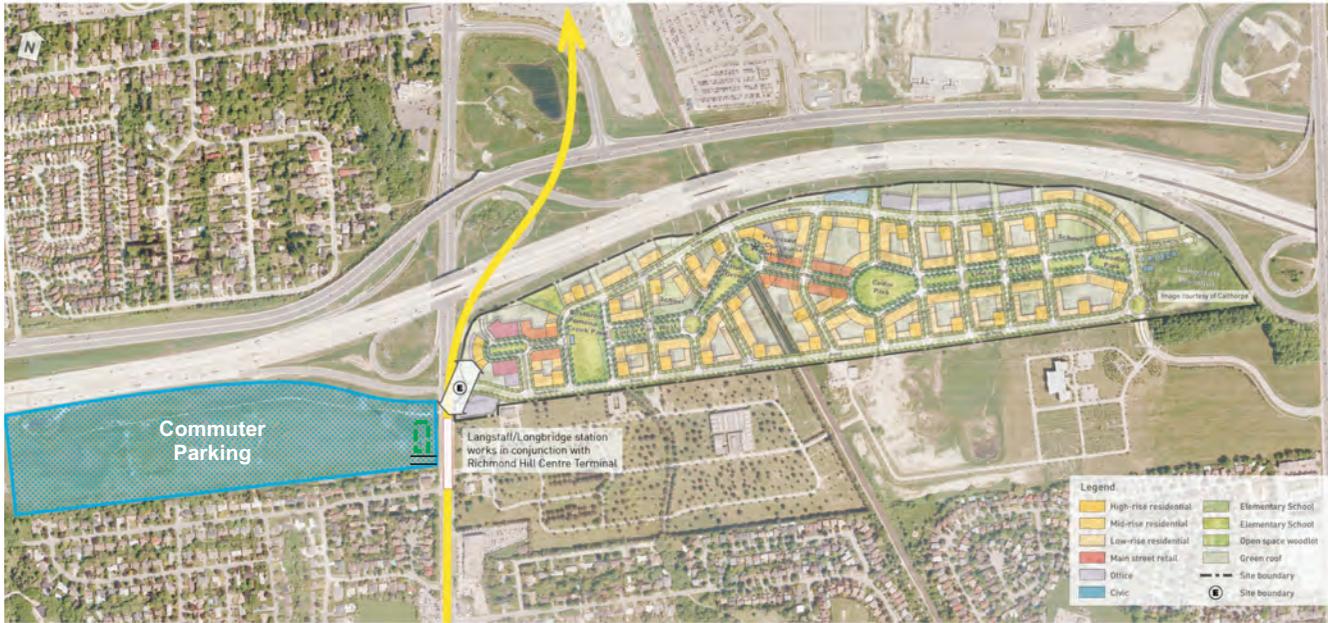
The analysis and evaluation process is detailed in Appendix E. Key factors leading to the selection of the preferred alternative include:

- This location has a high potential for future redevelopment east of Yonge Street.
- There is potential within the Hydro Corridor to accommodate a commuter parking lot and this is the only cost effective location for such facilities.
- The proposed entrance building location on the Hydro One public property takes full advantage of available land without impacting any private property around the area. It creates a direct connecting space between PPUDO, commuter parking and Langstaff / Longbridge station.
- The other proposed entrance building is at the southeast corner of Yonge Street and Langstaff Road East. This entrance will be integrated into the anticipated redevelopment of the Langstaff Lands.

The preferred station layout and the commuter parking lot are shown in Exhibits 4-12 and 4-13.



Note for Langstaff / Longbridge Station:  
 The proponents will continue to work with all affected stakeholders during detail design to refine the northern limit of the station box and location of station facilities



Conceptual design, to be further developed in consultation with the community.

#### **4.1.4.6 Richmond Hill Centre Station**

The Richmond Hill Centre Station location provides a high potential for intensification and an integrated inter-modal transportation hub. The proposed station location for the Richmond Hill Centre station box was determined based on the preferred subway alignment, Alignment C (described in Section 4.1.2, and Appendix D).

In developing the Richmond Hill Centre station alternatives, the following key planning considerations were taken into account:

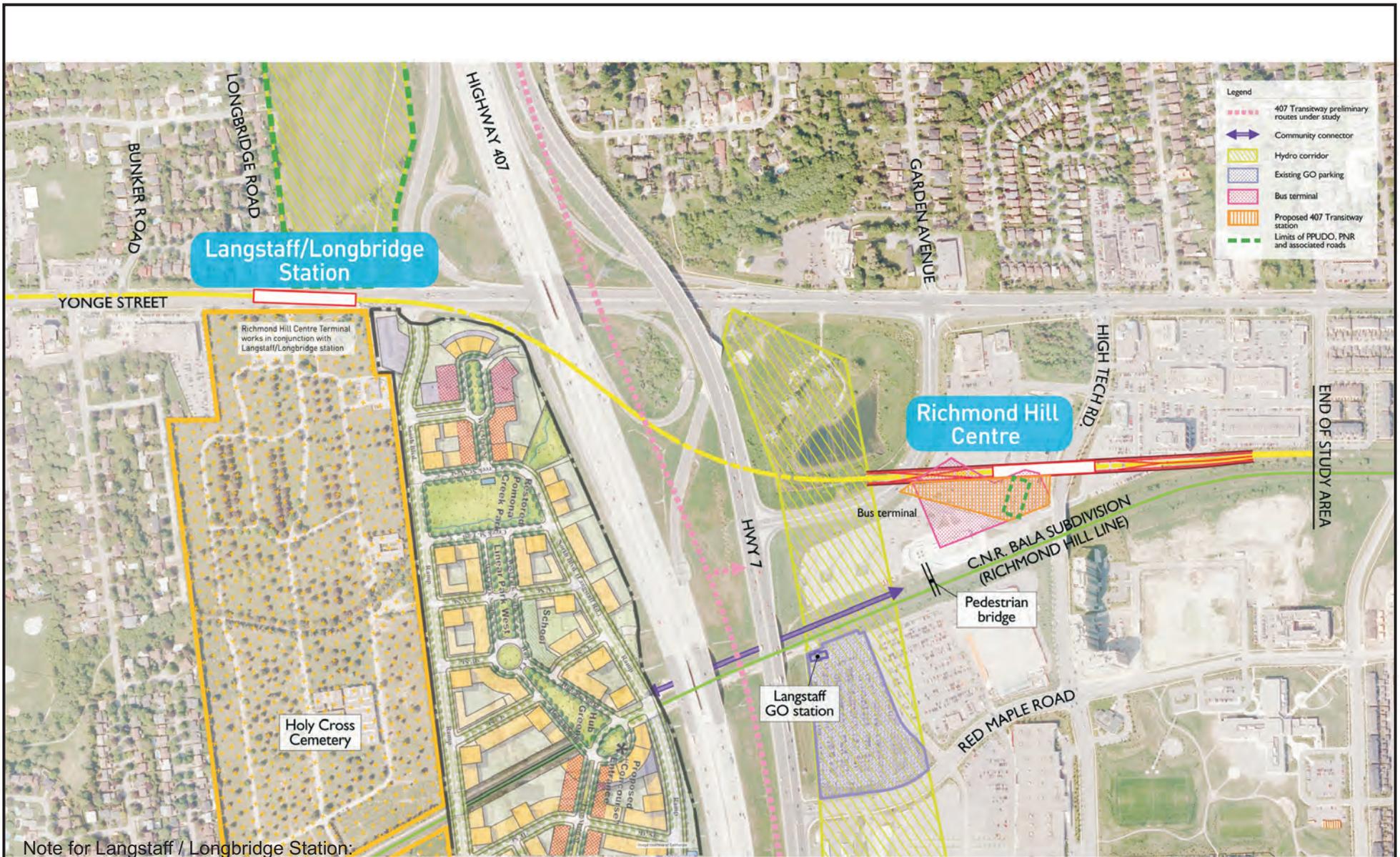
- Due to the high volume of buses accessing the station, a 28 bus bay/compact transit intermodal facility is required;
- A high quality terminal transfer environment between modes;
- Pedestrian access to intermodal transfer point;
- Integrate with future Richmond Hill transit-oriented development and Highway 407 transitway;
- Close proximity to GO rail should be maintained for commuters;
- Key constraints included:
  - Protection of woodlot;
  - Minimize impact on hydro corridor and existing hydro towers; and
  - Avoid interference with the storm water management pond.

Two alternatives were developed for evaluation, the first being a stacked terminal located where the existing bus terminal is and the second being an L-shaped surface terminal. The analysis and evaluation process is detailed in Appendix E. The stacked terminal alternative was determined to be preferred. Key factors leading to the selection of the preferred alternative include:

- Provides better connections between all transportation modes at this location;
- Leaves unencumbered a considerably larger area of re-developable land;
- Provides an opportunity to support growth and redevelopment; and
- Impacts a smaller area and requires less mitigation of the environmental effects,

Overall, the stacked bus terminal option provides a passenger-friendly layout with the least impact to the existing property and business owners.

The alignment and conceptual station layout is shown in Exhibit 4-14. The Richmond Hill Centre Station preliminary layout concept is shown in Exhibit 4-15. The final master plan for the layout of the subway station and bus terminal will be determined in conjunction with the Town of Richmond Hill, property owners and transit operators.



Note for Langstaff / Longbridge Station:  
 The proponents will continue to work with all affected stakeholders during detail design to refine the northern limit of the station box and location of station facilities



## 4.2 Description of the Recommended Transit Project

The purpose of this section is to define the recommended Transit Project, which is comprised of the construction, operation and maintenance of the extension of the Yonge Subway from the existing Finch Station to Richmond Hill Centre near Yonge Street / Highway 7.

Recommendations include the following elements:

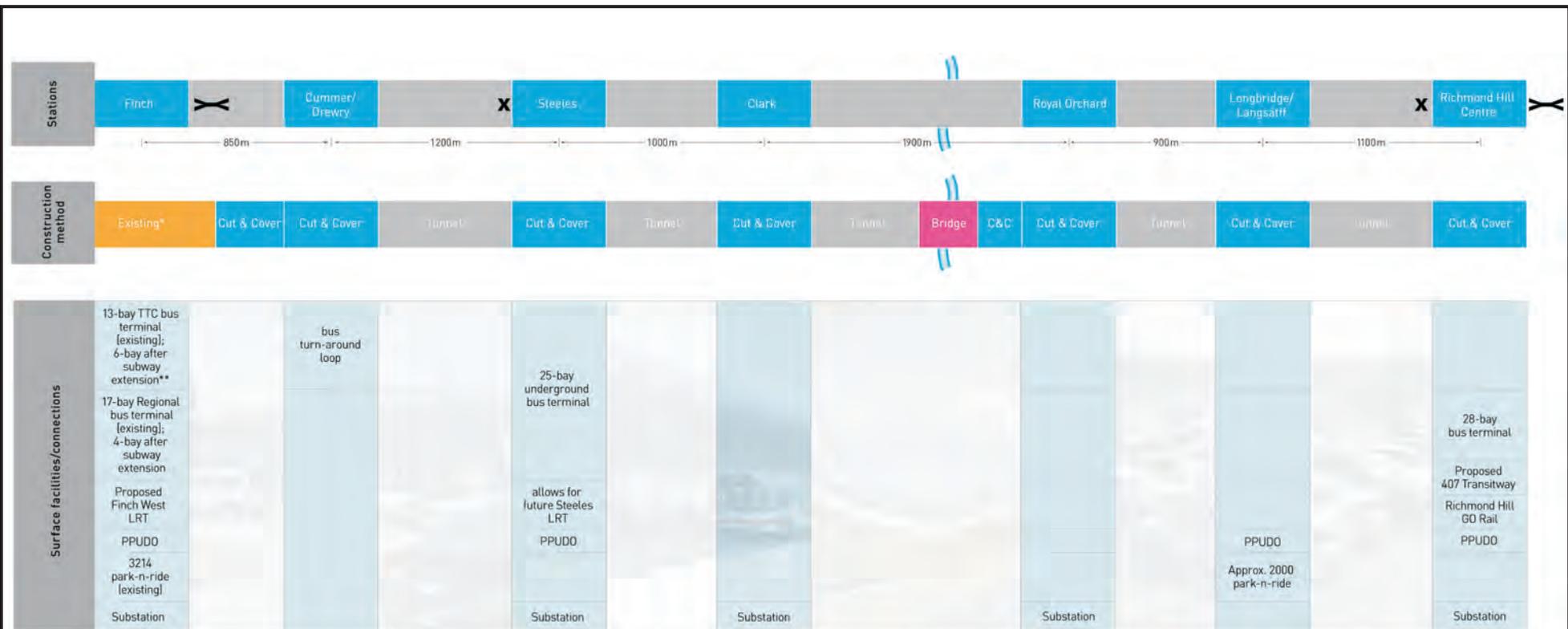
- Subway Running Structure – This provides details on the location and configuration for the running structure that connects each of the six stations
- Ancillary Features – This represents supporting elements that are required for the operation of the subway;
- Stations – This describes the amenities found at each of the six stations; and
- Implementation – This section discusses matters relating to anticipated construction methodology and duration as well as capital cost estimates for the Transit Project and supporting infrastructure.

The total length of the recommended alignment is 6.8 km long and includes six new stations:

- Cummer / Drewry Station;
- Steeles Station;
- Clark Station;
- Royal Orchard Station;
- Langstaff / Longbridge Station; and
- Richmond Hill Centre Station.

It is noted that a key consideration of the Transit Project is that it does not preclude a potential future extension of the subway extension north of the Richmond Hill Centre terminal station.

The Recommended Transit Project is summarized in Exhibit 4-16. Stations, construction methods, facilities, and key screening criteria are noted. Preliminary alignment engineering plates are provided as Appendix A.



Screening criteria

Existing densities		80	85	110	80	30	40
Projected densities†		110 - 120	280 - 520	145 - 180	100 - 130	144 - 266	295 - 550
Transportation connection		✓	✓			✓	✓
Natural environment		✓	✓	✓	✓	✓	✓
Cultural environment		✓	✓	✓	✓	✓	✓

Tail track: Cross track:

\* Some reconstruction of existing tail tracks will be required  
 \*\* 4-bay after Finch LRT is completed  
 † Persons and jobs per hectare

Not to scale

#### 4.2.1 Subway Running Structure

The Transit Project will have a total length of 6.8 km from the end of the existing tail track at the north end of existing Finch Station, the current terminus of the Yonge Subway Line, to the north end of the tail track to be located north of the proposed Richmond Hill Centre Station (RHC), north of Highway 7. The entire alignment will be underground, with the exception of the proposed East Don River bridge crossing.

The subway running structure and station platforms are primarily located within the Yonge Street right-of-way from Finch Station to the north end of the Langstaff/Longbridge Station, at Langstaff Road. Immediately north of the Langstaff/Longbridge Station, the alignment turns north-east to cross under Highway 407 and Highway 7, the Hydro One Corridor (just east of the Richmond Hill stormwater management pond), the municipal utility corridor, property owners, High Tech Road, and terminates in the transit corridor and private property on the west side of the CN Bala / Richmond Hill GO Line. The Richmond Hill Centre Station (terminus station) is located on the Yonge Bayview Holding Inc. properties and across High Tech Road to the properties immediately north. The north end of the tail track terminates in the transit corridor line as well as private property on the west side of the CN Bala / Richmond Hill GO Line.

The recommended geometric alignment is illustrated in Appendix A, Preliminary Alignment Engineering Plates, and is summarized below.

##### 4.2.1.1 Horizontal Alignment

The horizontal alignment of the proposed Transit Project was developed following existing TTC design standards. The alignment includes 9 horizontal curves as depicted in the alignment plates in Appendix A.

##### 4.2.1.2 Vertical Alignment

The vertical alignment was developed following existing TTC design standards for subways. Minimum and maximum design parameters used on the vertical alignment are:

- |  |            |
|--|------------|
| 1) Minimum gradient at stations and special track structures | 0.3%       |
| 2) Maximum gradient along rest of running structure          | 3.5%       |
| 3) Minimum length of vertical curve                          | LVC = 60 m |

Sight line for signalling will be confirmed during design of the Transit Project.

##### 4.2.1.3 Subway and Track Technology

The latest TTC subway cars have a length of approximately 22.8 m and a width of 3.1 m. The train sets are composed of six cars, resulting in a train length of approximately 138 m

and a maximum operating speed of 80 km/h. Trains are powered by electric motors, which utilize 600VDC. Current train operations, both locomotive control and opening/closing car doors, are manually controlled by on-board staff. Wayside signalling regulates the movement of trains along the line. Since this is an extension of the existing TTC Subway system, the current technology and operational requirements on the existing line will govern the operation of this project. As the TTC is currently upgrading the existing signalling system to ATO/ATC, the extension will include the implementation of this new system which will allow closer spacing of trains in response to increased ridership.

The track technology to be used is a combination of floating concrete slabs and double ties, which are designed to minimize the noise and vibration effects of subway operations to an acceptable level. The double tie trackbed system is designed to reduce vibration levels in the frequency range 30 Hz to 120 Hz by 14-16 dB in the box structure and by 12-15 dB in the tunnel structure. Sections of the TTC Sheppard Subway were built using such technology and have achieved the desired results.

#### **4.2.1.4 Future Alignment Refinements**

The alignment, as illustrated in this report, is preliminary in nature. Refinements in the horizontal and/or vertical alignment will continue in detailed design and may be undertaken to:

- Improve operating characteristics and reduce operating costs;
- Reduce future maintenance requirements;
- Minimize effects to properties;
- Reduce construction related effects; and
- Reduce capital costs.

#### **4.2.2 Ancillary Features**

##### **4.2.2.1 Subway Operational Needs**

In support of the subway operations, “special track work areas” are identified based on the following subway operations requirements:

- Locations where provision for switching trains between northbound and southbound tracks have been identified at Steeles Station and Richmond Hill Centre. These locations have been included to provide reliable service or in emergency situations. These locations would require the installation of double cross-over tracks south of each station;
- Storage and turn back of trains north of Finch Station, requiring the installation of additional centre track and two single cross-over tracks north of the existing Finch tail tracks ; and
- Tail track structure north of Richmond Hill Centre Station platform to allow full operating speed into Richmond Hill Centre Station as well as to provide for storage of trains.

#### **4.2.2.2 Electrical Substations**

Electrical power is required to operate lights, equipment and safety systems associated with the stations. Electrical power is also required to power the trains themselves (referred to as traction power). The connections between subway and the power distribution grid occur in a facility that is referred to as an electrical substation. These substations contain transformers, switches and circuit panels to support the systems listed above. Substations can be constructed at-grade, below grade or a combination of the two. Exhibit 4-17 illustrates an existing substation that is split above grade / below grade.

To meet the traction power requirements for the subway system, substations are typically 2.0 km apart but cannot exceed 2.5 km in spacing. Since subway stations require power for lights and equipment, TTC usually locates the electrical substations at or near subway stations.

Since the Transit Project is approximately 6.8 km long, it will require a minimum of four substations, which will be located near Steeles Station, Clark Station, Royal Orchard Station and Richmond Hill Centre Station. Although conceptually identified on the station layout drawings, the final location and configuration of electrical substations will be refined during detailed design. Electrical connections between the substations and the existing electrical grid will be determined during detailed design as well.

#### **Exhibit 4-17: Typical Electrical Substation – Above Grade Portion (Don Mills Station, Sheppard Subway)**



*Aerial view of Don Mills Station  
substation showing substation enclosure*

#### **4.2.2.3 Emergency Exit Buildings (EEB)**

In accordance with NFPA130, emergency egress from the subway tunnel shall be provided throughout the underground system so that the distance to an exit shall not be greater than 381 metres. Therefore the maximum distance from emergency exit to emergency exit or emergency exit to station shall be 762 metres. These structures extend from the underground tunnels to the surface and are designed to provide an emergency exit for passengers and emergency services personnel. They can also provide emergency ventilation and secondary power sources.

The below grade portion of the structures consist of a central vertical access/egress shaft leading from the subway tunnel to the surface. At grade, the structure typically comprises a one-storey building about 3 metres high and 10 square-metres in area, as shown in Exhibit 4-18.

Exhibit 4-18 identifies the preliminary locations of the required Emergency Exit Buildings (EEB). These locations are based on TTC's life safety requirements of providing an exit at a maximum interval of 762 m. The proposed locations are:

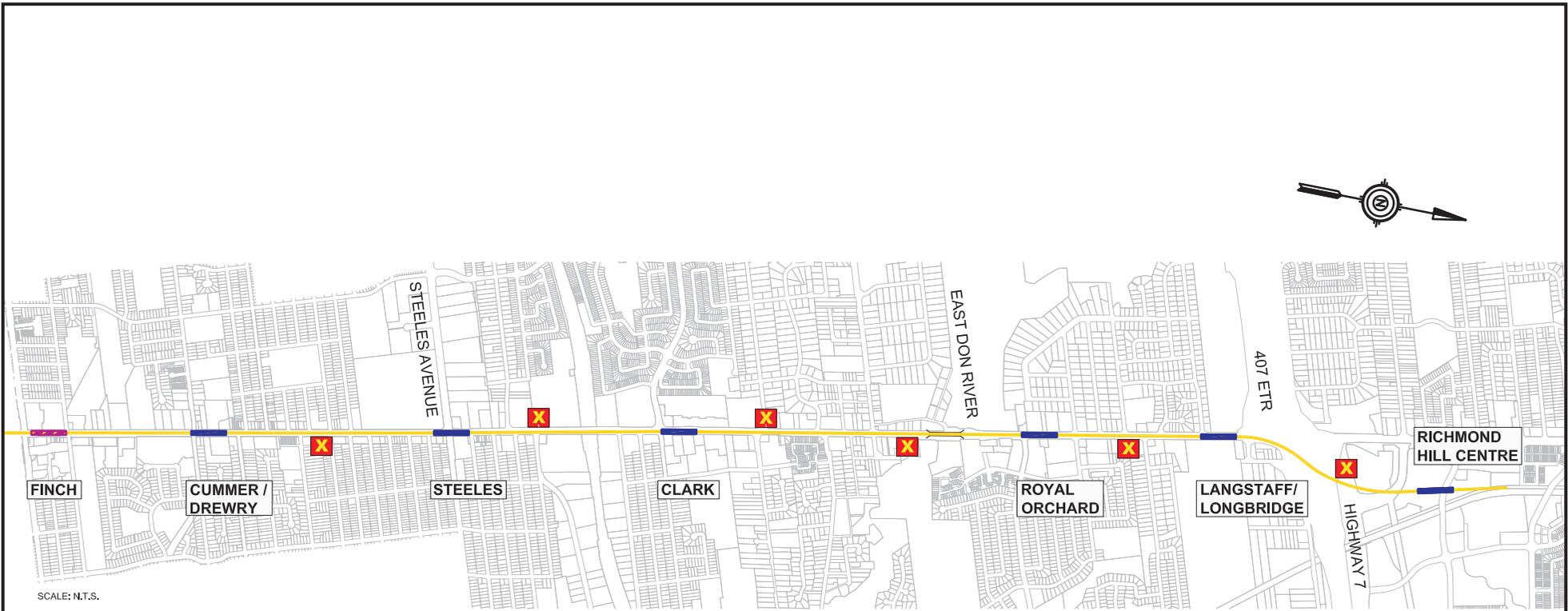
- Private property on the east side of Yonge Street between Centre Avenue and Newton Drive;
- Private property on the west side of Yonge Street between Doncaster Avenue and the CN rail corridor (7200 Yonge Street);
- Within municipal right-of-way on the west side of Yonge Street opposite Arnold Avenue;
- Within municipal right-of-way on the east side of Yonge Street between Centre Street and the proposed East Don River Bridge;
- Private property on the east side of Yonge Street between Uplands Avenue and Kirk Drive (8199 Yonge Street); and
- Within municipal right-of-way on the north side of Highway 7 west of Garden Avenue.

#### **4.2.3 Subway Stations**

The six stations along the Transit Project, including their respective layouts and facilities, are described in detail in Section 4.1.4, Station Layout Concepts and Appendix E, Station Layout Concepts.

#### **4.2.4 Property Requirements**

Directly affected property will be acquired through the appropriate property acquisition process and compensation where appropriate for property owners will be based on fair market value. Property requirements will continue to be examined and refined as part of the detailed design phase. The property acquisition and mitigation process is discussed in Section 5.2.2.



SCALE: N.T.S.

**LEGEND**

-  EXISTING SUBWAY STATION
-  SUBWAY STATION
-  SUBWAY LINE
-  EMERGENCY EXIT



Example of an Emergency Exit Building from Sheppard Subway

## 4.3 Implementation

Implementation aspects discussed in this section are construction methods, duration of major construction activities, project costs, construction staging and effects, and commissioning.

### 4.3.1 Construction Methods

A variety of construction methods were considered as part of this study. The following is a discussion of the various types of construction to be employed along the Transit Project for both the subway running structure and at stations.

As illustrated in Exhibit 4-19, the following construction methods are anticipated as part of the Transit Project.

#### 4.3.1.1 Tunnelling

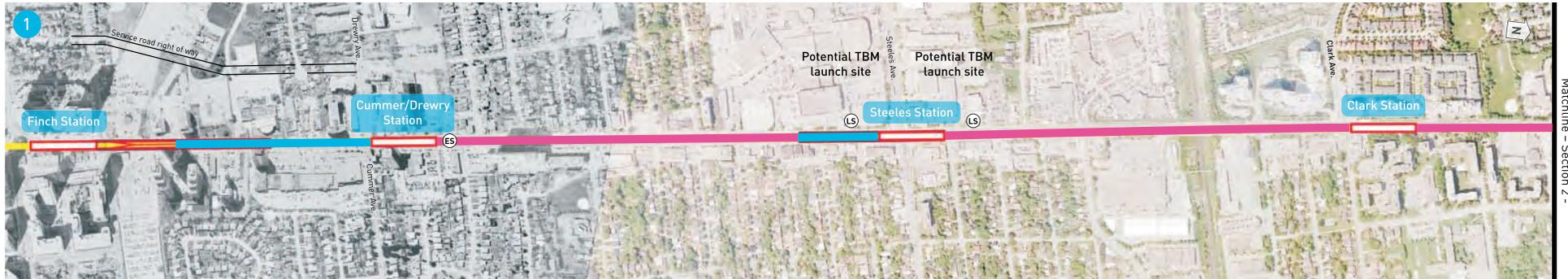
Tunnelling uses a large machine, usually built for the specific project, to excavate a tunnel and handle the excavated material, as well as place the initial tunnel lining, in a continuous, highly automated process. The front end of the machine consists of a circular cutting face that excavates the soil and pulls it into its round shell. The amount of material excavated using a Tunnel Boring Machine (TBM) is less than half that required for cut-and-cover construction. Tunnelling also minimizes disruption to traffic and buildings. A twin-bored tunnelling method is proposed for the entire running structure from Finch Station to the Richmond Hill Centre Station, with the exception of the section between the existing Finch Station tail tracks and Cummer/Drewry Station and the approaches to the East Don River bridge. Earth Pressure Balance (EPB) tunnelling methodology maintains a constant pressure along the cutting face through the use of a continuous injection of a slurry mixture. EPB reduces construction related settlement above the tunnel and minimizes the amount of ground water that enters into the construction area.

##### 4.3.1.1.1 Tunnel Boring Machine Launch and Removal

The tunnel boring machine requires both a launch site and a removal site. The machine with its trailing gear for conveyor belts and line assembly may occupy a length of about 70 m, and it requires an initial open cut excavation for it to be mobilized. Once tunnelling commences, the contractor will occupy the launch site for soil removal and tunnel liner insertion until the tunnel section is complete.

During this Transit Project Assessment Process, preliminary discussions were held with the affected local landowners about possible TBM launch and removal sites. For the purposes of determining the potential environmental effects of the Transit Project, the following approach was assumed:

While significant lengths of the subway extension will be tunnelled, the construction of subway stations and special track work structure is done using the cut and cover method.



Legend

-  Subway station
-  Cut and cover
-  Tunnelling
-  Bridge construction
-  Tail tracks
-  Launch shaft
-  Exit shaft

1. Richmond Hill Centre Station and surrounding area would provide sufficient space for the southbound launch of the TBM and as well as storage of tunnel liners and other tunnelling materials and equipment;
2. Likewise, existing surface parking in the southwest quadrant of the Yonge Street / Steeles Avenue intersection could also provide sufficient space for the southbound launch of the TBM and storage of tunnel liners; and other tunnelling materials and equipment;
3. Cut-and-cover section at each end of the proposed East Don River Bridge. This area would be used as an extraction area to remove the TBM machines.
4. Cummer / Drewry Station could be used to remove the TBM.

Detailed research, analysis and design are required to confirm the tunnelling sequence as well as locations for storage of tunnel liners and other tunnelling materials and equipment. This work will be conducted during the detailed design phase of the Transit Project.

#### *4.3.1.1.2 Tunnel Boring Machine Operations and Maintenance*

The TBM is typically operated on two shifts per day advancing at a rate of approximately 15 m a day. Regular maintenance of the TBM will be required. Depending on the type of soil encountered, maintenance may vary across different depths and stages of construction. Stations and EEB's can serve as maintenance shafts, however the final operations and maintenance sequence will be determined during design and construction planning.

#### *4.3.1.1.3 Installation of Tunnel Liners and Grouting*

The machine has equipment to assemble and place a tunnel liner ring immediately behind its shell tailpiece as it advances. In soft ground, the machine advances by means of thrusting jacks reacting against the tunnel lining just placed. This structure is assembled immediately after the TBM shield advances and it is placed tightly against the excavated soil surface. Any resulting annular space between the soil surface and the tunnel liner is then backfilled with grout.

#### *4.3.1.1.4 Building Underpinning*

Building underpinning is used when structural reinforcement may be required for tunnel sections under or adjacent to a specific building. Depending on the depth/type of the foundation and the depth of the tunnel, building underpinning may be required for several properties. In this process, temporary support or reinforcement is provided by the use of drilled or jacked supporting piles so as to protect existing structure. To control ground settlement and distortion, ground freezing and grouting are usually the preferred soil improvement methods. Buildings that will require underpinning will be determined during design.

### **4.3.1.2 Cut-and-Cover Construction**

Tunnelling is an effective means of creating an underground linear facility, which has a uniform cross section. The geotechnical parameters that allow tunnelling also require

separation between tunnels and nearby structures, including other tunnels. This separation is usually the equivalent of at least 1 tunnel diameter (approximately 6 m). For some portions of the subway line, excavation by a TBM is not practical or economical. This includes:

- Stations – The large spans (station platform widths), relatively short lengths and complicated spatial arrangements normally preclude economical tunnelling.
- Cross-overs – Similar to the three track structure, the cross-overs for Finch Station, Steeles Station and Richmond Hill Centre Station have special structural configurations and require the placement of special track work.

In these instances cut-and-cover is the preferred method of construction. In addition, where the alignment can be close to the surface and access from the surface during construction results in negligible adverse environmental effects, cut-and-cover can be more economical than tunnelling.

The ground surface is opened (cut) a sufficient depth to construct the subway tunnel structure and ancillary facilities. The sides of the excavation are usually supported by vertical temporary walls to minimize the volume of material excavated and to protect adjacent facilities and buildings. The walls require cross-bracing or tiebacks for support. Once the construction excavation is complete, the contractor builds the structure from the bottom to the top of the structure. Once the structure construction is complete, the remaining excavation is backfilled and the surface is reinstated.

The cut-and-cover method results in larger quantities of excavated material and is suitable for shallow cuts (no more than 20 m depth). It also requires few special procedures and can be constructed in an expedited manner.

Recognizing that cut-and-cover can be more disruptive than tunnelling, the environmental effects and mitigation measures were assessed as part of the Transit Project Assessment Process.

The following sections provide an overview of this construction methodology.

#### *4.3.1.2.1 Within Road Rights of Way*

When the excavation occurs within a road or street, existing utilities are often encountered and these must be maintained by temporary support or by relocation. When vehicular traffic must be maintained, temporary decking is placed over the cut using the side walls for support. The top down procedure may be used to minimize the length of time that the surface areas are disturbed.

#### *4.3.1.2.2 Maintaining Services – Utilities*

In an urban setting all residents and businesses are serviced by a wide range of utilities. To avoid effects to these services, cut-and-cover requires special consideration for the maintenance of utilities. To facilitate cut-and-cover construction, utilities can be relocated. This is often completed in advance of the subway construction. Alternatively, the utility can be temporarily suspended through the construction site. The most appropriate method for the utilities that may be affected will be determined during the detailed design phase.

### 4.3.2 Anticipated Duration of Major Construction Activities

The anticipated duration of a project of this scope will be approximately 8 years, including the following overlapping activities:

- Design and Engineering (48 months overall duration);
- Construction (66 months overall duration); and
- Testing and commissioning (12 months duration).

The Transit Project could be in service by 2017 assuming a Spring 2009 full funding commitment to proceed with the implementation of the Transit Project.

### 4.3.3 Project Costs

Based on the station concepts and subway alignment, an order of magnitude project cost has been estimated in 2008 dollars and is provided in Exhibit 4-20.

**Exhibit 4-20: Major Project Costs**

Major Project Elements		Cost M \$
Stations and Area Facilities		\$655
Finch improvements	\$10	
Cummer / Drewry	\$70	
Steeles	\$195	
Clark	\$70	
Royal Orchard	\$65	
Langstaff / Longbridge	\$85	
Richmond Hill Centre	\$160	
Tunnels, special structures and operating systems		\$600
Subway trains		\$240
Storage and maintenance facilities for subway trains		\$110
Engineering and other costs		\$670
Property		\$125
<b>Project Cost Estimate, 2008 dollars</b>		<b>\$2.4 billion</b>

The above capital cost estimates of the Transit Project includes the implementation of an ATO/ATC signalling system, platform edge doors in stations and a per vehicle allowance for the storage and maintenance of subway trains, assuming that trains are stored at an existing TTC subway yard (Davisville or Wilson Yard). In the event that the SRYNS determines that a satellite or full yard is required on the Yonge line to support the Transit Project vehicle fleet (or for expanded service on the Yonge-University-Spadina Line), the current cost allowance will be adjusted accordingly.

As noted in more detail in Section 5.4.6, preliminary projections of future Yonge Subway ridership to 2031 undertaken by the TTC/City of Toronto, indicate that approximately 20% of the growth in Yonge Subway ridership south of Bloor to 2031 is attributable to the Yonge extension, 10% is attributable to the Transit City initiative and the remaining 70% is due to population /employment growth in the 905/416 area, improvements in transit service and other transit network expansions planned for the future. The above factors may be utilized to negotiate an attribution of the costs to expand Yonge-Bloor Station to the Transit Project.

#### **4.3.4 Construction Staging and Effects**

As discussed in the previous section, the preferred construction and staging procedures will affect transportation modes, mobility and infrastructure. It will be necessary to develop and implement appropriate decking for cut-and-cover construction as well as adequate staging to ensure that interruptions to vehicular and pedestrian travel are addressed. Traffic management plans will be developed during the detailed design phase that provide for adequate movement of vehicles and pedestrians through the construction periods. Due to lowered capacity of intersections along Yonge Street and likely higher traffic volumes on adjacent streets, signal timing strategies during design and coordination between transit providers are necessary. These traffic management plans will be developed in consultation with municipal staff, transit operators and other stakeholders as required. Additional details are provided in Section 4.3.4.1.

Construction approaches include:

- Utilizing techniques based on recommendations from the Geotechnical investigation;
- The use of Tunnel Boring Machine(s) (TBM) in order to minimize surface impacts, impacts on adjacent buildings, and eliminate ground water inflows without the requirement for external dewatering procedures during tunnelling;
- Only the stations and special track structures will be built using cut-and-cover methods, the rest of the subway will be tunnelled since twin tunnels will have no surface effect except at launch and removal locations; and
- Minimizing effects on traffic circulation through the use of decking at cut-and-cover sections under existing roadways, complemented by a traffic management plan.

##### **4.3.4.1 Traffic Management During Construction**

The Traffic Management Plan will detail vehicular and pedestrian traffic arrangements during the construction of the Transit Project. The analysis of traffic operations in the Traffic Management Plan will generally follow the Traffic Impact Study Guidelines prepared by the City of Toronto and York Region. The complexity of the Traffic Management Plan will also be related to the extent of the construction contract and the nature of the existing traffic congestion issues in the construction zone. The Traffic Management Plan will be developed during detailed design.

The general guidelines and principles that will be followed for traffic management during construction of the Transit Project include, but are not limited to:

- *Traffic Lanes*

Where possible, the existing number of traffic lanes will be preserved at an individual construction site. Reduction in the number of lanes will only be permitted after an evaluation of trade-offs at approved locations for long term construction activities.

As a general guideline, where the road surface must be excavated, the minimum number of lanes of traffic, as noted in Exhibit 4-21, should be provided at all times.

**Exhibit 4-21: Minimum Number of Lanes to be Maintained**

Existing Lanes	Minimum Number of Lanes to be Maintained
1 lane in each direction	1 lane with appropriate controls
2 lanes in each direction	1 lane in each direction
2 lanes in each direction 1 centre left turn (continuous)	1 lane in each direction 1 left turn at signalized intersection
3 lanes in each direction	2 lanes in peak direction 1 lane in off peak direction
3 lanes in each direction 1 centre left turn lane (continuous)	2 lanes in peak direction 1 lane in off peak direction 1 left turn signalized intersection

- *Alternative Traffic Options*

Where partial lane closures must occur, an analysis of traffic operations in the area of the construction, including appropriate upstream and downstream intersections, should occur to assess queue lengths, delays and general levels of service.

- *Road Closures*

Where full closure of the road must occur, a suitable road detour will be designated, with the approval of the appropriate road authorities. Temporary closings of arterial roads may occur from 7:00 p.m. to 5:00 a.m. and on weekends. In major commercial areas (i.e. Centerpoint Mall), later start times for road closures (i.e. 9:30 p.m.) will be considered during detailed design.

- *Turn Lanes*

Where lane closures are required at signalized intersections and a left turn lane is presently provided, provisions for left turning vehicles will be provided. If not possible due to construction, approval for the left turn restriction must be given by the appropriate road authority. If a left turn restriction is allowed, then a suitable detour route for left turns will be designated.

Right turn lanes may be closed and need not be accommodated in the traffic diversion, unless traffic volumes dictate their permanent need. This will be coordinated by the Proponent with the road authority.

- *Signing*

For all areas of construction, suitable advance signing shall be provided. Where lane restrictions will be present for long periods of time, advance signing shall also include appropriate alternate routes to encourage motorists to avoid the construction area.

- *Traffic Signal Adjustments/Timing:*

Where elements of the traffic signal infrastructure must be adjusted to accommodate traffic diversions, or excavations, the physical relocation will be designed for submittal to the appropriate road authority.

Where lane closures at a traffic signal must occur, there may be a need to adjust the traffic signal timing.

- *Transit Operations and HOV Lanes:*

Bus bays shall be provided during construction, if possible. The provision of bus bays and stops during construction will be coordinated between the Proponent and the transit operator.

HOV lanes will not be provided during construction.

- *Pedestrians*

A minimum 1.2 m pedestrian sidewalk shall be provided if a sidewalk currently exists. Where a sidewalk must be closed for temporary construction work, alternative pedestrian routes with appropriate signage will be provided.

- *Private Access*

Access shall be maintained to all driveways throughout the construction period, unless suitable arrangements have been made with the property owner and the appropriate road authority to provide an alternative access or temporary closure.

All elements of a traffic management concept must be approved by the affected road authorities, in consultation with the Police and Fire Departments and Ambulance Services, prior to the award of a construction contract.

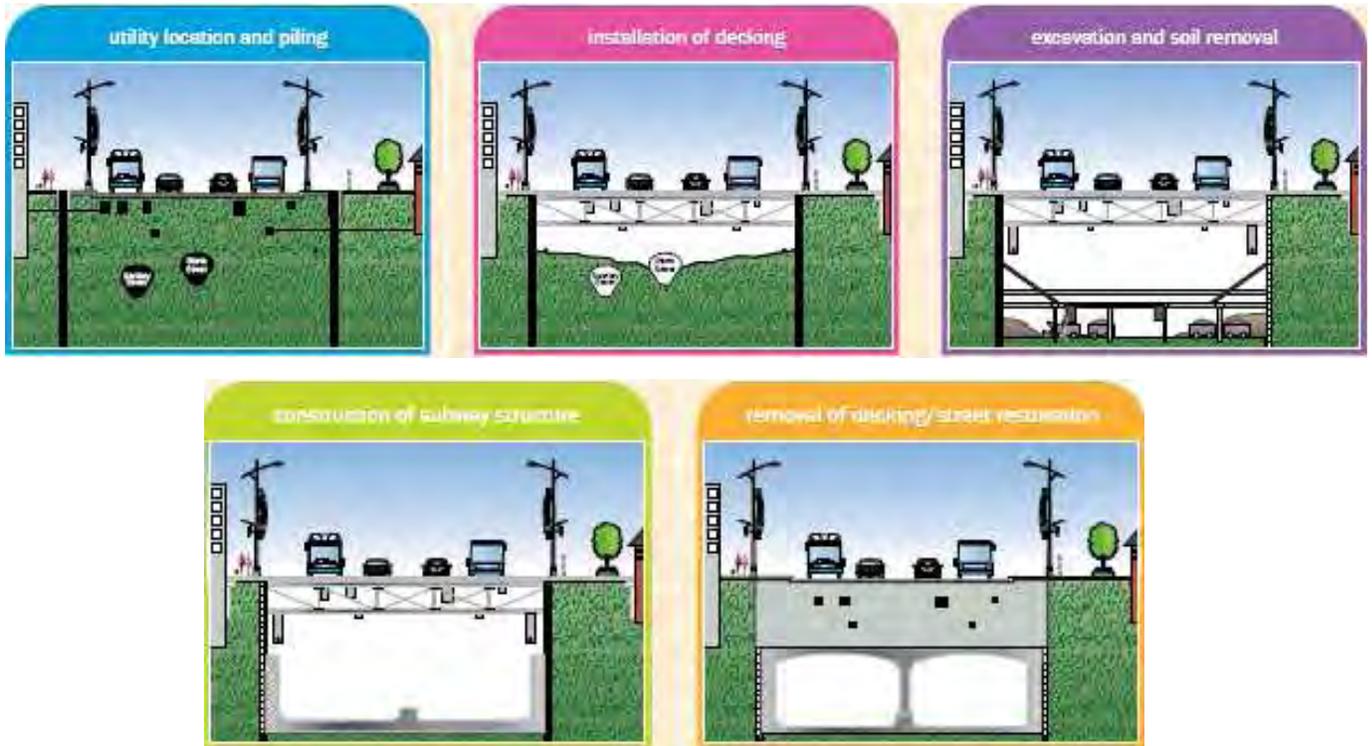
Prior to the start of construction, the Proponent will organize information sessions, as required, with the local community and business groups to explain the construction activities and restrictions, as well as to establish lines of communication.

Construction and proposed staging procedures will have temporary and/or permanent effects. For each subway station, a specific construction and staging plan will be developed during detailed design and will be implemented during construction based on traffic management principles that have proven successful on other similar subway construction projects including the Spadina subway project which is currently being

implemented based on such principles. An example of the traffic management principles to be developed and applied to the Transit Project are outlined above.

Exhibit 4-22 identifies the anticipated staging associated with the subway station and special trackwork sections utilizing the cut-and-cover construction method. The need for decking over the construction site will be determined on a site-by-site basis during detailed design.

**Exhibit 4-22: Typical Station Staging**



Construction staging will be required at the following areas:

- All subway stations;
- East Don River Bridge;
- Special trackwork locations;
- Tunnel boring launch and extraction locations; and
- Steeles Avenue Bus Terminal.

The preliminary staging requirements for the various sites are discussed below.

#### **4.3.4.2 Cummer / Drewry Station**

In order to construct the Cummer / Drewry Station, including the reconstruction of the existing tail tracks north of Finch Station and the completion of the triple track structure, localized lane closures and lane diversions will be required. Temporary decking will be required to maintain an appropriate number of traffic lanes through the construction area.

In order to define the construction staging requirements, additional traffic analysis will be completed during detailed design to confirm the temporary lane configuration along Yonge Street and Cummer / Drewry.

The City of Toronto and TTC will also review the possible implementation of the Service Road south of Drewry Avenue to provide additional road capacity in the vicinity of the subway station construction area.

#### **4.3.4.3 Steeles Station (TBM Launch site, Station, Crossover and Bus Terminal)**

In order to construct the Steeles Station and Bus Terminal, as well as the track crossover and accommodate the TBM launch site, construction staging and Traffic Management Plan will be developed during detailed design. Construction at the site will directly impact roads under the jurisdiction of York Region and City of Toronto. Impacts to roads under the jurisdiction of the City of Vaughan and Town of Markham will also be determined during detailed design. The final configuration of the roadway cross sections along Steeles Avenue and Yonge Street in the vicinity of the subway station will be confirmed during detailed design.

#### **4.3.4.4 Clark Station**

In order to construct the Clark Station, localized lane closures and lane diversions will be required. Temporary decking will be required to maintain an appropriate number of traffic lanes through the construction area. In order to define the construction staging requirements, additional traffic analysis will be completed during detailed design to confirm the lane configuration along Yonge Street. The opportunity may exist to reduce the existing number of lanes from the current condition during construction based on the overall traffic management principles developed for the project.

#### **4.3.4.5 East Don River Construction Staging**

In order to construct the East Don River Bridge crossing, the existing Yonge Street roadway will be diverted to the west side of Yonge Street to provide sufficient area to construct the bridge and the approaches. The preliminary staging of the East Don River Bridge are discussed in detail in Appendix C, East Don River Crossing Report.

#### **4.3.4.6 Royal Orchard Station**

The construction staging requirements for the Royal Orchard Station will be directly impacted by the traffic staging requirements for the north approach to the East Don River Bridge construction. The preliminary traffic staging for bridge construction is to shift Yonge Street in a 4-lane configuration to the west side of the right-of-way. Temporary decking will be required at the station construction area to maintain an appropriate number of traffic lanes through the construction area. Special consideration will be given during detailed design of the traffic staging as a result of the heritage properties on the west side of Yonge Street at this location.

#### **4.3.4.7 Langstaff / Longbridge Station**

In order to construct the Langstaff / Longbridge Station, localized lane closures and lane diversions will be required. Temporary decking will be required to maintain an

appropriate number of traffic lanes through the construction area. In order to define the construction staging requirements, additional traffic analysis will be completed during detailed design to confirm the lane configuration along Yonge Street. Any lane diversions will be to the west side of Yonge Street as a result of the Holy Cross Cemetery on the east side of Yonge Street at this location.

Currently Yonge Street transitions from 2 lanes to 3 lanes per direction approximately 100 metres north of the Longbridge / Yonge Street intersection. This widening is a result of the configuration for the Yonge Street / 407 interchange. Temporary conditions during construction will require coordination with 407/MTO to ensure the interchange operates to the satisfaction of all parties.

#### **4.3.4.8 Richmond Hill Centre Station**

In order to construct the Richmond Hill Centre Station, the existing buildings located over the station box must be demolished and the existing bus terminal temporarily relocated. Once these facilities have been cleared, construction of the station can be completed. The completion of the station construction under High Tech Road will require construction staging to maintain an appropriate number of traffic lanes on High Tech Road and minimize impacts to the existing bridge over the CN right-of-way.

#### **4.3.5 Commissioning**

Upon completion of the subway construction (running structure and stations) the subway operator will commence commissioning of the systems which will have impacts and mitigation as noted in Section 5.4, Operations and Maintenance Impacts.

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

### 5.1 Introduction

This section of the EPR:

- 1) Describes the environment that will be affected or might reasonably be affected;
- 2) Describes the potential impacts;
- 3) Describes mitigation measures (to minimize, manage, prevent and avoid environmental effects); and
- 4) Proposes monitoring and contingency measures for the Transit Project described in Section 4.0 (if required).

#### 5.1.1 Interactions between the Transit Project and the Environment

The environmental impacts of the Transit Project can be classified under three categories:

- 1) **Displacement of Existing Features by the Transit Project** - These include existing features within the Study Area which will be directly affected by the introduction of the subway tunnels, stations, commuter facilities and ancillary facilities. These are permanent impacts;
- 2) **Construction Impacts** - These are short-term potential impacts resulting from construction activities; and
- 3) **Operational Impacts** - These are ongoing, long-term effects arising from the operation and maintenance of the Transit Project.

The level of interaction between an activity/component and an area of potential environmental impact includes: none, weak, moderate and strong. These terms were defined as follows:

- 1) None = no probability of an interaction. As a result, no additional discussion and documentation is required in support of this project.
- 2) Weak = a low probability of an interaction. A general discussion is provided in this section, but given the anticipated low probability and/or significance, no additional commitments or follow up actions are required.
- 3) Moderate = a moderate probability of an interaction. A more detailed discussion accompanied with supporting supplemental analysis and possible mitigating measures and commitments.
- 4) Strong = a high probability of an interaction. These issues are usually regulated or closely monitored by government agencies and will require detailed analysis to quantify the potential impact and the anticipated effect of mitigation measures. Future commitments for elements with strong interactions are addressed by this project.

The interactions matrix helped to determine the extent of interaction between project components and environmental components. The interactions matrix is presented in Exhibit 5-1.

Notes for Exhibit 5-1:

- 1) Level of interaction: “-“ = None “W” = Weak “M” = Moderate “S” = Strong
- 2) For indirect impacts to residents - refer to noise, vibration and air quality.
- 3) Dust, mud and litter are addressed in air quality, soil and aesthetics.
- 4) For impacts to land use, refer to residential areas, commercial areas, business impacts, recreation areas and aesthetics.
- 5) C&C - Cut-and-cover Construction.
- 6) T - Tunnelling by Earth Pressure Balanced Tunnel Boring Machines.

**Exhibit 5-1: Interactions Matrix**

Environmental Features	Natural Environment (Subsection 1)									Socio-Economic (Subsection 2)								Culture (Subsection 3)			Transportation (Subsection 4)			Utilities (Subsection 5)	
	Fisheries and Aquatic Habitat	Vegetation, Wildlife and Terrestrial Habitat	Wetlands	Species at Risk	Soils	Groundwater	Drainage and Stormwater Management	Air Quality	Contaminated Properties	Residential Areas	Commercial Areas	Recreation Areas	Noise	Vibration	Electromagnetic Interference (EMI)	Stray Current	Aesthetics	Human Health and Safety	Built Heritage and Cultural Heritage Landscapes	Archaeological Features	Aboriginal Rights and Lands/Resources Used for Traditional Purposes	Automobile Traffic and Transit Service	Pedestrians and Cyclists	Rail	Service and Facilities
<b>Section 5.2: Displacement of Existing Features</b>	Finch Station to Cummer / Drewry Station (C&C)	-	-	-	-	W	W	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cummer / Drewry Station (Platform, Concourse, Entrances) (C&C)	-	W	-	-	W	W	-	W	S	S	-	-	-	-	-	M	-	M	W	-	-	-	-	-
	Cummer / Drewry Station to south of Steeles Station (T)	-	-	-	-	W	-	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	South of Steeles Station to Steeles Station (C&C)	-	-	-	-	W	W	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Steeles Station (Platform, Concourse, Entrances) (C&C)	-	W	-	-	W	W	-	W	S	S	-	-	-	-	-	S	-	W	W	-	-	-	-	-
	Steeles Station – Bus Terminal	-	-	-	-	W	W	-	W	S	S	-	-	-	-	-	S	-	W	W	-	-	-	-	-
	Steeles Station – PPUDO	-	W	-	-	W	W	-	W	S	S	-	-	-	-	-	S	-	W	W	-	-	-	-	-
	Steeles Station to Clark Station (T)	-	-	-	-	W	-	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Clark Station (Platform, Concourse, Entrances) (C&C)	-	W	-	-	W	W	-	W	S	S	-	-	-	-	-	M	-	W	-	-	-	-	-	-
	Clark Station to south of East Don River (T)	-	-	-	-	W	-	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	South of East Don River to Royal Orchard Station (C&C, Bridge Construction, C&C)	S	S	-	-	W	S	-	W	S	S	M	-	-	-	-	S	-	M	M	W	-	-	-	-
	Royal Orchard Station (Platform, Concourse, Entrances) (C&C)	-	W	-	-	W	W	-	W	S	S	-	-	-	-	-	M	-	M	-	-	-	-	-	-
	Royal Orchard Station to Langstaff / Longbridge Station (T)	-	-	-	-	W	-	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Langstaff / Longbridge Station (Platform, Concourse, Entrances) (C&C)	-	W	-	-	W	W	-	W	S	S	-	-	-	-	-	M	-	W	W	-	-	-	-	-
	Langstaff / Longbridge Station – Parking Lot	-	M	-	-	W	S	-	W	S	S	-	-	-	-	-	S	-	W	W	-	-	-	-	-
	Langstaff / Longbridge Station to south of Richmond Hill Centre Station (T)	-	-	-	-	W	-	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	South of Richmond Hill Centre Station to Richmond Hill Centre Station (C&C)	-	W	-	-	W	W	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Richmond Hill Centre Station (Platform, Concourse, Entrances) (C&C)	-	-	-	-	W	W	-	W	M	M	-	-	-	-	-	M	-	W	-	-	-	-	-	-
	Richmond Hill Centre Station – Bus Terminal	-	-	-	-	W	W	-	W	M	M	-	-	-	-	-	M	-	W	-	-	-	-	-	-
	Richmond Hill Centre Station – PPUDO	-	-	-	-	W	W	-	W	M	M	-	-	-	-	-	M	-	W	-	-	-	-	-	-
Tailtrack North of Richmond Hill Centre (C&C)	-	-	-	-	W	-	-	W	M	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Emergency Exit Buildings	-	W	-	-	W	-	-	W	S	S	-	-	-	-	-	M	-	W	-	-	-	-	-	-	
Ventilation Shafts	-	-	-	-	W	-	-	W	S	S	-	-	-	-	-	M	-	W	-	-	-	-	-	-	
<b>Section 5.3: Construction Impacts</b>	Building Demolition	-	-	-	-	-	W	W	M	S	S	-	M	M	-	-	M	S	W	-	-	-	-	W	
	Contaminated Site Clean-up	-	W	-	-	S	W	W	S	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-	
	Surface Utility Relocation	-	W	-	-	-	-	-	-	W	W	-	-	-	-	-	-	-	-	-	-	W	W	-	S
	Subsurface Utility Relocation	-	-	-	-	W	W	-	-	W	W	-	-	-	-	-	-	-	-	-	-	W	W	-	S
	Cut-and-cover Construction	S	M	-	-	W	M	W	W	M	M	M	S	S	-	-	M	W	-	W	-	S	S	-	S
	Tunnelling	-	-	-	-	W	M	-	-	W	W	-	-	W	-	-	M	W	-	-	-	-	-	W	S
	Soil Removal and Disposal	-	-	-	-	S	-	-	W	S	-	-	-	-	-	-	M	-	-	W	-	-	-	-	-
	Dewatering	-	-	-	-	S	M	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S
	Unwatering – Surface Water	-	-	-	-	-	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reinforcement of Existing Buildings	-	-	-	-	W	-	-	W	S	S	-	-	S	-	-	-	W	W	-	-	-	-	-	-
	Erosion and Sedimentation Control	W	-	-	-	W	-	S	-	W	-	-	-	-	-	-	M	-	-	-	-	-	-	-	-
	Heavy Equipment Operations and Maintenance	W	W	-	-	W	W	W	-	W	-	M	S	M	-	-	M	W	-	-	-	-	-	-	-
	Traffic Management	-	-	-	-	-	-	-	W	-	M	M	W	-	-	-	-	W	-	-	-	S	S	-	-
	Material Import / Storage / Stockpiling	-	-	-	-	-	-	-	W	M	M	-	W	-	-	-	M	-	-	-	-	W	W	-	-
	<b>Section 5.4: Operations and Maintenance</b>	Subway Operations	-	-	-	-	-	-	-	-	-	W	M	M	M	M	-	-	-	-	-	-	-	-	-
Track and Structure Maintenance		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stormwater Management		-	-	-	-	-	S	-	W	-	-	-	-	-	-	-	W	-	-	-	-	-	-	-	
Bus Operations		-	-	-	-	-	-	-	S	-	-	-	S	M	-	-	-	-	-	-	-	M	W	-	-
Parking and PPUDO		-	-	-	-	-	S	S	-	-	-	-	S	-	-	-	W	-	-	-	-	S	W	-	-
Station Maintenance (Cleaning, Deliveries, State of Good Repair)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M	-	-	-	-	-	-	-
Testing of Emergency Equipment		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Legend</b>	<p><b>Level of interaction:</b> “-“ = None “W” = Weak “M” = Moderate “S” = Strong                      The level of interaction between an activity/component and an area of potential environmental impact includes: none, weak, moderate and strong. These terms were defined as follows:                      None = no probability of an interaction.                      Weak = a low probability of an interaction.                      Moderate = a moderate probability of an interaction.                      Strong = a high probability of an interaction.</p>																								

## 5.2 Displacement of Existing Features

This section discusses the permanent displacement impacts associated with the built form (i.e. tunnels, station entrances, parking lots, etc.) of the Transit Project. Impacts that are temporary and occur only during construction are discussed in detail in Section 5.3. The operations and maintenance of the Transit Project (i.e. subway trains operating along this extension, the feeder bus network at Richmond Hill Station and Steeles Station, associated automobile traffic for the commuter parking lot and PPUDO) are discussed in detail in Section 5.4.

### 5.2.1 Natural Environment

#### 5.2.1.1 Fisheries and Aquatic Habitat

##### Environmental Impacts

The proposed work at the main branch of the East Don River Valley involves removing the existing open bottom concrete arch culvert (46 m length x 12 m width x 5.8 m height) and replacing it with a bridge structure. The new bridge will provide a clear span of the river with bridge piers and abutments in the valley. No permanent impacts to the watercourse (loss of habitat) will occur. This project will result in a net benefit at the East Don River as the valley will be re-naturalized and the existing culvert will be replaced. The potential impacts associated with construction and the proposed mitigation (including re-naturalization) and monitoring requirements are outlined in Section 5.3.1.1.

Several tributaries of the East Don River lie within the vicinity of Yonge Street as shown in Figure 1 of Appendix K. There will be no direct impact to these watercourses by the proposed Yonge Street Subway works.

The Preliminary Geotechnical Report produced by Golder & Associates concluded that, based on the level of investigation completed thus far, it is anticipated that the effects on any groundwater flow on nearby watercourses (East Don River and Pomona Creek), as a result of the Transit Project if any, will be maintained to environmentally acceptable levels through appropriate combinations of dewatering, groundwater inflow mitigation measures, and contingency plans developed through the course of additional investigations, detailed design, and continued consultation with the TRCA and MOE regulatory agencies.

#### 5.2.1.2 Vegetation, Wildlife and Terrestrial Habitat

The alignment and station locations recommended for the Transit Project avoid most of the communities/ecosystems located within the Study Area.

All tunnel boring machine launch and extraction locations are located within existing paved parking lot areas or within the Yonge Street right-of-way. Specifically there are 3 tunnelling projects contemplated for the Transit Project:

- Launch from the Richmond Hill Centre station area in a parking lot and be extracted near Royal Orchard Station within the Yonge Street right-of-way.

- Launch northbound from Steeles Avenue within the Yonge Street right-of-way and be extracted approximately 100 m south of East Don River within the Yonge Street right-of-way.
- Launch southbound from Steeles Avenue within the Yonge Street right-of-way and be extracted near Cummer/Drewry Station within the Yonge Street right-of-way.

Implementation of the subway trainway will be completed through a cut-and-cover process within a road allowance or other previously disturbed areas for the following sections:

- From the north end of the Richmond Hill Centre Station to the end of the proposed tail tracks north of Richmond Hill Centre Station
- From the south end of Royal Orchard Station to 100 m south of the East Don River; and,
- From the south end of the Cummer/Drewry Station to the existing tail tracks north of Finch Station.

The extents of tunnelling and cut-and-cover construction are identified in Exhibit 4-19.

The construction of the East Don River Bridge will result in impacts to existing vegetation and terrestrial habitat, but as these impacts will be mitigated through replanting and renaturalization of the East Don River valley, this project will result in a net benefit at the East Don River.

Terrestrial communities/ecosystems will be displaced at the proposed commuter parking lot during construction activities and there may also be limited removal of urban and landscape vegetation for the construction of subway stations. However, all vegetation communities located within the Study Area are considered widespread and common in Ontario and secure globally and locally. The potential impacts associated with construction and the proposed mitigation and monitoring requirements are outlined in Section 5.3.1.2.

Ornamental and naturally occurring vegetation is located along City streets and on private land within the Study Area. This vegetation provides habitat for birds and small mammals, shade, soil stabilization, aesthetic appeal and carbon cycling through respiration. The potential impacts associated with construction and the proposed mitigation (including re-planting) and monitoring requirements are outlined in Section 5.3.1.2.

### **5.2.1.3 Wetlands**

There are no provincially significant or non-provincially significant wetlands located within the project area. No unevaluated wetlands were observed during field investigations.

#### **5.2.1.4 Species at Risk**

There are no permanent displacement impacts to aquatic, vegetation, or wildlife species at risk associated with the Transit Project.

#### **5.2.1.5 Soils**

There are no permanent displacement impacts to soils associated with the Transit Project. All impacts are transient and relate to the construction of the Transit Project. The potential impacts associated with construction and the proposed mitigation and monitoring requirements are outlined in Section 5.3.1.5.

#### **5.2.1.6 Groundwater**

As geodrains, wells, and other permanent dewatering systems are not used around the Project, no long-term effect on groundwater is anticipated. There are no permanent displacement impacts to groundwater associated with the Project. All impacts are transient and relate to the construction of the Transit Project. The potential impacts associated with construction and the proposed mitigation and monitoring requirements are outlined in Section 5.3.1.6.

#### **5.2.1.7 Drainage and Stormwater Management**

##### **Environmental Impacts**

Given the urban nature of the corridor, the project will not add significant impervious areas (minor areas associated with some entrance structures). The exception is at the Langstaff / Longbridge Station, where a Commuter Parking lot is proposed. The placement of these permanent facilities with impervious areas may affect the drainage characteristics of the subwatersheds. Consideration will be taken to ensure any drainage towards the residential properties is minimized.

The corridor is mostly urbanized and there are generally limited opportunities to provide storm water management for runoff associated with the Transit Project. The details of new storm water management facilities to be included as part of the Transit Project will be developed during the detailed design phase and will be discussed with the appropriate approval agency (local municipality and TRCA).

Most of the run-off in the area is captured through the municipal sewer system. From a drainage perspective, the one area with the potential for change is at the East Don River crossing at Yonge Street where the existing culvert is being replaced by a bridge. A hydraulic analysis was carried out to determine what, if any, impacts on flooding might occur at this location. The proposed conceptual bridge has a deck elevation of approximately 175, a soffit elevation of 165 m. Analysis was carried out using HEC-RAS and the Toronto and Region Conservation Authority's existing updated Don River watershed model.

As detailed in the Stormwater Management Preliminary Assessment provided as Appendix G, the flood levels for storms under the Regional storm remain unchanged and flood levels drop under the 100-year storm.

The storm water management options to be considered during detailed design are identified in the mitigation section. The potential impacts associated with construction and the proposed mitigation and monitoring requirements are outlined in Section 5.3.1.7. The following outline the mitigation and monitoring proposed for permanent facilities.

## Mitigation

Overall, the alternative storm water management treatments to be considered when preparing the storm water management plan during detailed design include:

- Grassed swales - where the roadway has a rural cross-section and/or there is no existing development adjacent to the right-of-way.
- Enhanced swale - flat bottom and rock flow check - where a basic grassed swale does not meet the design criteria (velocity  $\leq 0.5$  m/s; depth  $\leq 0.25$  m) and/or to further enhance the water quality treatment.
- Wet pond - where the contributing drainage area is greater than 5 ha and suitable space is available within the right-of-way or an adjacent undeveloped area.
- Oil/grit separator - for water quality treatment as appropriate.

At station locations, mitigation is proposed where applicable:

- *Cummer/Drewry Station (Yonge Street – Finch Street to Steeles Avenue):* The roadway drains from north to south and the area is completely urbanized. There are no opportunities for grassed swales or wet ponds within or adjacent to the right-of-way.
- *Steeles Station (Yonge Street – Steeles Avenue to north of Meadowview Avenue – Intermodal Station):* The roadway drains from north to south and the area is completely urbanized. There are no opportunities for grassed swales or wet ponds within or adjacent to the right-of-way.

Steeles Station will be an intermodal station for York Regional Transit, Viva, and TTC. A major bus terminal is proposed underground along Steeles Avenue. The new entrance/exit ramps will require widening of Steeles Avenue and Yonge Street which will provide some additional runoff.

- *Clark Station (Yonge Street – North of CN Rail Crossing to Centre Street):* The Yonge Street storm sewers connect to sewers on the cross roads. The area is completely urbanized and there are no opportunities for grassed swales or wet ponds within or adjacent to the right-of-way.
- *Royal Orchard Station (Yonge Street - Centre Street to north of Bunker Road):* This section of Yonge Street section drains from both the south and the north to the East Don River. Grassed swales, riprap lined channels and rock flow checks are proposed prior to the runoff outletting to the East Don River.
- *Langstaff / Longbridge Station (Yonge Street and Langstaff Road - North of Bunker Road to Highway 7):* This section of Yonge Street drains northward and southward to the Pomona Mills Creek crossing located on Langstaff Road east of Yonge Street. Grassed swales are proposed along Langstaff Road for quality and quantity treatment of runoff from any expansion to Yonge Street.

A commuter parking lot of approximately 15 ha is proposed in the Hydro corridor west of Yonge Street. The drainage for the affected area is split, with some draining eastward to Pomona Mills Creek and the remainder draining west to the East Don River. Two separate quality and quantity treatment facilities will be implemented to capture, treat and release the runoff from the new parking lot. As well, alternative strategies for runoff attenuation, reduction and/or treatment will be investigated in the subsequent design phase.

A rehabilitation project for Pomona Mills Creek has been identified as part of the requirements for the development of the Langstaff lands under the guidance of the Town of Markham and TRCA.

- Richmond Hill Station (Yonge Street and Highway 7 – Intermodal Station):* This section drains southward to an existing stormwater pond in the interchange between Yonge and Highway 7 (northeast quadrant) that outlets to Pomona Mills Creek. All new amenities will be built within existing impervious (parking) areas. There will be no negative impact on the existing drainage system by any new station development.

Design criteria have been established by the City of Toronto in accordance with the Wet Weather Flow Management Policy (August 2003) and Sewer Use By-law (available on the City of Toronto’s website) and interim objectives to address water balance, water quality and water quantity. TTC’s Design Standards, Volume 1 has also established criteria to address both surface water quantity and quality.

Design criteria for stations within York Region have been established variously by the Town of Richmond Hill, Town of Markham and City of Vaughan, and will be utilized for stations north of Steeles Avenue.

To offset these potential impacts, lot level controls will be implemented to reduce peak run-off rates where practicable. The proposed approach to stormwater management at station locations is summarized in Exhibit 5-2.

**Exhibit 5-2: Stormwater Management for Subway Stations**

Station	Recommended Design		
	Quantity Control	Quality Control	Water Balance
Cummer/Drewry	Roof Control Drains on all above ground buildings.	Not Required.	City of Toronto’s WWFMMP Water Balance Requirements
Steeles	Roof Control Drains on all above ground buildings.  Lot level controls including parking lot storage.	Oil / grit separators for PPUDO, commuter parking lots and bus terminals, as part of a “treatment train” approach to stormwater management.	City of Toronto’s WWFMMP Water Balance Requirements.

Station	Recommended Design		
	Quantity Control	Quality Control	Water Balance
Clark	Roof Control Drains on all above ground buildings.	Not Required.	Requirements as established by Town of Markham and City of Vaughan
Royal Orchard	Roof Control Drains on all above ground buildings.	Not Required.	Requirements as established by Town of Markham and City of Vaughan
Langstaff/Longbridge	Roof Control Drains on all above ground buildings.  Lot level controls including parking lot storage.  Stormwater Management Ponds	Oil/grit separators, wet ponds and/or enhanced swales for PPUDO, and commuter parking lots as part of a “treatment train” approach to stormwater management.	Requirements as established by Town of Markham and City of Vaughan
Richmond Hill Centre	Roof Control Drains on all above ground buildings.  Utilization of existing stormwater management pond.	Oil / grit separators for PPUDO, commuter parking lots and bus terminals, as part of a “treatment train” approach to stormwater management.	Requirements as established by Town of Richmond Hill

**5.2.1.8 Air Quality**

There are no permanent air quality impacts associated with the Transit Project. There are transient impacts that relate to the construction of the Transit Project and localized impacts associated with the vehicular activity that will be associated with bus and automobile operations in the vicinity of the proposed Steeles Station, Langstaff / Longbridge Station, and the Richmond Hill Centre Station. Details are provided in Sections 5.3.1.8 and 5.4.1.8.

**5.2.1.9 Contaminated Properties**

A number of broad areas of potential environmental concern (APECs) were identified. These areas have been categorized by assessing the overall relative potential of contamination from the findings of the Contamination Overview Study discussed in Section 3.1.8 and provided as Appendix I. The areas/activities that could result in potential soil and/or groundwater contamination are summarized below:

- **Area 1** – This area consists of commercial activities located on the east side of Yonge Street between High Tech Road and Westwood Avenue. According to

information obtained through Ecolog ERIS, fuel storage tanks and pesticide storage are located in this area.

- **Area 2** - This area consists of commercial/industrial activities located on the east side of Yonge Street between Highway 407 and Thornheights Road. According to information obtained through Ecolog ERIS, fuel storage tanks, registered waste generators and manufacturing facilities are located in this area.
- **Area 3** – This area consists of commercial activities located on the east and west sides of Yonge Street between Colonsay Road and Kirk Drive. According to information obtained through Ecolog ERIS, numerous fuel storage tanks and registered waste generators are located in this area.
- **Area 4** – This area consists of commercial activities on the east and west sides of Yonge Street between Elgin Street and Centre Street. According to information obtained through Ecolog ERIS, numerous fuel storage tanks and registered waste generators are located in this area.
- **Area 5** – This area consists of commercial facilities on the east and west sides of Yonge Street between Clark Avenue and Ontonabee Avenue. According to information obtained through Ecolog ERIS, numerous fuel storage tank, registered waste generators and pesticide storage sites are located in this area.
- **Area 6** - This area consists of commercial facilities on the east and west sides of Yonge Street between Holmes Avenue and Centre Avenue. According to information obtained through Ecolog ERIS, numerous fuel storage tank, registered waste generators, pesticide storage sites and manufacturing facilities are located in this area.

## Mitigation

A risk analysis will be performed for the APECs identified prior to construction to determine the presence or absence of environmental impacts to soil and groundwater, and to assess the appropriate management of excess materials (contaminated and non-contaminated). Any subsurface investigation can be performed in coordination with the geotechnical investigation, where feasible. The number and depth of boreholes required to address contamination risks identified will need to be determined on a case-by-case basis, and should take into consideration the proximity of the preferred route to land use activities suspected of having a potential for site contamination, the depth of proposed cuts, and geologic and hydrogeologic conditions.

Based on the results of the subsurface investigation and the proposed earthworks excavations, an Excess Materials Management Plan (EMMP) will be developed prior to, and implemented during construction. The purpose of the EMMP is to provide a pragmatic approach to managing excess materials and groundwater generated during construction of the Yonge Subway with due regard to environmental regulations and guidelines (Ontario Regulation 347, Ontario Regulation 153/04, OPSS 180, and municipal sewer use by-laws). Excess materials that could be typically encountered during construction include earth and rock (contaminated and non-contaminated), concrete, asphalt and other extraneous solid material; and groundwater (contaminated and non-contaminated).

## 5.2.2 Socio-Economic Environment

### 5.2.2.1 Buildings and Property (Property Acquisition)

The majority of the subway alignment utilizes the municipal road allowance. However, certain sections of the alignment cross beneath private properties as well as public lands. In addition, portions of private holdings will need to be acquired along the proposed alignment to accommodate bus terminals, station facilities and emergency exit buildings.

There are three basic types of property acquisition necessary in order to obtain the parcel of land required to construct the Transit Project:

- 1) Full Taking - an entire piece of privately owned property including air rights. This is required where a surface facility, such as a bus terminal, will occupy all of the affected property.
- 2) Partial Taking - a portion of privately owned property. This would occur in a scenario where a surface feature (such as an Emergency Exit Building or a vent shaft) occupies only a small portion of the overall property. The lands required for the project would be severed from the remaining property.
- 3) Subsurface Taking - an underground corridor through a property. This would apply for all tunnelled sections of the Transit Project.
- 4) Temporary Taking – temporary easements for a limited period of time in order to construct the Transit Project. These takings typically have no implications following the completion of construction.

Property parcels of various sizes will be necessary at the proposed subway stations as a result of the planned station amenities, including bus terminals, passenger pick-up / drop-off facilities, station entrance buildings, vent structures and substations.

The issue of business disruption for those businesses that will be permanently displaced is discussed below. All business disruption impacts that are transient and relate to the construction of the Transit Project are discussed in Section 5.3.2.1.

Locations of the impacted properties identified to date are outlined in the paragraphs and tables below. The property requirements identified in this study are preliminary and subject to change as the detailed design of the Transit Project proceeds. Given the preliminary nature of the design, no temporary needs have been identified. However, heavy equipment maintenance, storage / material lay-down areas and temporary easements for elements like temporary road diversions are a requirement of subway construction. These needs will be identified during the detailed design.

#### 5.2.2.1.1 Cummer/Drewry Station

For the Cummer/Drewry Station location, it is anticipated that a total of 7 properties will be impacted to provide for entrances and vent shafts for the station. Three properties on the north side of Drewry Avenue will be required to provide for the proposed bus turnaround loop. Exhibit 5-3 contains the full list of preliminary property requirements at Cummer/Drewry Station.

**Exhibit 5-3: Preliminary Property Requirements at Cummer / Drewry Station**

Physical Address	Full Taking	Partial Taking
5799 to 5915 YONGE STREET	N/A	Vent and Entrance
3 to 21 DREWRY AVENUE	N/A	Vent and Entrance
5925 to 5931 YONGE STREET	Entrance	N/A
5959 YONGE STREET	N/A	Vent
5995 to 5997 YONGE STREET	N/A	Vent
6000 YONGE STREET	N/A	Entrance / Vent
6002 YONGE STREET	N/A	Vent
50 DREWRY AVENUE	Bus Loop	N/A
52 DREWRY AVENUE	Bus Loop	N/A
58 DREWRY AVENUE	Bus Loop	N/A

*5.2.2.1.2 Steeles Station*

For the Steeles Station location, it is anticipated that a total of 68 partial or full takings of residential and commercial properties will be required in order to widen Steeles Avenue and Yonge Street based on the preferred plan. Along the south side of Steeles Avenue, immediately east of Yonge Street and extending to Willowdale Avenue, a row of approximately 28 residential properties will need to be acquired.

Exhibit 5-4 contains a full list of preliminary property requirements at Steeles Station.

**Exhibit 5-4: Preliminary Property Requirements at Steeles Station**

Physical Address	Full Taking	Partial Taking
6301 to 6307 YONGE ST	N/A	Road Widening
6309 6313 YONGE ST	N/A	Road Widening
6321 YONGE ST	N/A	Road Widening
6321 YONGE ST	N/A	Road Widening
6347 YONGE ST	N/A	Road Widening
6349 6353 YONGE ST	N/A	Road Widening
6355 YONGE ST	N/A	Road Widening
6365 YONGE ST	N/A	Road Widening
6369-6375 Yonge Street	N/A	Road Widening / Vent
6979-6991 Yonge Street	N/A	Road Widening / Entrance;
1 STEELES AVE E	Bus Terminal	N/A
7 STEELES AVE E	Bus Terminal / Road Widening	N/A
9 STEELES AVE E	Road Widening	N/A
11 STEELES AVE E	Road Widening / Electrical Substation	N/A
13 STEELES AVE E	Road Widening / Electrical Substation	N/A
15 STEELES AVE E	Road Widening	N/A
19 STEELES AVE E	Road Widening	N/A
21 STEELES AVE E	Road Widening	N/A
23 STEELES AVE E	Road Widening	N/A
25 STEELES AVE E	Road Widening	N/A

Physical Address	Full Taking	Partial Taking
TTC Bus Loop	Road Widening	N/A
31 STEELES AVE E	Road Widening	N/A
33 STEELES AVE E	Road Widening	N/A
35 STEELES AVE E	Road Widening	N/A
41 STEELES AVE E	Road Widening	N/A
43 STEELES AVE E	Road Widening	N/A
45 STEELES AVE E	Road Widening	N/A
47 STEELES AVE E	Road Widening	N/A
49 STEELES AVE E	Road Widening	N/A
51 STEELES AVE E	Road Widening	N/A
53 STEELES AVE E	Road Widening	N/A
55 STEELES AVE E	Road Widening	N/A
57 STEELES AVE E	Road Widening	N/A
59 STEELES AVE E	Road Widening	N/A
61 STEELES AVE E	Road Widening	N/A
63 STEELES AVE E	Road Widening	N/A
65 STEELES AVE E	Road Widening	N/A
67 STEELES AVE E	Road Widening	N/A
69 STEELES AVE E	Road Widening	N/A
71 STEELES AVE E	Road Widening	N/A
7015 YONGE ST	N/A	Road Widening / Entrance
7027 YONGE ST	N/A	Road Widening / Vent
7037-7039 YONGE ST	N/A	Road Widening
7043 YONGE ST	N/A	Road Widening
7045 YONGE ST	N/A	Road Widening
7047-7049 YONGE ST	N/A	Road Widening
7051-7053 YONGE ST	N/A	Road Widening
7057 YONGE ST	N/A	Road Widening
7059 YONGE ST	N/A	Road Widening
7061 YONGE ST	N/A	Road Widening
7069-7073 YONGE ST	N/A	Road Widening
7079 YONGE ST	N/A	Road Widening
7089 YONGE ST	N/A	Road Widening
7092 YONGE ST	N/A	Road Widening
Surface Lot b/w 7064 Yonge Street and 7092 Yonge Street	N/A	Road Widening
7064 YONGE ST	N/A	Road Widening
7040-7054 YONGE ST	N/A	Road Widening / Entrance
7028 YONGE ST	N/A	Road Widening / Vent
2 STEELES AVE W	N/A	Road Widening
72 STEELES AVE W	N/A	Road Widening
88 STEELES AVE W	N/A	Road Widening
92 STEELES AVE W	N/A	Road Widening
100 STEELES AVE W	N/A	Road Widening
180 STEELES AVE W	N/A	Road Widening
212 STEELES AVE W	N/A	Road Widening
222 STEELES AVE W	N/A	Road Widening
228 STEELES AVE W	N/A	Road Widening
6212 6600 YONGE ST	N/A	Road Widening / bus terminal / vent / entrances

5.2.2.1.3 Clark Station

For the Clark Station location, it is anticipated that a total of 7 properties will be impacted to provide for entrances and vent shafts for the station. Exhibit 5-5 contains the full list of preliminary property requirements at Clark Station.

**Exhibit 5-5: Preliminary Property Requirements at Clark Station**

Physical Address	Full Taking	Partial Taking
7345-7359 YONGE ST	N/A	Optional Entrance / Alternate substation / Alternate vent
1 CLARK AVE W	N/A	Entrance
7377 YONGE ST	Vent / Entrance	N/A
7368 YONGE ST	N/A	Vent
7433 YONGE ST	N/A	Vent
7451 YONGE ST	N/A	Optional Entrance / Vent
7378 YONGE ST	N/A	Entrance / Vent

5.2.2.1.4 *Royal Orchard Station*

For the Royal Orchard Station location, it is anticipated that a total of 6 properties will be impacted to provide for entrances and vent shafts for the station. Exhibit 5-6 contains the full list of preliminary property requirements at Royal Orchard Station.

**Exhibit 5-6: Preliminary Property Requirements at Royal Orchard Station**

Physical Address	Full Taking	Partial Taking
8018 YONGE ST	N/A	Vent
10 ROYAL ORCHARD BLVD	N/A	Entrance / alternate Substation location
8051-8055 YONGE ST	Entrance / alternate Substation	N/A
8111 YONGE ST	N/A	Entrance / Vent
8088 YONGE ST	N/A	Vent
8100 YONGE ST	Entrance / Substation	N/A

5.2.2.1.5 *Langstaff/ Longbridge Station*

Given the built-up nature of most of the Transit Project alignment, the Hydro Corridor located south of Highway 407 presents the only opportunity to provide much needed commuter parking facilities for the Transit Project in a cost effective way. These facilities include:

- Commuter parking
- Storm water collection and retention
- Passenger Pick-Up and Drop Off

Each of these elements exists within existing Hydro corridors today and demonstrates that the associated risks can be effectively mitigated. It should be noted that there will not be any related public roads constructed parallel to or through the hydro corridor, nor will there be any private parking or emergency exit buildings within the hydro corridor.

The Langstaff/Longbridge station will be located on Yonge Street, adjacent to the Hydro Corridor. The station will also include station entrances and ventilation shafts, and one station entrance and one ventilation shaft can be expected to be located within or adjacent to the Hydro corridor.

It is anticipated that a total of 4 properties will be impacted to provide for entrances and vent shafts for the station. In addition, Exhibit 5-7 contains the full list of preliminary property requirements at Langstaff / Longbridge Station.

**Exhibit 5-7: Preliminary Property Requirements at Langstaff / Longbridge Station**

Physical Address	Full Taking	Partial Taking
1 LONGBRIDGE RD	N/A	Optional Entrance / Alternate Vent
8300 YONGE ST	N/A	Vent
8403 YONGE ST	Entrance / Vent	N/A
8425 YONGE ST	Entrance / Vent	N/A

Additional entrance locations will only be considered if the property owners are interested in accommodating future entrance locations on their property.

*5.2.2.1.6 Running Structure and Richmond Hill Centre Station*

The study team has worked with the municipalities, private and public land owners, and other members of the public to determine property requirements associated with the running structure along the Yonge Street corridor. The location of the proposed running structure has no direct impact on properties from Finch Station to the proposed Langstaff/Longbridge Station. However, the running structure, special track structures and Richmond Hill Centre Station will require the acquisition of an underground property taking north of the Langstaff/Longbridge Station and a partial taking of property belonging to Yonge Bayview Holding Inc. Property and an easement will be required from MTO/407ETR, and ORC. The existing York Region Bus Terminal will either be integrated, or removed and replaced as part of the station development.

The right of way under the CN York Subdivision will be addressed through a crossing agreement with CN Rail. As well, agreements to cross the hydro right-of-way and Highway 407 will also have to be negotiated.

Additionally, raising the elevation of Yonge Street across the East Don River will permanently affect the existing access to the Ladies’ Golf Club. The Ladies’ Golf Club will be provided with a permanent access of similar characteristics to the existing access approximately 20 metres south of the proposed East Don River bridge.

Exhibit 5-8 contains the full list of preliminary property requirements for the Running Structure and Richmond Hill Centre Station.

**Exhibit 5-8: Preliminary Property Requirements for Running Structure and Richmond Hill Centre Station**

Physical Address	Full Taking	Partial Taking	Subsurface Easement
N/A - YONGE BAYVIEW HOLDINGS INC	N/A	Bus Terminal	N/A
N/A - MANAGEMENT BOARD SECRETARIAT (PROVINCE OF ONTARIO)	N/A	Bus Terminal	N/A
8705-8735 YONGE	N/A	Bus Terminal, PPUDO, Entrance, Vent	Yes
50 HIGH TECH	N/A	Entrance, Vent, Electrical Substation	Yes
N/A – Town of Richmond Hill	N/A	Bus Terminal	
38 Langstaff Road East	N/A	N/A	Yes

N/A - Highway 407 - Ministry of Transportation of Ontario (MTO)	N/A	N/A	Yes
N/A – Town of Richmond Hill	N/A	N/A	Yes

5.2.2.1.7 *Emergency Exit Buildings (EEB)*

It is anticipated that a total of 4 additional properties will be impacted to provide for emergency exit buildings between stations. Exhibit 5-9 contains the full list of preliminary property requirements at these locations.

**Exhibit 5-9: Preliminary Property Requirements at Emergency Exit Buildings**

Physical Address	Full Taking	Partial Taking
N/A - ARN 190809452000200	N/A	EEB
7200 Yonge Street	N/A	EEB
8199 Yonge Street	N/A	EEB

5.2.2.1.8 *Environmental Effects and Mitigation*

All preliminary property needs identified in this Transit Project Assessment Process are for the permanent works associated with the Transit Project. Given the preliminary nature of the design, no temporary needs have been identified. However, heavy equipment maintenance, storage / material lay-down areas and temporary easements for elements like temporary road diversions or temporary replacement parking are a requirement of subway construction. These needs will be identified during the design phase.

All property acquisition required for the Transit Project in the City of Toronto will be conducted by the City of Toronto on behalf of the Toronto Transit Commission. For properties in York Region (City of Vaughan, Town of Richmond Hill, and Town of Markham), acquisition will be by York Region (coordinated with these municipalities).

In acquiring property, York Region / City of Toronto balances community need with the rights of the individual. 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 York Region / City of Toronto and the owner. If necessary, in order to protect the ability to proceed with the Transit Project, expropriation may also be utilized to acquire the necessary property.

The steps in the process are as follows:

- 1) York Region / City of Toronto contacts the owner to indicate its interest in the property and to identify issues and concerns.
- 2) York Region / City of Toronto conducts surveys, appraisals, and other property-related assessments.
- 3) 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 York Region / City of Toronto Council for approval and acceptance.

- 4) In order to protect the Transit Project schedule, York Region / City of Toronto may initiate expropriation procedures. The expropriation process may be initiated while negotiations are occurring.
- 5) 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.
- 6) York Region / City of Toronto approve the settlement and/or expropriation, and acquires the property.
- 7) If expropriated, the owner has the right to have compensation payable referred for arbitration to the Ontario Municipal Board.

The objective of the Expropriations Act is to put tenants and property owners in the same position they were in prior to the beginning of the civil 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:

- 1) **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.
- 2) **Damages Attributable to Disturbance:** These damages 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.
- 3) **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 result compensation is intended to leave the affected owner “whole” and thereby mitigating the negative impact.

#### **5.2.2.2 Noise**

There are no permanent displacement impacts associated with the Transit Project. There are transient impacts that relate to the construction of the Transit Project and localized impacts associated with the vehicular activity that will be associated with bus and automobile operations at the proposed Steeles Station, Langstaff / Longbridge Station, and the Richmond Hill Centre Station. Details are provided in Sections 5.3.2.2 and 5.4.2.2.

#### **5.2.2.3 Vibration**

There are no permanent displacement impacts associated with the Transit Project. There are transient impacts that relate to the construction of the Transit Project and localized

impacts associated with the vehicular activity for the operation of the subway, buses and automobiles. Details are provided in Sections 5.3.2.2 and 5.4.2.2.

#### **5.2.2.4 Electromagnetic Interference (EMI)**

There are no permanent displacement impacts associated with the Transit Project. There are localized impacts associated with the operation of the subway (see Section 5.4.2.3).

#### **5.2.2.5 Stray Current**

There are no permanent displacement impacts associated with the Transit Project. There are localized impacts that relate to the operation of the subway (see Section 5.4.2.4).

#### **5.2.2.6 Aesthetics**

##### **Environmental Effects**

Transit facilities will alter the visual setting of communities within which they are located. The changes brought about by the construction of a station, ventilation shafts and ancillary structures can either enhance or impair the visual setting of a community.

##### **Mitigation**

Particular attention will be paid to station layout, Emergency Exit Buildings and the East Don River bridge during the design phase to ensure that these facilities will not intrude on residential or commercial areas. All plans are subject to local municipal approvals. Aesthetic impact of the stations will be dealt with in conjunction with adjacent development at the design phase.

##### **Monitoring**

Prior to Site Plan Approval the Proponent may undertake additional public consultation during the design phase of the Stations, Emergency Exit Buildings and the East Don River bridge, which will allow the public and key stakeholders to provide additional input into the design of these surface features.

Site Plan Approval is a form of development control authorized under section 40 of the Planning Act or, in the case of the City of Toronto, through Section 114 of the City of Toronto Act, and implemented through the City of Toronto, City of Vaughan, Town of Markham, and Town of Richmond Hill.

The Site Plan Approval process will apply for all amenities that will be at or above ground (i.e. underground structures, including tunnels and the below grade portions of stations will not be subject to this process). The Site Plan Approval process will provide information on:

- The overall site layout;
- Grading and servicing plan;
- The details of any landscaping; and
- Elevation and floor plans for buildings.

### **5.2.2.7 Human Health and Safety**

There are no permanent displacement impacts associated with the Transit Project. Impacts are either transient and relate to the construction of the Transit Project, or are related to the operations and maintenance of the Transit Project (see Sections 5.3.2.6 and 5.4.2.6).

## **5.2.3 Cultural Environment**

### **5.2.3.1 Built Heritage and Cultural Heritage Landscapes**

As summarized in Section 3.3.1 and detailed in Appendix H, a number of built heritage resources and cultural heritage landscapes were identified in the study corridor. Sensitivities associated with the proposed subway station facilities in regard to the identified built heritage resources and cultural heritage landscapes are summarized below.

#### *Cummer/Drewry Station*

- Entrance area on location of No. 5925 Yonge Street, a property identified as having some heritage value, but not listed or designated. The City of Toronto may require a Heritage Impact Assessment (HIA). The need for this will be determined during detailed design, based on the specific impact and in consultation with the City of Toronto.
- Station footprint located in front of No. 5926 Yonge Street, which is listed in the *Toronto Heritage Properties Inventory*. The City of Toronto may require a Heritage Impact Assessment (HIA). The need for this will be determined during detailed design, based on the specific impact and in consultation with the City of Toronto.

#### *Royal Orchard Station*

- Located within the Vaughan Thornhill Heritage Conservation District. The City of Vaughan may require an HIA. The need for this will be determined during detailed design, based on the specific impact and in consultation with the City of Vaughan.
- Station footprint located within the Vaughan Thornhill Heritage Conservation District, and specifically in front of the No. 8000 Yonge Street, a Part IV *OHA* designated property, and the Baptist Church on the west side of Yonge Street at No. 8010 Yonge Street. The City of Vaughan may require an HIA. The need for this will be determined during detailed design, based on the specific impact and in consultation with the City of Vaughan.
- A vent shaft area is located in front of the Baptist Church on the west side Yonge Street at No. 8010 Yonge Street and the entrance to the Old Thornhill Cemetery located within the Vaughan Thornhill Heritage Conservation District. The City of Vaughan may require an HIA. The need for this will be determined during detailed design, based on the specific impact and in consultation with the City of Vaughan.

- A vent shaft area is located adjacent to No. 7951 Yonge Street, which is listed on the *Markham Register of Property of Cultural Heritage Value or Interest*. The Town of Markham may require an HIA. The need for this will be determined during detailed design, based on the specific impact and in consultation with the Town of Markham.
- Located immediately south of the station on the north side of the East Don River is the Radial Railway Stop Number 17 Radial House. The Town of Markham may require an HIA. The need for this will be determined during detailed design, based on the specific impact and in consultation with the Town of Markham.

#### *Langstaff/Longbridge Station*

- Entrance on the west side of Yonge Street, opposite Holy Cross Cemetery. No impacts are anticipated.

No impacts are anticipated at the Steeles Station, Clark Station, and Richmond Hill Centre Station.

### **5.2.3.2 Archaeological Features**

#### **Environmental Effects**

The Stage 1 archaeological assessment was completed. Ten archaeological sites have been registered within two kilometres of the study corridor, two of which are located adjacent to the Yonge Street corridor. Additionally, a review of the general physiography and local nineteenth century land use of the study corridor suggested that it has potential for the identification of Aboriginal and Euro-Canadian archaeological sites.

The field review determined that, with the exception of the East Don River crossing, the entire Yonge Street right-of-way has been heavily disturbed by previous construction activities and no further archaeological assessment is required. However, a number of locations beyond the right-of-way have remained relatively undisturbed, and they exhibit archaeological site potential. These include:

- 1) The proposed location of the Cummer/Drewry Station, as a portion of the proposed bus loop is within 100 m of an early settlement road and historic atlas depicts a homestead at the approximate location of the bus loop;
- 2) The proposed location of the Steeles Station, at the northeast corner where the proposed PPUDO location and associated roads, as a historic atlas depicts a homestead at the approximate area of the proposed PPUDO location and associated roads;
- 3) The proposed location of the Langstaff/Longbridge Station, west of Yonge Street within the Hydro Corridor (proposed park and ride lot), as it is within 300 m of the East Don River; and
- 4) The proposed location of the Langstaff/Longbridge Station, east of Yonge Street along Langstaff Road East, as it is within 200 m of a tributary of the East Don River.

For these areas, there is a possibility of archaeological remains that could be displaced as a result of the Transit Project.

### **Mitigation**

Disturbance to archaeological resources will only occur where construction activities disrupt the surface within the above identified areas. The following recommendations are made:

- 1) With the exception of the East Don River crossing, the Yonge Street right-of-way does not retain archaeological site potential due to previous road, commercial, and residential disturbances. Additional archaeological assessment is not required within the existing right-of-way, and that portion of the study corridor can be cleared of further archaeological concern; and
- 2) A Stage 2 archaeological assessment will be conducted on lands determined to have archaeological potential, as summarized above, if the proposed project is to impact these lands. This work will be done in accordance with the MCL's draft *Standards and Guidelines for Consultant Archaeologists* (MCL 2006), in order to identify any archaeological remains that may be present.

### **Contingency**

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 apply<sup>9</sup>:

- 1) Work shall be suspended until an assessment has been completed by the Ministry of Culture; and
- 2) York Region / City of Toronto shall perform required measures to mitigate negative impacts on found resources as required by the Ministry of Culture.

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

#### **5.2.3.3 Aboriginal Rights and Lands / Resources Used for Traditional Purposes**

As mentioned in Section 2.3.1.3. and 2.3.2.3., the project team has contacted a number of government agency representatives to determine the status of potentially affected Aboriginal communities / groups within the project study area who may hold an interest in this study and should be directly consulted. In addition, a number of potentially affected Aboriginal communities / groups identified in consultation with the Regional Municipality of York were notified of the project.

Potential effects on lands and resources used for traditional purposes by Aboriginal persons have been examined by taking into account the knowledge of the study area and identifying potential effects on specific resources. The urban and suburban nature of the study area limits many traditional uses. The area that has the highest potential to be a site for practicing traditional land uses is the East Don River (traditional land use includes

<sup>9</sup> Toronto Transit Commission Master Specification 05-06-28 - Section 02230, subsection 1.2.2

hunting, fishing and the gathering or harvesting of plants for traditional use). However, there is currently no public access to the East Don River Valley from Yonge Street.

A Stage 1 Archaeological Assessment of the study area was completed for this Environmental Project Report. A Stage 2 Archaeological Assessment will be completed in the East Don River Valley where ground disturbance is anticipated. If archaeological resources are found of potential interest to one or more Aboriginal groups, those groups will be notified and involved in the process on determining an appropriate mitigation strategy.

## **5.2.4 Transportation**

### ***5.2.4.1 Automobile Traffic and Transit Service***

There are no permanent displacement impacts associated with the Transit Project. There are transient impacts that relate to the construction of the Transit Project and localized impacts associated with bus and automobile operations at the proposed Steeles Station, Langstaff / Longbridge Station, and the Richmond Hill Centre Station. Details are provided in Sections 5.3.4.1 and 5.4.4.1.

### ***5.2.4.2 Pedestrians and Cyclists***

There are no permanent displacement impacts associated with the Transit Project. All impacts are transient and relate to the construction of the Transit Project. Details are provided in Sections 5.3.4.2.

### ***5.2.4.3 Rail***

There are no permanent displacement impacts associated with the Transit Project. All impacts are transient and relate to the construction of the Transit Project. Details are provided in Sections 5.3.4.3.

## **5.2.5 Utilities**

### **Environmental Effects**

As detailed in Section 3.5, a number of utilities are located in the vicinity of the Transit Project alignment. Through ongoing consultation with municipalities and utility companies, a thorough review and confirmation of existing, necessary relocations or modification of utility plants will be undertaken during the detailed design stage.

There will be no impacts to utilities associated with the commuter parking lot within the existing Hydro One corridor.

### **Mitigation**

By tunnelling the majority of the Transit Project that is within road rights of way and private lands, impacts to utilities are largely avoided. This includes all Ontario Hydro high voltage transmission lines. For project elements that are to be constructed by cut-and-cover, two approaches will be used:

- 1) For small utilities that are not in direct conflict with the permanent works, temporary support through the construction site is possible; and

- 2) For utilities that will be in direct conflict with the permanent works or for large utilities that cannot be temporarily braced, these utilities will be relocated.

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 York Region / City of Toronto's requirements. The Proponent will also coordinate the utility work to provide opportunities to interface with Capital Works Programs in the vicinity of the subway project. The net effect will be the retention of all services within the area (i.e. no permanent displacement of affected utilities).

- 1) Regarding the proposed commuter parking lot at the Langstaff / Longbridge Station, Hydro One will be consulted with respect to a more detailed mitigation strategy as part of the design phase; however, based on recent work for similar facilities located within the same Hydro Corridor, the minimum mitigation measures expected for each facility are summarized as follows.
  - 2) The commuter parking lot will be aligned and configured to ensure a minimum clearance of 6 metres around each tower foundation and to allow unimpeded access to overhead lines when necessary for transmission line maintenance. Access and circulation roads will also be required into and around the parking lot both for commuter parking and the PPUDO. The layout will be designed in consultation with Hydro so as to minimize any potential impacts on maintenance activities.
  - 3) The PPUDO facility will consist of a dedicated short-term parking area adjacent to the entrance building, similar to that currently deployed at Downsview station. The PPUDO is planned to be located in the southeast portion of the corridor, as far from the existing Hydro towers as possible. As discussed above, the facility will be designed in consultation with Hydro to minimize any potential impacts on maintenance activities.
  - 4) No new storm water management ponds are expected to be required in order to construct the commuter parking lot. Surface water will be collected through bio-swales and taken off site through underground pipes that will also provide some storage capability. The underground pipes will be designed in consultation with Hydro to minimize any potential impacts on existing towers or ongoing maintenance activities.

The alignment for the underground running structure crosses Highway 407, Highway 7 and the Hydro corridor with significant clearance from any Hydro towers. South of Highway 407 at the east bound ramp to Highway 407, the tunnel is approximately 10 m from the 230kV tower. North of Highway 407, the tunnel passes approximately 35 m east of the nearest Hydro tower.

### 5.3 Construction Impacts

The following discussion focuses on the major project elements and construction techniques that were described in Sections 4.2 and 4.3 and can be summarized as:

- Cut-and-Cover - this includes:
  - Structures for special track-work areas;

- The running structures between the north end of the existing tail tracks north of Finch Station and Cummer/Drewry Station; approximately 100 m south of the East Don River to the Royal Orchard Station, and the running structures from the north end of Richmond Hill Centre Station to the proposed terminus of the extension;
- Each of the six stations and connection to and reworking of the northerly portion of the Finch Station tail tracks;
- The Steeles Station underground bus terminal; and,
- Emergency Exit Buildings (from the subway tunnels to grade) located at 1+000 (South of Newton Avenue); 2+075 (North of Meadow Avenue); 3+100 (Arnold Avenue); 3+800 (North of Thornhill Summit Way); 4+900 (Uplands Avenue) and 6+100 (Highway 7).
- Tunnelling - the balance of the running structure that is not addressed by cut-and-cover.
- At-grade Buildings – these will be located on the surface at the entrances / exits of the subway stations as well as emergency egress facilities noted earlier in this section.
- Station facilities including PPUDO at three stations and the commuter parking lot at Langstaff / Longbridge Station.

Although construction related impacts might occur during the construction of surface features such as station facilities (including the bus terminals, PPUDO's and Commuter Parking) as well as Emergency Exit Buildings, the environmental effects of these facilities may extend beyond the construction stage and represent permanent environmental impacts. These effects have been discussed previously in Section 5.2.

### 5.3.1 Natural Environment

#### 5.3.1.1 Fisheries and Aquatic Habitat

The only potential effect to fisheries and aquatic habitat during construction will be at the East Don River as all other water crossings will be constructed by tunnelling.

During construction, a temporary detour road will be installed immediately upstream of the existing Yonge Street roadway at the East Don River. This detour road will utilize the existing concrete culvert and will not require an extension of the existing culvert. Temporary retaining walls may be required at the toe of the slope to limit the intrusion of the widened slope into the valley.

The Preliminary Geotechnical Report produced by Golder & Associates concluded that, based on the level of investigation completed thus far, it is anticipated that the effects on any groundwater flow on nearby watercourses (East Don River and Pomona Creek), as a result of the Transit Project if any, will be maintained to environmentally acceptable levels through appropriate combinations of dewatering, groundwater inflow mitigation measures, and contingency plans developed through the course of additional investigations, detailed design, and continued consultation with the TRCA and MOE regulatory agencies.

## Potential Impacts

### *East Don River*

- No in-water works will be required for construction of the East Don River Bridge and the temporary detour road. The new bridge will clear span the river with bridge piers and abutments in the valley but removed from the channel.
- No permanent impacts to the watercourse (loss of habitat) will occur.
- Temporary in-water works will be required for the removal of the existing concrete arch culvert, with associated localized disturbance of stream bed required to remove the existing culvert footings.
- Riparian vegetation potentially impacted by the removal of existing culvert includes a large Weeping Willow located on the west bank, immediately upstream of the existing culvert inlet and small White Elm and Manitoba Maple in addition to embankment removals. The existing road embankment is highly disturbed and dominated by invasive species. Primary species include Black Locust, Norway Maple, Manitoba Maple, Weeping Willow, Black Walnut, Siberian Elm, and Dog-strangling Vine.
- Potential indirect impacts during the temporary in-water works and adjacent construction activity (e.g. erosion and sediment influx or disturbance and downstream transfer, other water quality impacts, entry of debris into water, interception of flow, potential disturbance of fish) can be managed using appropriate mitigation and restoration measures.

While there will be minor impacts as a result of the proposed construction, they are limited to localized terrestrial areas and potential disturbance during construction. The new bridge which has a clear span much longer than the width of the current culvert ultimately provides an overall net benefit to the East Don River and valley crossing, as outlined below:

- The proposed bridge will have a significantly smaller footprint in the valley compared to the existing fill embankment and culvert crossing.
- Following removal of the culvert, the clear bridge span will enable re-instatement of a natural channel section through the crossing as well as future ‘natural’ migration of the channel;
- The clear bridge span will improve wildlife movement opportunities along the valley system.
- Removal of the existing embankments provides the opportunity to remove the existing invasive-dominated vegetation and re-instate more natural cover on the smaller embankment footprint.

## Mitigation Measures

To avoid and minimize the potential construction-related impacts of the project on fish and aquatic habitat in the East Don River, the following mitigation measures will be implemented:

- An in-water construction timing restriction will be implemented during the removal of the existing culvert and naturalization of the channel, to protect the coldwater fishery. No in-water work will be permitted from September 16 to June 30.
- Although DFO's Species at risk (SAR) mapping maps the subject reaches as part of the broader reach that supports Redside Dace, this species has not been caught during sampling in the vicinity of the bridge and TRCA has indicated that the habitat conditions are not ideal at this location (TRCA personal communication. November 19, 2008). On this basis, a SAR permit should not be required for any instream works.
- Stringent erosion and sediment control measures will be implemented and maintained during the construction period. All disturbed surfaces draining to the river will be stabilized and re-vegetated following construction.
- An appropriate containment system will be specified during detailed design to prevent construction debris associated with the removal of the existing culvert and construction of the new bridge from entering the river.
- Any material that is inadvertently dropped into the watercourse will be retrieved carefully with minimal disturbance to the channel bed or banks.
- Any temporarily stockpiled material, construction or related materials will be properly contained (e.g. within silt fencing) in areas separated at least 30m from the watercourses. All construction materials and debris will be removed and appropriately disposed of following construction.
- Temporary flow management measures during removal of the existing culvert and re-instatement of the natural channel will be implemented to ensure that the construction area is fully isolated from the main stream and clean flow is maintained downstream at all times. The appropriate technique will be determined based on flow volumes and the duration of the works during the detailed design stage.
- Any fish stranded within the temporary work zones will be removed using appropriate techniques by qualified individuals and released downstream of the temporary work zones.
- No equipment shall ford or otherwise enter any of the watercourses except as specified herein or unless authorized by MNR or TRCA.
- Only clean materials free of fine particulate matter will be placed in the water for temporary construction measures (e.g. coffer dams will be constructed of 'pea gravel' bags, geotextile fabric or other clean material) or permanent works (e.g. substrate material).
- All activity will be controlled so as to prevent entry of any petroleum products, debris or other potential contaminants/deleterious substances, in addition to sediment as outlined above, to the watercourses. No storage, maintenance or refueling of equipment will be conducted near the watercourses. A Spills Prevention and Response Plan will be developed by the Contractor and kept on site at all times.

- Any areas draining to the river or riparian vegetation that are temporarily disturbed to access the culvert will be re-vegetated and any woody vegetation that is removed in the valley will be replaced. Only native species compatible with the riparian habitat along the East Don River will be used as outlined in the Terrestrial Mitigation Strategy (Section 5.3.1.2).

### *Design-Related Measures*

In the above section, potential impacts to fisheries and aquatic habitat from above ground works were addressed and appropriate mitigation measures outlined to minimize these impacts. During the subsequent detailed design phase, the mitigation measures will be refined and finalized based on the final design details for the proposed East Don River Bridge, the logistics of the existing East Don structure removal and other above ground works associated with the Transit Project. In addition, input from agencies and the public will be integrated into the mitigation strategies.

The Natural Environment Report did not specifically address impacts to the natural environment as a result of proposed dewatering works. However, based on the level of hydrogeological investigation completed thus far, it is anticipated that the effects on any groundwater flow on nearby watercourses (East Don River and Pomona Creek), as a result of the project if any, will be minor (Delcan 2009). These potential effects will be reviewed and assessed further during detailed design and the mitigation, monitoring and contingency plans will be developed in consultation with and accordance with TRCA's Guidelines for Dewatering Needs Assessment and Environmental Management Plan.

The East Don River structure will be designed to avoid direct drainage into the river. Drainage will be directed to the floodplain areas away from the river, rather than directly to the water, enhancing the existing condition.

The proposed naturalization of the presently enclosed section of the East Don River through the future bridge crossing will be developed during the detailed design stage. The channel through the bridge reach as well reaches immediately upstream and downstream of the proposed structure will be constructed using naturalized principles, to maintain or enhance the existing habitat within this reach. The design will be developed by appropriately qualified individuals (e.g. hydrologists or fluvial geomorphologists and fisheries biologists) with experience in channel design. Specific aspects of the design will include:

- The creation of a stable, naturally functioning channel section that transitions smoothly with up and downstream sections of the channel to preclude development of potential barriers to fish movement;
- Re-instatement of natural channel form, morphology, substrates and cover elements;
- Re-instatement of vegetation cover (where light permits) under the new structure; and
- Planting of a mix of native shrubs and trees along the channel edges and in the riparian area impacted.

In addition to the above, the existing scour pool (+1.5 m deep) located at the inlet of the structure should be retained in the naturalization design for the new channel section, as pool habitat and potential refuge habitat for fish. The pool also functions to provide energy dissipation for the stormwater outlet. Additional pool habitat could also be incorporated into the design further downstream for dissipation and habitat use if deemed appropriate. Opportunities to enhance the functioning of the stormwater outfall could also be considered at detailed design to reduce the scouring action and flux of silt observed entering the river.

Hardened bank stability measures (concrete slabs and gabion structures) currently line the channel banks upstream of the existing structure inlet. Opportunities to remove these structures and replace them using ‘bioengineered designs’ to stabilize the banks and bed (e.g. live crib walls, live rock revetments, cabled log jams) within the rehabilitation zone should also be reviewed during detailed design, to enhance the existing situation. Similarly, opportunities to remove the concrete slabs that currently line the bank further upstream of the inlet and re-naturalize the banks should also be reviewed during the detailed design phase.

### **Monitoring**

In addition to the monitoring that will be identified through TRCA’s Guidelines for Dewatering Needs Assessment and Environmental Management Plan, an environmental inspector experienced in working around watercourses will be responsible for ensuring that all environmental mitigation and design measures are properly installed/constructed and maintained, and appropriate contingency and response plans are in place and implemented if required.

### **5.3.1.2 Vegetation, Wildlife and Terrestrial Habitat**

#### **Potential Impacts**

The following are the anticipated construction-related impacts to vegetation features and communities:

- The Preliminary Geotechnical Report produced by Golder & Associates concluded that, based on the level of investigation completed thus far, it is anticipated that the effects on any groundwater flow on nearby watercourses (East Don River and Pomona Creek), as a result of the Transit Project if any, will be maintained to environmentally acceptable levels through appropriate combinations of dewatering, groundwater inflow mitigation measures, and contingency plans developed through the course of additional investigations, detailed design, and continued consultation with the TRCA and MOE regulatory agencies.
- No vegetation removals are required for tunnel boring machine launch and extraction locations, since all are located within parking lots or within Yonge Street.
- Vegetation removals will be required on the existing road embankment (which will be removed) at the East Don River crossing. The vegetation on the embankment is highly disturbed and dominated by invasive species. Primary

species include Black Locust, Norway Maple, Manitoba Maple, Weeping Willow, Black Walnut, Siberian Elm, and Dog-strangling Vine. A small patch of one species considered rare in York Region (Beggar's Lice) was located at the base of the embankment on the west side of Yonge Street and will be removed during construction. This species is commonly encountered in the Greater Toronto Area and was also found elsewhere in the Study Area. No impacts to any other locally or regionally rare species observed in the study area are anticipated.

- Cultural meadow vegetation along a hydro corridor, south of Highway 407 and west of Yonge Street, will be removed for a potential Commuter Parking Lot. The vegetation in this area is dominated by common, disturbance tolerant species such as Brome Grass, Canada Goldenrod, Heath Aster and Common Buckthorn. This area also provides early successional habitat for urban adapted wildlife including birds and small mammals.
- There may also be limited removals of urban and landscape vegetation for the construction of subway stations.
- Potential for localized indirect impacts such as edge impacts (windthrow, sunscald, changes in light conditions), invasion of exotic or other aggressive species, and drainage modifications may occur as a result of the construction, but these impacts can be managed through appropriate mitigation and restoration measures.
- Additional impacts to wildlife during construction and operation will be limited, since wildlife present will likely be tolerant to the existing urban conditions of noise and light.
- Migratory birds can nest on buildings and vegetation (including street trees) and nesting and breeding activity can be impacted if construction occurs during the breeding season.

### **Mitigation Measures**

To minimize direct impacts to vegetation and associated habitat features along Yonge Street, specifically in the East Don River valley, and to protect adjacent vegetation/habitat features from indirect impacts during construction, the following mitigation measures will be implemented:

- A re-vegetation and enhancement plan will be developed in consultation with TRCA for the East Don River valley.
- The bridge structure design and valley enhancement plan will specifically target opportunities to improve wildlife movement, including provision of a stable overbank area for wildlife movement as well as vegetation planting and placement of cover elements at the ends of and through the structure to create smooth transitions with the existing valley vegetation and encourage wildlife movement through the structure.
- Vegetation clearing zones and vegetation retention zones will be clearly delineated in both the Contract documents and in the field to minimize the risk of

unnecessary or inadvertent vegetation impacts and avoid incidental impacts as a result of temporary stockpiling, debris disposal and access. Works zones will be delineated in the field using construction fencing to minimize the area of disturbance and prevent disturbance of adjacent areas.

- The East Don River valley will be identified as a ‘priority protection area’ on Contract Drawings to restrict contractor activities in these areas.
- Appropriate vegetation clearing techniques (e.g., trees to be felled away from the retained natural areas) will be used to remove vegetation required for the proposed works.
- Stringent erosion and sediment control measures will be designed, implemented and maintained throughout construction. This includes installing sediment and erosion control fencing along the edge of the required working area to protect the edges of all retained natural areas, as well as proper containment and filtering of all construction-generated sediment (whether from dewatering or soil exposure from clearing and grubbing).
- All exposed surfaces will be re-stabilized and re-vegetated as soon as possible following construction, using an appropriate seed mix.
- The valley enhancement plan will be developed during detailed design with input from TRCA. This will include replacement of woody vegetation removed for construction and enhancement of the valley cover and linkage generally. Only native species representative of the local area and valley habitats will be used.
- All construction-related debris will be appropriately contained during construction and cleaned-up and properly disposed of following construction.
- All activity will be controlled so as to prevent entry of any petroleum products, debris or other potential contaminants/deleterious substances, in addition to sediment as outlined above, to natural areas and particularly the East Don River valley. No storage, maintenance or refueling of equipment will be conducted within the valley. A Spills Prevention and Response Plan will be developed by the Contractor and kept on site at all times.

In addition to protecting vegetation, which in turn protects the associated habitat functions, it is necessary to ensure the protection of breeding birds (in accordance with the Migratory Bird Convention Act (MBCA) that may nest or otherwise use areas where construction is proposed. Numerous birds located within the project limits are listed under the MBCA. The MBCA prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. Migratory insectivorous and non-game birds are protected year-round, while migratory game birds are only protected from March 10 to September 1. No permit can be issued for the destruction of migratory birds or their nests incidental to some other undertaking or activity.

Measures for the protection of migratory birds, as well as protection of all wildlife generally, include:

- To meet the requirements of the MBCA, timing constraints will be applied to avoid vegetation clearing during the breeding bird season (May 1 to July 31).
- If clearing cannot avoid the breeding bird season, then an avian biologist will be employed to conduct a nest survey in the area to be cleared. If active nests of migratory birds are located then a mitigation plan will be developed and approved by Environment Canada prior to clearing. This may involve delays to allow for fledging.
- The nest survey will also include the East Don River culvert to ensure that birds such as swallow species or Eastern Phoebe are not nesting in it. No bird activity was observed during the 2008 field visit, however there is potential for nest building in the culvert. Any “inactive” nests (previous season nests, and nests where adult birds are not seen flying in and out) should be removed before construction.
- No active nests will be removed/disturbed in accordance with the MBCA.
- Any wildlife incidentally encountered during construction will not be knowingly harmed.

During the subsequent Detailed Design stage, the mitigation measures will be refined and finalized based on the final design details for the proposed East Don River Bridge, the logistics of the existing East Don structure removal and other above ground works associated with the Yonge Subway. In addition, input from agencies and the public will be integrated into the mitigation strategies.

### **Monitoring**

In addition to the monitoring that will be identified through TRCA’s Guidelines for Dewatering Needs Assessment and Environmental Management Plan, 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.

#### **5.3.1.3 Wetlands**

There are no provincially significant or non-provincially significant wetlands located within the project area. No unevaluated wetlands were observed during field investigations. There are no construction impacts to wetlands associated with the Transit Project.

#### **5.3.1.4 Species at Risk**

There are no construction impacts to aquatic, vegetation, or wildlife species at risk associated with the Transit Project.

#### **5.3.1.5 Soil**

### **Potential Impacts**

During the design phase, a comprehensive geotechnical and geo-environmental investigation program will be undertaken, with a significant number of boreholes excavated very close to the actual trainway alignment and stations. The investigation will require the disposal of significant volumes of excavated material and will determine the extent of and whether the excavated soil is contaminated.

### **Proposed Mitigation Measures**

During the design phase a Soil Management Strategy Plan will be developed for disposal of excavated material, consistent with past TTC practice. This plan will require that management of contaminated soils is conducted in accordance with the applicable recommendations outlined in the MOE's *Environmental Protection Act – Document: Protocol for Analytical Methods Used in the Assessment of Properties*. The handling and disposal requirements for soils not meeting the MOE standards for degree of contamination will be determined based on toxicity characteristics and leaching procedure as indicated in the *Environmental Protection Act*.

#### **5.3.1.6 Groundwater**

##### **Potential Impacts**

The selection of the primary tunnel lining will have an influence on the need of dewatering and the volume of groundwater to be drawn down during construction of the twin bored tunnels. Use of a precast, segmented, and gasketed concrete liner installed concurrently with tunnelling progress will minimize effects on local groundwater conditions, whereas use of a ribs and lagging liner will create a large horizontal drain within the water bearing deposits that can create an extensive zone of groundwater influence beyond the tunnel alignment. It has been assumed that a pre-cast, segmental, gasketed lining system will be used for this project as has been used on TTC machine-tunnelled sections of the subway system in the recent past (e.g., Sheppard Subway).

While bored tunnel construction using earth pressure balance or slurry pressure balance machines will allow tunnel construction without the need for dewatering, TBM launch and exit shafts, cut-and-cover stations, and cross passages are all likely to require temporary groundwater control if excavated through or in close proximity to water-bearing granular soils.

At the following cut-and-cover sections, the groundwater table is generally below the base slab of the station and temporary construction dewatering, if needed, may consist of conventional sump pits and pumps to control seepage of water contained within discontinuous granular layers:

- Finch Station and Cross-Over
- Cummer/Drewry Station
- Steeles Station and Cross-Over
- East Don River Bridge

At the following cut-and-cover sections the groundwater level was above the base slab of the station and dewatering systems would typically be necessary to control groundwater to the depth of the base of the excavation:

- Clark Station
- East Don River Cut-and-cover Section (South)
- East Don River Bridge
- East Don River Cut-and-cover Section (North) and Royal Orchard Station
- Langstaff / Longbridge Station
- RHC Station

At Clark Station, RHC Station, Royal Orchard Station and the cut-and-cover sections north and south of the East Don River, depressurization of the Thorncliffe aquifer will likely be required. The necessity and the extent of dewatering of the Thorncliffe aquifer will depend upon the thickness of the overlying confining layer, which will require further investigation.

Based on the conceptual designs under consideration, the bridge over the East Don River includes piers supported on deep foundations in areas outside of the present channel. It is anticipated that the deep foundations may consist of either driven piles or drilled shafts (caissons). Foundation pile or caisson caps for the piers may be constructed within relatively shallow and sheeted excavations and dewatering, if necessary, may consist of either sump pits and pumps or a relatively shallow well-point system depending on localized subsurface conditions and the final locations of the piers. Such relatively limited dewatering should not have an adverse effect on the East Don River. Drilled shaft (caisson) foundations may, if needed, be constructed with casing and under a balancing fluid pressure (slurry or water) such that the need for dewatering of the shafts may be limited or unnecessary.

At Langstaff / Longbridge Station the York-Peel-Durham-Toronto (YPDT) Conservation Authorities Moraine Coalition (CAMC) interpretation through this area indicates that approximately 10 m of cohesive glacial till may separate the base of the proposed excavation from the top of the Thorncliffe Formation. As such, depressurization of the Thorncliffe aquifer may not be required to maintain a stable excavation base at that location.

### **Mitigation and Monitoring**

Based on previous construction for Toronto subway projects, temporary dewatering (or depressurization of water-bearing layers) may be accomplished using deep wells, eductor wells, well-points, or passive water pressure relief systems. During construction of the Sheppard Subway, flows from dewatering were discharged to existing storm or sanitary sewers in accordance with applicable local by-laws, Municipal Code Chapter 681 and Provincial regulations. Analysis of the capacity of the existing sewers should be confirmed prior to discharge. Regular monitoring of groundwater levels and discharge water quality was also undertaken to observe, record and enforce the compliance of the construction contractors with the applicable contract specifications, by-laws, and regulations. It is anticipated that similar design, construction, permitting, and monitoring requirements will be applied to the Transit Project.

The lateral extent of the groundwater drawdown could be significant – on the order of several hundred metres from any dewatering system. However, given that the granular

soils are typically very dense and the cohesive soils range between firm to hard, the influence of dewatering on settlement of the surrounding ground and overlying facilities should be relatively small.

Determining the lateral and vertical extent of groundwater drawdown that may be necessary for each of the cut-and-cover track structures, stations, or cross-passage areas and the effects this may have on local watercourses (East Don River, Pomona Creek) will require successively more detailed investigations and analyses during subsequent phases of design. These investigations should include groundwater pumping tests monitored by observation wells (piezometers) within granular layers at multiple elevations and distances surrounding the pumping test wells, similar to work undertaken during design of the Sheppard Subway.

Backfill for the stations should consist of well-compacted fill that is compatible with the hydrogeologic conditions of the surrounding ground at each station site. It is generally recommended that the in situ permeability of mass backfill be similar to that of the surrounding ground. This is particularly of concern where granular backfill might otherwise be used for large excavations for station construction that pass through native cohesive ground. The pore space within the granular backfill will become saturated with time, and may exacerbate undesirable leakage in the permanent structure or undesirable groundwater flow patterns. Furthermore, if the surrounding ground is suspected to be, or shown to be, affected by contamination, it will be necessary to use low permeability backfill materials to limit the potential for aquifer cross-contamination.

The available subsurface data collected along the alignment indicate that the existing native till deposits should be generally suitable for placement and compaction as backfill for cut-and-cover excavations, though water content and compaction control will require more effort than for conventional granular backfill.

In addition, it is recommended that measurement or estimation of base flows within the East Don River and Pomona Creek be carried out immediately prior to the nearby pumping tests (as recommended above) to assess whether or not there is any influence of the pumping tests on these watercourses. If, based on the results of such tests and engineering analyses, active dewatering is judged to be problematic for surrounding areas, other measures may be possible to facilitate construction. Mitigation measures could include continuous excavation support walls (e.g., contiguous caisson walls, concrete diaphragm walls, etc.) to minimize flow into the excavation from surrounding granular soils. Depending on the depth and thickness of the granular soils, penetration of such walls deep below the base of the excavation can assist in minimizing the groundwater flow upward and into the excavation. Different grouting techniques or sub-aqueous construction of a base slab may also provide a means to inhibit flow of groundwater around continuous walls and into the excavation base.

The feasibility of such alternative ground control measures are dependant on the specific ground conditions and the extent of the proposed construction – the thicker and more extensive the water-bearing deposit and the deeper and larger the required excavation are, the lower the likelihood that eliminating the need for dewatering will be possible.

A combination of these techniques along with dewatering or groundwater depressurization may, however, be a suitable means for limiting the influence of

temporary groundwater drawdown to levels that are environmentally acceptable. It is anticipated that during subsequent investigation and engineering phases, carried out to standards consistent with previous TTC projects, the need for mitigation measures and detailed designs and contingency plans can be developed to both facilitate construction and protection of the environment.

The hydrogeologic data developed during future phases of work on this project will be utilized to develop applications for Permits to Take Water that should be obtained in principle before completing final design and initiating construction tendering. A pre-consultation process with the hydrogeologists of the Water Resources Unit (WRU) of MOE will be carried on to expedite the permit procedure prior to construction. For all water taking activity, TRCA will be provided with specific data including record of approximate duration, potential zone of influence and identification of potential impacts. An Environmental Management Plan (EMP) following TRCA's guidelines, the Detailed design Report along with the construction drawings will be submitted to WRU for review prior to construction.

### **Summary of Significance of Potential Effects**

In summary, at cut-and-cover stations between Finch Station and Steeles Station are generally above the groundwater level and temporary construction dewatering can consist of conventional sump pits and pumps to control seepage from water contained within the discontinuous granular layers and storm water. At the remaining stations and the cut-and-cover sections for the East Don River crossing the groundwater level is above the base of the excavations and, as such, temporary construction dewatering is likely to consist of eductor and/or deep well systems and conventional sump pits and pumps to control seepage and storm water. Depressurization of the underlying Thorncliffe aquifer will likely be required at cut-and-cover sections north of and including Clark Station, with the exception of Langstaff / Longbridge Station where the thickness of the overlying glacial till layer is approximately 10 m and, as such, depressurization of the Thorncliffe aquifer may not be required to maintain a stable excavation base. Depending on the outcome of future investigations and analyses, other mitigation measures may also be used to limit the effects of dewatering, if or as needed, and these would have to be specified in construction documents. Contingency plans should be developed for construction to ensure that the effects of construction on the groundwater regime and surrounding environment are minimal and the requirements of any Permits to Take Water obtained through the Ministry of the Environment are satisfied.

Based on the level of investigation completed thus far, it is anticipated that the effects on any groundwater flow on nearby watercourses (East Don River and Pomona Creek), as a result of the project if any, will be maintained to environmentally acceptable levels through the course of additional investigations, detailed design, and continued consultation with the TRCA and MOE regulatory agencies.

#### ***5.3.1.7 Drainage and Stormwater Management***

##### **Potential Effects**

The details of the features proposed to mitigate permanent effects were outlined in Section 5.2.1.7. Low scale sedimentation and erosion is anticipated during the cut-and-

cover construction at stations, special track structures and the proposed East Don River bridge.

### **Proposed Mitigation Measures**

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.

#### **5.3.1.8 Air Quality**

##### **Environmental Effects**

The impact from construction activities related to the Transit Project will be associated primarily with emissions of Suspended Particulate Matter (SPM) in the air and dustfall on objects such as cars and windows resulting from open-pit and cut-and-cover construction techniques, demolition, and carryout by construction vehicles, leading to grinding and re-suspension of construction dust by regular traffic on public roads. If uncontrolled, these emissions could result in off-site concentrations that exceed the Ministry of Environment (MOE) standards and affect nearby residences and commercial establishments as well as pedestrians. In order to meet the provincial standards, control efficiencies ranging up to 70% and 95% respectively, may be required.

Although emissions typically occur over short periods of time, they may have a substantial temporary impact on local air quality, especially during dry conditions and/or low wind speed events.

##### **Mitigation Measures**

To reduce emissions, a number of control measures are available, depending on the sources. A detailed description of appropriate measures are provided in the document Best Practices for the Reduction of Air Emissions From Construction and Demolition Activities, March, 2005 (BPREA), prepared by Cheminfo Services Inc. for Environment Canada.

For demolition activities, typical measures include:

- Minimize drop heights for debris;
- Enclose chutes and cover bins when debris is allowed to fall;
- Use fogging or misting systems in contained or enclosed places;
- Include wind barriers, such as wind fences (or natural vegetation on long projects) to reduce wind erosion;

- Recognize windy conditions and reduce certain activities or apply additional dust suppressant;
- Maintain a clean area by vacuuming or sweeping accumulations of debris;
- Practices for loading debris;
- Minimize the quantity and length of time debris is stored on site;
- Control mud and dirt trackout onto public streets; and
- Secure loads and cover haul trucks.

During construction activities, similar control methods can be used as well as:

- Conduct excavation and grading activities in phases, to minimize the extent of disturbed area present and the length of time it is exposed.
- Use barriers to minimize wind erosion, including snow fencing, natural vegetation left in strategic places during clearing and material berming.
- Implement surface improvements to unpaved road surfaces, including, paving as soon as practical, and use of material with low silt content.

Since construction activities are generally of short duration, the use of wet suppression and wind speed reduction are generally the most common, efficient and cost effective approaches; however, other control technologies are often used for specific situations. The efficiency of these control methods can vary significantly.

To promote compliance with MOE's criteria, the TTC Master Specifications requires that contractors incorporate mitigation or control measures into construction activities. The MOE expects that emission from construction operations comply with the O. Reg. 419/05 SPM criteria, therefore, control measures articulated in the Controls and Methods Plan will need to be carried out diligently under contractual specifications. Such measures include, but are not limited to:

- Develop a comprehensive environmental Controls and Methods Plan of the whole process of dust control.
- Cover or wet down dry materials to prevent blowing dust and debris.
- Prevent dust from blowing across the Site and from leaving the Site, in particular frequently wet paved and unpaved temporary roads and excavated areas.
- Comply with provincial ordinances and Engineer's requirements regarding minimizing of dust and airborne pollution.
- Wash down the streets within the Work Site on a weekly basis and as additionally directed by the Engineer.
- Securely cover excavated material being removed from the Site and all fill materials being delivered to the Site to prevent blowing of dust or fines into the streets and haul routes.
- Application of calcium chloride shall be kept to minimum and shall be restricted to vehicle right-of-way. In close proximity to watercourses, frequent applications

of water shall be the preferred method. Obtain the Engineer's approval before chemicals for dust control are used.

### **Monitoring**

The MOE expects that construction operations will meet Regulation 419/05 requirements. For this reason, a work plan should be required in the contract specifications to ensure that the required control measures are carried out diligently.

Mitigation measures may not completely eliminate dust emissions from construction and demolition activities; however, the measures should reduce emissions to a level that minimize impacts of dust on the areas surrounding the construction site. When construction and/or demolition activities are likely to cause dust emission, air monitoring must be conducted prior to beginning activities to establish a baseline value for the quantity of SPM in the air.

During construction and/or demolition operations where dust is being created, air quality monitoring must be conducted to establish the level of particulate matter in the air. Following construction and/or demolition operations where dust was created, confirmatory tests must be conducted to quantify the level of particulate matter in the air. The conditions under which monitoring will be conducted, as well as mitigation measures that will be implemented if high SPM concentrations are identified must be specified in the Controls and Methods Plan.

#### **5.3.1.9 Contaminated Properties**

As discussed in Section 5.2.1.9, the Excess Materials Management Plan will provide a mitigation strategy to effectively manage any contaminated excess materials (both soil and groundwater) encountered during construction.

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 must be integrated into the detailed design of the subway corridor.

### **5.3.2 Socio-Economic Environment**

#### **5.3.2.1 Buildings and Property**

##### **Potential Effects**

The types of impacts that can potentially occur during construction of the trainway and stations include vibration and ground settlement. Under certain conditions, physical damage to buildings and property can occur as a result of construction activity.

Construction of the East Don River bridge approaches will have a temporary effect on the rear access of the most northerly residence on the west side of Yonge Street, just south of the East Don River crossing. Although not physically affected, other residences in the area, such as condominiums located on the east side of Yonge Street, will be inconvenienced by construction activity.

Vibration due to the construction of the trainway tunnels may cause minor ground settlement in some residences.

The impacts to commercial areas and local businesses are primarily to changes in vehicle and pedestrian movement patterns, but may also include the following:

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

Although a number of commercial areas and local businesses will be directly impacted either by tunnelling activities, or general construction activities, the impacts will be addressed indirectly through the mitigation efforts noted in other sections of this report (traffic, pedestrian, noise and dust, etc.).

Recreational facilities along the Yonge Street Corridor are primarily composed of Municipal Parks and golf clubs.

The construction of the proposed East Don River bridge will affect the Ladies' Golf Club of Toronto. Construction will also affect access to the Municipal Park on the north-east corner of the East Don River area which is north of the Ladies' Golf Club on the east side of Yonge Street. The Radial Station 17 may be affected by the construction of the bridge.

### **Proposed Mitigation Measures**

Contractor(s) will be required to minimize any inconvenience caused by the construction activities to property owners. Measures such as minor re-grading will be utilized to ensure any affected resident is provided with adequate and convenient access to his / her dwelling during construction.

In order to monitor effects on existing structures and buildings, a monitoring program will be implemented prior to construction. Existing conditions will be assessed based on instrumentation readings that will be used to develop a pre-condition survey. The Proponent will conduct monitoring for movement of adjacent structures and utilities during excavation or backfilling of the Transit Project. In addition, during excavation, regular (usually weekly) measures of ground settlement, using inclinometers and surface monitoring points for structures will be conducted. Following backfilling, the monitoring schedule will be reduced to once every three months for up to a period of one year.

Monitoring also includes "review" and "alert levels". The purpose of this system is to facilitate coordination between the Proponent and the contractor when evaluating the method, sequence and rate of construction. The Proponent can terminate construction operations if readings indicate alert levels, which will be defined in the construction contract documents on a structure-specific basis, until the necessary mitigation measures are carried out. Mitigation measures include alternative construction equipment or methods and/or additional support/protection measures.

Methods such as inspecting and comparing residential buildings to pre-construction data will be utilized to monitor effects. If the Proponent should receive property damage claims, the monitoring program may be utilized during claim resolution.

Temporary access to the Ladies' Golf Club and the Municipal Park south of the Yonge Street / Royal Orchard Boulevard intersection will be provided at all times during construction. Detailed arrangements for temporary access will be made during the design stage and confirmed by the bridge contractor. The Radial Station 17 may need to be temporarily relocated during construction using appropriate protection methods.

### **Summary of Significance of Potential Effects**

The subway extension along Yonge Street will not have significant effects on residential land uses during construction. Affected residential property will be partially or totally acquired. An appropriate monitoring system will minimize potential structural damage to the existing buildings; a settlement may be negotiated with the corresponding property owner if damage is identified.

The subway extension will have temporary effects on access to recreational facilities. However, coordination with the owners of the affected facilities (in the immediate and long-term) will provide patrons continuous access during and upon completion of the Transit Project.

#### **5.3.2.2 Noise and Vibration**

This section details the potential environmental noise and vibration impacts associated with the construction phase of the Transit Project. The sources of noise and vibration may operate above or below ground or within tunnels.

Unlike operational noise, construction noise and vibration are temporary in nature depending on the type of work required and its location relative to the sensitive receptors. Potential receptors are detailed in Appendix K.

The primary sources of noise during construction are pile drivers, general excavation, construction activities and vehicular traffic.

The tunnelling method using a Tunnel Boring Machine (TBM) is expected to transmit lower levels of noise and vibration to adjacent buildings than the cut-and-cover method. However, the cut-and-cover method will be used for the station structures regardless of the method chosen to construct the trainway sections.

In general, except for activities at the access shaft(s) serving the tunnel construction, the general public in urban areas is not likely to be aware of the ongoing tunnelling work since TBM excavation does not produce any audible "environmental" noise at street level. Community impacts, however, depend on the access shaft(s) locations.

Tunnel construction impacts are concentrated at the shaft(s) and can include the noise due to mobile construction equipment (dozers, loaders, dump trucks, etc.) and more-or-less fixed construction equipment at or near the shaft (cranes, generators, pumps, etc.). The noise generated around the shafts can be controlled using several noise control measures which include physical and administrative controls. The physical measures include the

use of fixed and/or temporary sound barrier walls/partial enclosures, traffic management and the use of quieter equipment.

Pile drivers if used for construction at the station areas should be of the "quiet" hydraulic type rather than the noisier drop weight type.

One of the sources of concern is the potential impact of "mobilization sites" on the adjoining noise-sensitive land uses as such sites may be the centre for the following activities:

- Driving shafts;
- Crane operations;
- Construction equipment operated by gasoline, diesel and electric engines;
- Stockpiling of construction materials;
- Removal and stockpiling of excavated materials;
- Areas for truck loading and unloading; and
- Parking facilities and other vehicle movements.

The significance of the construction noise impact depends on the number of pieces of equipment, their types, time of operation and their proximity to the receptors in question.

For this project, the existing high ambient sound levels are likely to reduce the significance of the noise during construction although such noise will be clearly audible during peak periods of construction.

### **Mitigation**

One of the effective ways for mitigation of the noise impact due to mobilization sites is to construct an effective sound barrier to protect the residences based on knowledge of the expected construction equipment sound levels. Other mitigation measures will also be discussed in the subsequent paragraphs.

The following is a brief outline of the procedures to be followed in handling construction noise:

- Noise sensitive receptors to be identified.
- The applicable municipal noise by-laws will be examined. Where timing constraints or any other provisions of the municipal by-law may cause hardship to the proponent and its Contractors, an explanation of this will be outlined in a submission to the MOE and an exemption from such By-Law will be sought directly from the municipality of concern.
- "General noise control measures" (not sound level criteria) will be referred to, or placed into contract documents. These general measures could include things such as:
  - Shields or other physical barriers to restrict the transmission of noise;

- Soundproof housings or enclosures for noise producing machinery such as compressors, pumps, motors or generators;
  - Efficient intake and exhaust silencers on air equipment;
  - Efficient intake and exhaust mufflers on internal combustion engines;
  - Sound deadening lining material on hoppers and storage bins;
  - Conducting truck loading, unloading and hauling operations so that noise is kept to a minimum;
  - The use of electric rather than internal combustion power where possible; and
  - The placement of stationary noise producing equipment at a maximum distance from public areas.
- Should the proponent or the Contractor receive any complaints from the public, the Contractor's staff should verify that the "general noise control measures" agreed to are in effect. If the "general noise control measures" are not in effect, the proponent shall warn the contractor of any problems and enforce its contract.
  - If the "general noise control measures" are complied with, but the public still complain about noise, the proponent should require the contractor to comply with the MOE sound level criteria for construction equipment contained in the MOE's Model Municipal Noise Control By-Law and the applicable municipal Noise By-laws. Subject to the results of field investigation, alternative noise control measures would be required, where these are reasonably available.
  - In selecting the appropriate construction noise control and mitigation measures, the proponent and the Contractor should give consideration to the technical, administrative, and economic feasibility of the various alternatives.

Construction techniques can be altered to mitigate vibration related issues. However, modifying construction techniques requires a thorough investigation to ensure that the durability of the construction is not compromised (e.g. granular placement without the use of vibratory rollers can reduce the compaction which can lead to settlement). Restrictions or specified construction methods will be reviewed during the design and construction stage.

### **Monitoring**

The proponent will monitor noise and vibration during construction in accordance with the City of Toronto Municipal Code (specifically By-Law 514-2008), while in Toronto, and York Region and local municipal By-Laws while in York Region.

#### **5.3.2.3 Electromagnetic Interference (EMI)**

There are no transient impacts that relate to the construction of the Transit Project. Localized impacts associated with the operation of the subway are discussed in Section 5.4.2.3.

#### **5.3.2.4 Stray Current**

There are no impacts that relate to the construction of the Transit Project. Localized impacts associated with the operation of the subway are discussed in Section 5.4.2.4.

#### **5.3.2.5 Aesthetics**

Dust is a concern with any form of construction and especially with the cut-and-cover method of construction. Dust sources at cut-and-cover (or tunnelling access locations) construction sites (dust, mud and litter) are discussed in Section 5.3.1.8, Air Quality. In addition, construction sites will be hoarded to minimize visual intrusion of the construction activity.

#### **5.3.2.6 Human Health and Safety**

##### **Environmental Effects**

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

##### **Mitigation**

Noise, vibration and dust impacts and proposed mitigation methods are described in previous sections.

##### **Monitoring**

As described in Section 5.3.2.2, the Proponent and its contractor will monitor noise, vibration and dust effects during construction. In addition, the proponent will monitor contractor compliance with applicable legislation and regulations. The proponent's safety policies for staff and standard specifications for construction contracts will require full compliance with the following Acts and Regulations:

- 1) The Ontario Occupational Health and Safety Act,
- 2) The Ontario Regulations for Construction Projects,
- 3) Workplace Hazardous Materials Information System (WHMIS) Regulations,
- 4) The Canadian Environmental Protection Act and regulations, and
- 5) All other legislation, regulations and standards as applicable.

In addition, for any building demolition a Designated Substance Survey will be undertaken in accordance with the requirements of section 30 of the Ontario Occupational Health and Safety Act (OHSA). The purpose of the Survey will be to determine the presence of building products or equipment containing biological, chemical or physical agents termed Designated Substances under the OHSA or PCB's and to recommend actions for management during demolition and reconstruction of the existing Subway Station. The Survey findings will be included in the contract documents for the Project. In addition, the Contractor shall be required to complete the contract in compliance with all applicable regulations, including the Ontario Occupational Health and Safety Act (OHSA) and the Export and Import of Hazardous Waste Regulations and

the Storage of PCB Material Regulations (under the Canadian Environmental Protection Act).

### **Contingency**

During the course of construction, there is a risk of spills or discharge of pollutants or contaminants by the Contractor. The following contingency plan will be put in place:

- 1) Names and telephone numbers of persons in local municipalities and MOE to be notified forthwith of a spill;
- 2) Names and telephone numbers of representatives of fire, police and health departments of local municipalities who are responsible to respond to emergency situations;
- 3) Names and telephone numbers of companies experienced in control and clean up of hazardous materials that will be called in an emergency involving a spill;
- 4) Contingency plan shall include provisions for hazardous or unknown materials (e.g. puncturing a drain during excavation);
- 5) Containment and control of a spill and clean up procedures are to be initiated immediately to mitigate environmental damage, while awaiting additional assistance; and
- 6) Ensure materials and products are on site with which temporary repairs can be made to broken pipelines or other services so emission of pollutants can be controlled and stopped.

## **5.3.3 Cultural Environment**

### ***5.3.3.1 Built Heritage and Cultural Heritage Landscapes***

As discussed in Section 5.2.3.1, a number of cultural heritage features were identified in the study corridor. None of the heritage features are directly impacted by the Transit Project, however sensitivities associated with proposed subway station facilities in regard to the heritage features were identified. The mitigation measures provided in Section 5.2.3.1 will apply.

### ***5.3.3.2 Archaeological Features***

As discussed in Section 5.2.3.2, the Stage 1 archaeological assessment determined that with the exception of the East Don River crossing, the entire Yonge Street right-of-way has been heavily disturbed by previous construction activities and no further archaeological assessment is required. However, a number of locations beyond the right-of-way have remained relatively undisturbed, and they exhibit archaeological site potential.

The mitigation and contingency measures discussed in Section 5.2.3.2 will apply.

### ***5.3.3.3 Aboriginal Rights and Lands / Resources Used for Traditional Purposes***

Aboriginal rights with respect to lands and resources used for traditional purposes are discussed in Section 5.2.3.3.

## **5.3.4 Transportation**

### ***5.3.4.1 Automobile Traffic and Transit Service***

#### **Environmental Effects**

Although the majority of the Transit Project alignment follows the Yonge Street right-of-way, the potential disruption to automobile traffic and transit service is limited due to the tunnelling construction method for the line sections. However impacts will occur as a result of cut-and-cover construction at all stations and special trackwork areas, as well as the construction of the East Don River bridge.

For all six subway stations, plus all special trackwork areas, cut-and-cover works will directly impact:

- Driveways and private roads for adjacent properties;
- Existing transit service, including all routes currently using Yonge Street, Steeles Avenue, Cummer / Drewry, Clark Avenue, Royal Orchard Boulevard and the Richmond Hill Bus Terminal; and
- Traffic, including both vehicular and pedestrian/cyclist movements.

Although temporary in nature, the construction activities that cause these types of impacts will occur over several months and therefore warrant special consideration.

#### **Mitigation**

To mitigate traffic impacts in the areas of the Cummer / Drewry Station, the implementation of the North York Civic Service Road from Finch Avenue north to Drewry Avenue on the west side of Yonge Street could be advanced as part of the Traffic Management Plan for the Transit Project construction. The Service Road is an EA-approved public street that helps facilitate development and access along Yonge Street in the North York Centre Secondary Plan Area. The implementation of this section of the Service Road should play an important role in helping to mitigate traffic impacts related to the construction the Transit Project. The City of Toronto continues to acquire property for the Service Road (both east and west of Yonge Street) and has included the completion of the entire Service Road in its five-year capital plan including property acquisition and construction. Property is still required to complete the section of the Service Road between Finch and Drewry Avenues.

Overall, during the design phase, the proponent will work with the City of Toronto, York Region, City of Vaughan, Town of Markham and Town of Richmond Hill to develop traffic management plans. The objective of these plans will be to maintain vehicle and pedestrian access at all times for all streets, driveways and property entrances. The plan developed during the design phase will be provided to the contractor as a guide. In the event that the contractor elects to deviate from this plan, the contractor will be required to

prepare and submit a detailed and comprehensive Traffic Management Plan, for review by the appropriate municipal Transportation departments.

#### **5.3.4.2 Pedestrian and Cyclists**

##### **Potential Effects**

The impacts and mitigation measures described in Section 5.3.4.1 above will also apply for pedestrians and cyclists. This work will be carried out in a manner as to ensure the least interference with pedestrians, cyclists and vehicular traffic and shall include fencing and lighting as required providing a safe environment.

Additionally, all cut-and-cover construction and the construction of the East Don River bridge will have an effect on the normal travel patterns of pedestrians and cyclists since the Yonge Street roadway and sidewalks will be altered.

##### **Proposed Mitigation Measures**

Adequate and immediate temporary decking over the excavated construction areas will allow pedestrian and cyclist circulation at all times. Details on decking implementation and location are being examined and will be fully detailed during the design stage.

The detour of Yonge Street in the area of the proposed East Don River bridge and open cut areas will have a 2-lane per direction cross section which will allow safe bicycle circulation. All detours will also include pedestrian walkways.

#### **5.3.4.3 Rail**

##### **Potential Effects**

The proposed subway alignment crosses the CN York Subdivision north of Steeles Avenue in a tunnel, with the obvert nine metres below the lowest point of the existing Yonge Street bridge foundation. This crossing has the potential to produce minor track settlement.

##### **Proposed Mitigation Measures**

The existing Yonge Street Bridge (MTO drawing number 37-674-1, C.N.R. Overhead Bridge Widening, dated October 1977) over the CN York Subdivision was to be built with a minimum vertical clearance of 30 ft (9.1 metres) between the CN tracks and the underside of the bridge; more than 2 metres greater than the minimum clearance required according to the CN standard (CN drawing number K1U-10.2m-A, dated December 2, 2005).

Current industry practice is to construct facilities such as the proposed subway tunnels using tunnel boring machines (TBM), which minimize settlement effects. TBM's were designed as earth-pressure-balance (EPB) machines so as to assist in controlling ground displacements in potentially difficult ground conditions below groundwater levels. Construction using TBM's is being recommended for the proposed Yonge subway crossing of the CN York Subdivision at the indicated location.

During the preliminary and final design stages of the project detailed geotechnical investigation and field survey will be performed to further assess the existing ground

conditions and ensure that the detailed design of the tunnels, ground control measures and construction procedures mitigate any potential impact to the tracks and the existing Yonge Street structures.

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

### 5.3.5 Utilities

#### Potential Effects of Tunnelled Sections

Potential effects on existing utilities in the tunnelled portions of the alignment will be limited to impacts on the twin-box culvert that discharges to the stormwater management pond north of Highway 7, approximately 50 metres away from the subway alignment, the York Durham Sanitary Sewer (YDSS) along Steeles Avenue and Hydro One facilities south of Highway 407.

#### Proposed Mitigation Measures

Utilities affected by the cut-and-cover construction along Yonge Street will be temporarily relocated along the Yonge Street right-of-way. The staging and relocation approach will be determined during the design phase. The relocation of these facilities will be executed in advance of the subway construction, either in separate construction contracts or as part of the main contracts.

To mitigate the impact on the twin-box culvert north of Highway 7 near the Richmond Hill Centre Station, alternatives such as the construction of an inverted siphon (also known as a depressed sewer), a pump station, or a combination of a pump station and an inverted siphon have been identified as the most practical measures. A more detailed assessment of these options is discussed in Appendix D. The design phase will determine the selected mitigation measure.

For the YDSS along Steeles Avenue at Steeles Station, the depth of cover below the station and the overtop of the sewer will be confirmed during detailed design and appropriate measures will be implemented to ensure the structural capacity of the sewer below the station.

For other utilities along the corridor, the depth of the cover between the top of the tunnel excavation and the roadway surfaces and associated utilities such as sewers and water-mains, will be examined during the design stage and measures determined to ensure that damage from minor settlement due to tunnel construction is mitigated.

It should be noted that the extent of removal and replacement of the existing Finch Station tail track to change the vertical profile does not extend to the location of the pipelines located in the hydro corridor north of Finch Station. No impacts to the Imperial Oil and Enbridge Pipeline Inc. plants are anticipated. During detailed design plans will be circulated to Imperial Oil and Enbridge Pipelines Inc. for their review and approval.

North of the Langstaff /Longbridge Station, the subway alignment heads east off of Yonge Street. The proposed subway tunnels do not conflict with the existing Hydro One

towers however monitoring will be required to ensure there are no settlement related issues with any towers within close proximity of the subway tunnel construction.

The tunnels will be constructed using Earth Pressure Balanced (EPB) tunnel boring machines. EPB's are designed to control and limit ground displacements and the permanent tunnel lining is installed in a one pass tunnelling operation. The tunnel liners are fully waterproof, using bolted, precast concrete gasketed liners with continuous grouting through the liners during installation. Hydro-geological surveys will be undertaken on a real-time basis to fully establish and mitigate ground conditions. Given the separation from the towers and the construction methods, any potential impacts to the Hydro utility can effectively be eliminated from the tunnelling activities, and long term operations and maintenance of the subway.

### **Potential Effects of Station Locations**

As a result of the cut-and-cover construction being undertaken at stations and special track structures, utilities along Yonge Street will be affected during construction. The depth of the cover between the roadway surfaces as well as any associated utilities such as sewers and water-mains, and the top of the tunnel excavation will be examined to ensure that damage from minor settlement due to tunnel construction is unlikely.

During the design stage, there will be a thorough examination of existing utilities and if necessary relocation and modification of utility plants may be undertaken. The appropriate utility companies in the City of Toronto, York Region, Town of Markham, Town of Richmond Hill, and the City of Vaughan will be contacted prior to commencing excavation. In addition, utility relocation may require alternate and temporary re-arrangement of vehicular and pedestrian flow due to changes in road conditions such as reduced traffic lanes. Mitigation measures such as a traffic management strategy and maintaining transit and pedestrian access will be examined.

#### *Cummer / Drewry*

There are many sizable concrete storm sewer pipes that are located at the same position of the proposed subway box. This includes two 1350 mm pipes, a 2400 mm pipe, and a 825 mm pipe that runs almost the entire length of the subway box. With these pipes, there are 3 manholes located directly in the subway box location. The aforementioned pipes that are directly impacted by the works will require realignment and relocation.

On the east side of the subway box a 725 mm pipe complete with 2 manholes are located parallel to the subway box at a minimum offset that they will need to be temporarily relocated for the open cut construction. In addition there are numerous smaller underground utilities within the existing road right of ways that are in conflict with the Transit Project and will be relocated.

#### *Steeles Station*

A 1676 mm sanitary sewer pipe runs along the north side of Steeles Ave and crosses directly through the station box. This pipe will require realignment and relocation. A 600 mm concrete storm sewer pipe intersects the cross over tracks at the southern limit that will be required to be relocated.

An 875 mm and 675 mm concrete storm sewer connected by a manhole runs along the east side of Yonge stream in close proximity to the construction required for the cross over tracks. These items require temporary relocation for the open cut construction. In addition there are numerous smaller underground utilities within the existing road right of ways that are in conflict with the Transit Project and will be relocated.

#### *Clark Station*

A 1350 mm concrete storm sewer intersects Yonge Street and a double catch basin manhole on the east side of Yonge both interfere with the proposed subway station box. A realignment and relocation of these items will be required for the construction. In addition there are numerous smaller underground utilities within the existing road right of ways that are in conflict with the Transit Project and will be relocated.

#### *Royal Orchard Station*

A 1050 mm concrete storm sewer pipe, including 2 catch basins and a manhole, runs along the east side of Yonge Street the entire length of the subway box. This directly impacts the construction of the station box and will require relocation. In addition there are numerous smaller underground utilities within the existing road right of ways that are in conflict with the Transit Project and will be relocated.

#### *Langstaff / Longbridge Station*

A 900 mm concrete storm pipe, with a double catch basin / manhole at the bend, runs across Yonge Street and then turns to continue north on the east side of Yonge Street. This directly impacts the construction of the station box and will require realignment and relocation. In addition there are numerous smaller underground utilities within the existing road right of ways that are in conflict with the Transit Project and will be relocated.

#### *Richmond Hill Centre Station*

A utility corridor exists along the north edge of the hydro corridor north of Highway 7. Station facilities will be designed to ensure this corridor is unencumbered for future utilities installation.

To mitigate the impact on the twin-box culvert north of Highway 7 near the Richmond Hill Centre Station, alternatives such as the construction of an inverted siphon (also known as a depressed sewer), a pump station, or a combination of a pump station and an inverted siphon have been identified as the most practical measures. A more detailed assessment of these options is discussed in Appendix D. The design phase will determine the selected mitigation measure.

The existing utilities on High Tech Road will be protected or temporarily or permanently relocated to facilitate the station and tail track construction.

### **Mitigation**

For stations, two approaches will be used to mitigate utility impacts:

- 1) For small utilities including Bell conduit, gas mains and any storm sewer, watermain or sanitary sewer less than 600mm in diameter and utilities less than 3 m deep that are

- not in direct conflict with the permanent works, temporary support through the construction site is possible; and
- 2) For utilities that are deeper than 3 m and will be in direct conflict with the permanent works or for utilities larger than 600 mm in diameter that cannot be temporarily braced, these utilities will be relocated.

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 municipalities requirements for the installation of services within the City of Toronto, City of Vaughan, Town of Richmond Hill and Town of Markham road allowance. The net effect will be the retention of all services within the area (i.e. no permanent displacement of affected utilities).

#### **5.3.5.1 General Compliance Monitoring - Construction**

During construction, on-site project staff will ensure that implementation of mitigating measures and key design features are consistent with the contract and external commitments. In addition, the effectiveness of the environmental mitigating measures is to be assessed to ensure that:

- Individual mitigating measures are providing the expected control and/or protection;
- Composite control and/or protection provided by the mitigating measures is adequate; and
- Additional mitigating measures are provided, as required, for any unanticipated environmental problems that may develop during construction.

On-site project staff will ensure that the environmental measures outlined in this report and in the subsequent contract documents/specifications are carried out. In the event that problems develop, appropriate Provincial ministries or agencies will be contacted to provide additional input.

If the impacts from construction are different than anticipated, or the method of construction is such that there are greater than anticipated impacts, the Contractor's method of operation will be changed or modified to prevent those impacts.

Specialist environmental staff may be required on site for sensitive environmental operations.

Specific components of the monitoring program are noted below.

- 1) Include noise, vibration and air quality monitoring and mitigation measures and construction site maintenance/upkeep requirements in construction contract documents;
- 2) Prepare an Environmental Management Plan including monitoring, triggers and contingencies in the event that further groundwater investigations indicate a potential adverse effect on sensitive features;
- 3) Compliance monitoring during detailed design and construction; and

- 4) Undertake buildings, structures, and railway protection and monitoring, and condition surveys.

## **5.4 Operations and Maintenance Impacts**

### **5.4.1 Natural Environment**

#### ***5.4.1.1 Fisheries and Aquatic Habitat***

No permanent impacts are anticipated to result from the operation and maintenance associated with the Yonge Street Subway Extension. Future maintenance activities would not be expected to involve any in-water works once the bridge crossing is constructed to span the East Don River, 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.

#### ***5.4.1.2 Terrestrial Habitat***

There are no permanent issues resulting from the operations and maintenance associated with the Transit Project. All impacts are transient and relate to the construction of the Transit Project.

#### ***5.4.1.3 Wetlands***

There are no permanent issues resulting from the operations and maintenance associated with the Transit Project.

#### ***5.4.1.4 Species at Risk***

There are no permanent issues resulting from the operations and maintenance associated with the Transit Project.

#### ***5.4.1.5 Soil***

The operations and maintenance stage associated with the Transit Project will have no permanent issues related to soils.

#### ***5.4.1.6 Groundwater***

##### **Potential Effects**

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

##### **Proposed Mitigation Measures**

It is recommended that all structures in the cut-and-cover sections be designed as “water-tight” structures to minimize the inflow of water into the structure and permanent changes to the groundwater flow regime that would otherwise occur if the structures provided for full groundwater drainage around the structure. 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.

#### ***5.4.1.7 Drainage and Stormwater Management***

##### **Potential Effects**

The 15 hectare commuter parking lot surface facility proposed for the Hydro One corridor west of Yonge Street, adjacent the Langstaff/Longbridge Station, will generate additional run-off volume. Consideration will be given during detailed design to ensure run-off is directed away from the residential properties and the East Don River towards appropriate stormwater management facilities.

Changes in existing run-off volumes will also occur at other station locations. However, variances from the existing run-off volumes will be insignificant since the facilities will be located on lands that are already impervious.

##### **Proposed Mitigation Measures**

The Storm Water Management Preliminary Assessment contained in Appendix G includes the recommended stormwater management design criteria, facility alternatives and conceptual stormwater management plan. The stormwater management options will be evaluated in detail during the design stage and will define the type, location and capacity of the facility to be built to control run-off from the proposed Langstaff/Longbridge Station facilities, based on TRCA's guidelines.

Increases to surface drainage within the City of Toronto from new subway station buildings and impervious areas will be mitigated according to the City of Toronto's current Wet Weather Flow Management Guidelines.

The existing stormwater system has enough capacity to support minor run-off variances expected to occur at other station locations.

#### ***5.4.1.8 Air Quality***

##### **Potential Effects**

To protect human health and the environment, the MOE has established maximum allowable exposure limits for NO<sub>2</sub>, CO, SPM and dustfall. The criteria for NO<sub>2</sub>, CO, dustfall and SPM are specified in the recently enacted Ontario Regulation (O.Reg. 419/05) and/or in the Ontario Ambient Air Quality Criteria (AAQC). Currently, no provincial standard or criterion is available for PM<sub>2.5</sub> or NO. Recognition of potential health impacts from PM<sub>2.5</sub> has resulted in the enactment of Canada-wide standards (CWS) for this size fraction that will take effect in 2010. PM<sub>2.5</sub> emanating from vehicle exhaust may have more serious health effects than ordinary dust because of both the size and chemical composition.

When the Transit Project commences operations, trips currently made by automobile or bus can be made by electrically powered rail service instead, hence the impact of the Transit Project on air quality on a regional scale will be positive.

Existing air quality levels are a direct result of the existing vehicular activity and other air polluting activities in the area. The three areas that will be most influenced by the Transit Project are those stations with bus terminals and commuter parking facilities, resulting in increased localized traffic to drop-off areas, parking facilities as well as bus terminals providing public transit links. These locations are:

- Yonge/Steeles in the vicinity of the proposed Steeles Station.
- Yonge/Langstaff in the vicinity of the proposed Langstaff/Longbridge Station.
- Richmond Hill Centre in the vicinity of Yonge and Highway 7.

A bus loop with a maximum of fifteen (15) buses at peak hour, in the Build Scenario, is proposed at the Cummer / Drewry station location. Since vehicular traffic volumes would be low at the Cummer / Drewry/ Yonge intersection and bus idling would not happen at the location, it was anticipated that the impact of the Cummer / Drewry station area on air quality would be minimal. Therefore, that area was not included in the air quality assessment.

The concentrations of air pollutants from vehicular emissions due to the Transit Project were predicted by conducting mathematical modeling using US EPA CAL3QHC model for intersections, with fleet averaged emission factors for the projected traffic volume for the year 2021, calculated using the Mobile 6.2C emission factor model. A 2021 horizon year was selected to reflect at most ten years of construction as well as several years of operation. Meteorological conditions, specifically a wind speed of 1 m/s (3.6 km/hr) were used which is considered to be more conservative than actual meteorological data and generate worst-case pollutant concentrations.

Two scenarios were selected for the detailed assessment of local traffic impacts for the locations near the three subway stations at Steeles, Langstaff/Longbridge and Richmond Hill Centre:

- i. The “do nothing” scenario, which takes into account the projected traffic volume for 2021 without the proposed transit development (also referred to as the “Future No-Build” or “Future Background”); and
- ii. The “Future Build”, which takes into account the projected traffic volume for 2021 and new trips generated from the operation of the subway, parking facilities and bus terminals assuming that construction is completed before 2021.

A comparison of the predicted maximum concentrations as a percentage of the applicable criteria for PM<sub>2.5</sub>, CO and NO<sub>x</sub> of all the model runs based on the worst-case conditions are presented in Exhibits 5-10, 5-11 and 5-12 for the locations near the three subway stations at Steeles, Langstaff/Longbridge and Richmond Hill Centre. The incremental value provides a measure of the impact resulting from the Transit Project.

These results assume that the future background concentrations remain the same in 2021 as they are presently. Since background concentrations represent the largest source of contaminants in the case of PM2.5, changes in background levels may have a significant effect on PM2.5 concentrations at the local level.

**Exhibit 5-10: Maximum Modeled Concentrations as a Percentage of Criteria – Steeles Station**

Pollutants (units)	Average Time	Criteria	2006 Background Concentration (As percentage of Criteria) (4)	Percentage of Criteria Steeles Area		Incremental Change (%)
				Future No-Build	Future Build	
CO (ppm)	1-hour	30	0.54 (1.8)	11.3	14.7	3.3
	8-hour	13	0.54 (4.2)	18.3	23.7	5.4
PM2.5 (µg/m <sup>3</sup> ) (1)	24-hour	30	19.20 (64.0)	32.0	<b>38.7</b>	6.7
NO2 (ppb) (2)	1-hour	200	35.20 (17.6)	34.3	46.0	11.6
	24-hr	100	35.20 (35.2)	27.5	36.8	9.3
NO2 (ppb) (3)	1-hour	200	35.20 (17.6)	45.5	<b>64.9</b>	19.4
	24-hr	100	35.20 (35.2)	36.4	51.9	15.5

**Exhibit 5-11: Maximum Modeled Concentrations as a Percentage of Criteria – Langstaff / Longbridge Station**

Pollutants (units)	Average Time	Criteria	2006 Background Concentration (As percentage of Criteria) (4)	Percentage of Criteria Langstaff/Longbridge Area		Incremental Change (%)
				Future No-Build	Future Build	
CO (ppm)	1-hour	30	0.54 (1.8)	12.7	15.3	2.7
	8-hour	13	0.54 (4.2)	20.5	<b>24.8</b>	4.3
PM2.5 (µg/m <sup>3</sup> ) (1)	24-hour	30	19.20 (64.0)	33.3	36.0	2.7
NO2 (ppb) (2)	1-hour	200	35.20 (17.6)	36.9	42.5	5.6
	24-hr	100	35.20 (35.2)	29.5	34.0	4.5
NO2 (ppb) (3)	1-hour	200	35.20 (17.6)	49.8	59.1	9.3
	24-hr	100	35.20 (35.2)	39.8	47.3	7.4

**Exhibit 5-12: Maximum Modeled Concentrations as a Percentage of Criteria –  
Richmond Hill Centre Station**

Pollutants (units)	Average Time	Criteria	2006 Background Concentration (As percentage of Criteria) (4)	Percentage of Criteria Richmond Hill Centre Area		Incremental Change (%)
				Future No-Build	Future Build	
CO (ppm)	1-hour	30	0.54 (1.8)	7.7	8.7	1.0
	8-hour	13	0.54 (4.2)	12.4	14.0	1.6
PM2.5 (µg/m <sup>3</sup> ) (1)	24-hour	30	19.20 (64.0)	29.3	30.7	1.3
NO2 (ppb) (2)	1-hour	200	35.20 (17.6)	28.0	30.4	2.4
	24-hr	100	35.20 (35.2)	22.4	24.3	1.9
NO2 (ppb) (3)	1-hour	200	35.20 (17.6)	34.9	38.9	4.0
	24-hr	100	35.20 (35.2)	27.9	31.1	3.2

Notes:

The criterion for PM2.5 is the federal standard published in Canada-wide standards for Particulate Matter (PM) and Ozone adopted by the Canadian Council of Ministers (July, 2000)

NO2 calculated with the Ambient Ratio Method Based on the Ministry of Environment, Air Quality of Ontario (2003) report average background concentration ratio of NO2/NOx of 0.6.

NO2 calculated using Tier 1 screening, Ozone Limiting Method, which assumes all NOx is NO2.

90th percentile of 2007 Background Concentration (i.e., if value is 60 ppb, then 90 percent of the data are equal to or below 60 ppb).

As shown in Exhibits 5-10, 5-11 and 5-12, the maximum concentrations and their locations for the modeled pollutants are as follows:

- The predicted maximum CO concentration will reach 25% of the criteria (at the Langstaff / Longbridge Station area under the Future Build Scenario) with an incremental change of 4% over the No-Build Scenario.
- The predicted maximum PM2.5 concentration will reach 39% of the criteria (at the Steeles Station area under the Future Build Scenario) with an incremental change of 7% over the No-Build Scenario.
- The predicted Maximum NO2 concentration may reach 65% of the criteria if it is assumed that all NOx emissions are emitted in the form of NO2 (at the Steeles area under the Future Build Scenario), with an incremental change of 19% over the No-Build Scenario. This is a conservative assumption. A corresponding value of 46% of the criteria with an incremental change of 12% over the No-Build Scenario resulting from the application of the ARM would be more realistic.
- The change in pollutant concentrations from Future No Build to Future Build will likely not exceed 19% even at the local level during peak hour traffic, in spite of a forecasted increase in traffic volume of 25% compared with the No-Build Scenario.

In general, results from modeling CO, NO2 and PM2.5 at the selected locations, indicate that the operation of the Transit Project is not likely to have an impact on air quality at the local level.

### **5.4.1.9 Contaminated Properties (Operations and Maintenance)**

Depending on whether there is a need to design and install any engineered contaminant barriers along the subway corridor (as outlined above in Section 5.3.1.9), there will be associated long term operation and maintenance of the containment barriers which must be integrated into the operations and maintenance of the subway corridor.

## **5.4.2 Socio-Economic Environment**

### **5.4.2.1 Buildings and Property**

There are no permanent property issues resulting from the operations and maintenance associated with the Transit Project. Impacts to residential or commercial properties are either permanent displacements or transient related to construction activities, as detailed in Sections 5.2.2.1 and 5.3.2.1 respectively. Any noise and vibration related impacts are identified in Section 5.4.2.2.

### **5.4.2.2 Noise and Vibration**

The proposed Transit Project comprises two distinct sources of noise and/or vibration:

1. Ground-borne vibration - the subway trains will be moving in tunnels which may transmit ground-borne vibration and noise that propagate through the soil to the near-by buildings. The resulting building vibration can cause intrusions in the form of mechanical motion or audible sound within the buildings.
2. Air-borne noise - the proposed bus terminal stations, commuter car park, subway bridge crossing of the Eat Don River, transformer substations and air shafts will produce noise that propagate through the air to the nearby buildings.

As detailed in the Noise and Vibration Impact Study included as Appendix K, wayside noise and vibration criteria provide a basis for assessing impact and determining the type and extent of mitigation measures necessary to minimize any general community annoyance or minimize interference with any particularly sensitive nearby land use or activity.

The following potential sources of noise and vibration were assessed as part of the Transit Project Assessment Process:

- Underground subway vehicle movements ground-borne noise and vibration
- Bus stations noise
- Commuter car park noise
- Subway viaduct crossing noise
- Electrical transformer substations noise
- Ventilation shafts noise

The following was concluded for each potential source of noise and vibration addressed in this study:

#### *Subway Ground-Borne Noise and Vibration*

Receptors were selected and assessed, as detailed in Appendix K, for potential noise and vibration impacts resulting from the Transit Project. The results of the noise and vibration predictions were adjusted to account for the use of railway vibration isolation such as using the double tie system and the use of floating slabs throughout the entire system with the application of a reasonable reduction factor of 12 dB to the vibration levels. It was concluded that there will be no impact for all selected points of reception.

#### *Bus Terminals*

The two bus terminals (Steeles and Richmond Hill Centre) will have no impacts on residential land uses due to a combination of distance setbacks and high ambient noise levels due to existing traffic.

#### *Commuter Parking Lot*

The commuter parking lot on the west side of Yonge Street between Yonge Street and the East Don River and between Highway 407 and Longbridge Road will have an adverse noise impact on the Longbridge Road residences without the application of mitigation measures. With the use of the recommended south property line 6 m high sound barrier (2 m base berm plus 4 m noise wall atop), the noise impact will be mitigated to pre-existing ambient conditions. The final configuration of the noise wall and berm combination will be subject to additional consultation with the local community during detailed design.

#### *Subway East Don River Crossing*

The subway crossing over the East Don River is predicted to have noticeable noise impacts at the adjacent golf course and at the nearby residential properties without the application of mitigation measures. The application of suitable sound absorbing surface finish materials to the underside of the ceiling and the inner sides of the viaduct parapet walls would result in significant acoustic improvements. Enclosing the subway line in a concrete structure would certainly eliminate the concerns with a predicted outside sound level within the low to mid 50's dBA which will blend with the outside ambient due to traffic.

### **Mitigation**

To mitigate the noise and vibration impacts identified above, the following mitigation is proposed:

- A track system, such as a double tie and floating slab systems or equivalent, will be installed in all sections of the subway line in order to reduce the ground-borne vibration and noise created by the train movements.
- TTC will continue to follow practices for the routine maintenance of train wheels to eliminate “wheel flats” which can contribute to ground borne noise and vibration.
- A 6.0 m high sound barrier (2 m high base berm plus 4 m high noise wall atop) will be constructed along the south side of the commuter car park lot (located on the hydro lands south of Highway 407 on the west side of Yonge Street) with a sound absorptive face treatment on the south side of the wall facing the

residences to reduce the effect of acoustic reflections. The final details of the noise wall and berm combination will be subject to discussion with the local community.

- A suitable sound absorbing surface finish material will be applied to the concrete structure of the subway bridge crossing over the East Don River if the sides of the bridge are to remain open. The material should have fairly high sound absorption co-efficient and to be applied to the underside of the ceiling and the inner sides of the viaduct parapet walls.

Enclosing the subway line in a concrete structure could also be considered as an alternative as it would eliminate the concerns with a predicted outside sound level within the low to mid 50's dBA which will blend with the outside ambient due to traffic.

- Recommended noise control measures for the subway transformer substations include one or a combination of the following:
  - Specifying low sound emission transformer system, for example:
    - Transformers core: maximum 59 dBA @ 15m
    - Cooling fans: maximum 64 dBA @ 15m
  - Partial sound barriers or enclosures
  - Orientation of the equipment and structures
- Acoustical treatment of ventilation shafts. The acoustical treatment may involve the use of lined turns and bends, partial barriers/enclosure near the ground surface and the application of special sound absorbing material to the inside walls of the shaft. The issue of noise in this case is considered as a routine technical matter for detailed design purposes.

Locating ventilation fans near the tracks rather than at street level can also help if there are turns in the shafts. This is also considered as a routine technical design factor.

- Further noise assessment will be undertaken to the following potential sources of noise if an MOE Certificate of Approval is required for that element or if significant changes in design or operation are proposed:
  - Bus stations
  - Commuter parking lot
  - Subway Bridge crossing
  - Electrical transformer substations
  - Ventilation shafts & fans

## Monitoring

The Proponent will conduct a noise and vibration study, in accordance with the protocols established with the Ministry of the Environment for the recent Sheppard Subway

project. 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 K for details).

#### **5.4.2.3 Electromagnetic Interference (EMI)**

##### **Environmental Effects**

The most common concern with respect to EMI is the adverse effect that it will have on computing devices including: microprocessor based patient diagnostic, monitoring, and therapeutic equipment. Based on recent tests undertaken by the Bay Area Rapid Transit (BART) system, examples of Electro Magnetic Frequency (EMF) intensities from human activities include the following<sup>10</sup>:

- 1) Earth’s static magnetic field varies from 300 mG (30  $\mu$ T) at the equator to over 600 mG (60  $\mu$ T) at the magnetic poles,
- 2) Overhead power transmission line: 32 to 57 mG (range of exposure to utility workers),
- 3) Household appliances: 8 to 165 mG (at a distance of 27 cm, or 12 inches),
- 4) Computer video display: 2 to 4 mG (at 35 cm, or 16 inches), and
- 5) Rail vehicle (electrically powered): 400 mG (at 110 cm, or 43 inches from the vehicle floor) to 1,500 mG (at floor level).

Recognizing that TTC and BART operate similar systems at similar power requirements (600 VDC), the measurements taken on the BART system can be applied to the proposed Transit Project in order to identify potential EMI sensitive uses. The results of the modelling undertaken for the BART system showed that the fields do not extend beyond 10.0 to 15.0 metres from the centre of the two tracks at track level. Since the Transit Project track level will be typically lower than 15 metres below the surface, the operation of a subway will have no effect on existing uses in the Study Area. Therefore no mitigation is required.

#### **5.4.2.4 Stray Current**

##### **Environmental Effects**

Stray current corrosion, which is a form of electrolytic corrosion, occurs on buried metallic structures and differs from other forms of corrosion damage in that the current, which causes the corrosion, has a source external to the affected structure. Stray current is caused by a portion of the negative return current which leaks into the ground and returns to the traction power substation through parallel paths provided by the ground and by any other metallic structures. For a non-metallic structure, such as plastic or concrete pipe and plastic coated cables, stray current is a non-issue.

<sup>10</sup> Silicon Valley Rapid Transit Corridor Final EIR (Earthtech 2003)

## **Mitigation**

In order to minimize uncontrolled stray currents a number of measures shall be used in connection with measures applied to the traction power return system:

- 1) Low linear rail resistance;
- 2) High rail-to-earth resistance, including insulated trackwork mounted fittings and appurtenances;
- 3) Good rail bonding, both longitudinal and track cross-bonding;
- 4) Parallel connected negative reinforcing feeder cables, insulated and cross-bonded to the return rails;
- 5) Good water drainage;
- 6) Structural steel-work and reinforcing isolation/separation; and
- 7) Utility structures to be electrically insulated, bonded, coated and cathodically protected as required.

The subway traction power distribution system shall be ungrounded and shall have no direct connection to earth.

The running rails shall be insulated from earth with the use of pads and hardware, and by the isolation of all rail associated metal ware from earth. The negative running rails shall be connected to the AC ground system through a floating negative automatic grounding switch (FNAGS). The FNAGS operates (and alarms) only on an abnormally high return rail to ground voltage.

The insulating pads under the rails shall have the following provisions:

- 1) Be capable of shedding water;
- 2) Resist the accumulation of airborne dirt;
- 3) Discourage DC current tracking over the surfaces of the insulation;
- 4) Have a high surface finish; and
- 5) Have high insulation levels from earth when installed and maintain an insulation level of at least 300 Ohms - km per rail during the design life.

### **5.4.2.5 Aesthetics**

There are no permanent issues resulting from the operations and maintenance associated with the Transit Project. Impacts to aesthetics associated with the infrastructure are described in Section 5.2.2.5 and 5.3.2.5.

### **5.4.2.6 Human Health and Safety**

The possibility of accidental spills is always present in association with the operation and maintenance of any facility, including transit systems. The contingency measures in

place during construction, as detailed in Section 5.3.2.6, are also applicable to the operation of the system.

### **5.4.3 Cultural Environment**

#### ***5.4.3.1 Built Heritage and Cultural Heritage Landscapes***

There are no permanent issues resulting from the operations and maintenance associated with the Transit Project. All potential impacts are transient and relate to the construction of the Transit Project, as detailed in Section 5.3.3.1.

#### ***5.4.3.2 Archaeological Features***

There are no permanent issues resulting from the operations and maintenance associated with the Transit Project. All potential impacts are transient and relate to the construction of the Transit Project, as detailed in Section 5.3.3.2.

#### ***5.4.3.3 Aboriginal Rights and Lands / Resources Used for Traditional Purposes***

There are no permanent issues resulting from the operations and maintenance associated with the Transit Project. Further discussion regarding Aboriginal rights with respect to lands and resources used for traditional purposes is provided in Section 5.3.3.3.

### **5.4.4 Transportation**

#### ***5.4.4.1 Automobile Traffic and Transit Service***

The Transit Project will provide significant transportation capacity to the northwest part of Toronto and therefore the overall effects on automobile traffic (and congestion) and transit service speed and reliability will be positive. The inclusion of surface facilities at the Steeles Station, Longbridge/Langstaff and Richmond Hill Station has the potential for localized negative impacts and positive impacts at Finch Station.

The cross sectional requirements at the Steeles Avenue intersection for both Yonge Street and Steeles Avenue will be developed during detailed design based on the operational requirements for both automobile and transit services, therefore no operational impacts are anticipated at this location.

The introduction of the commuter parking lot and PPUDO at the Langstaff/Longbridge Station results in additional traffic volumes on Yonge Street in the vicinity of the station. The traffic impact study undertaken for this location confirmed that the local road network can support the proposed facility, as detailed in Appendix M. Additional traffic analysis must be completed during detailed design to address the proposed development traffic from the Langstaff Development and from Richmond Hill Centre. This additional traffic will be simulated to ensure the Highway 407 / Yonge Street interchange operates satisfactorily to MTO / 407 ETR standards. The commuter parking lot has been studied on the basis that there are no access or egress points from the adjacent residential neighbourhood (i.e. that all access to/from the commuter parking lot / PPUDO will be directly to/from Yonge Street).

The introduction of the bus terminal and PPUDO at the Richmond Hill Centre results in additional traffic volumes north of Highway 407 on Yonge Street. These traffic volumes

along with the additional development traffic resulting from the Richmond Hill Land Use Study will be used during the detailed design of the Richmond Hill Station and the associated surface facilities.

The introduction of the Steeles Bus Terminal will result in a significant reduction in bus volumes south of Steeles Avenue on Yonge Street. The bus bay requirements at Finch Station will also be reduced as a result of bus services terminating at Steeles Station. The long term consolidation of bus bays at Finch and the associated impacts of a Finch LRT on bus bay requirements will be the subject of further study by TTC and the City of Toronto.

### **Monitoring**

Monitoring of traffic volumes on public roads and transit schedules are part of the City of Toronto's, York Regions and TTC normal operating procedures. This will allow for either agency to identify future issues and develop corrective actions. Furthermore, as development proceeds around each station, the City of Toronto, City of Vaughan, Town of Markham and Town of Richmond Hill will ensure the continued functioning of the road network, through the use of supporting traffic impact studies.

The use of residential streets and adjacent properties surrounding stations for passenger drop off and pick up will be monitored.

#### ***5.4.4.2 Pedestrians and Cyclists***

The undertaking will have no have permanent effects on pedestrian and bicycle circulation patterns. The East Don River bridge will include provisions for cyclists and sidewalks.

Additionally, pedestrian and cyclist amenities will be included at the stations resulting in positive local impacts. These will be developed (through the site plan process) to enhance current amenities in order to achieve an equal or better level of service for both travel modes.

#### ***5.4.4.3 Rail***

No permanent issues resulting from the operation and maintenance associated with the Transit Project are anticipated.

### **5.4.5 Utilities**

#### **Potential Effects**

The existing concrete arch culvert crossing Yonge Street over the East Don River will be replaced by the proposed East Don River bridge. No other permanent effects resulting from the operation and maintenance associated with the Transit Project are anticipated.

### **5.4.6 Subway System Capacity/Network Issues**

#### ***5.4.6.1 Ridership and Planned Improvements***

While a number of studies, decisions and investments have been undertaken over the past two decades to improve the capacity of the existing Yonge Subway to handle increased

ridership, the Yonge Subway requires further investments and improvements to maximize the operational performance and increase the capacity of the existing system.

Recent growth in TTC/Yonge Subway ridership and planned improvements to the transit network in the GTA could increase peak point ridership on the Yonge Subway. The following generators of future ridership growth on the Yonge Subway line are anticipated:

- The Yonge Subway extension to Richmond Hill Centre;
- The Transit City initiative including the Finch West, Sheppard East, Eglinton and Don Mills LRT lines;
- Growth in Sheppard Subway ridership; and
- General growth in overall TTC ridership.

All of the above growth factors will contribute, to varying degrees, to the need to improve the capacity of the Yonge Subway to accommodate existing ridership levels and respond to future ridership growth. The growth in Yonge-University-Spadina Subway ridership is a network capacity issue that must be viewed and addressed in a rapid transit network context.

The above impacts will be offset to some degree by improvements in GO Rail service levels and the opening of the Spadina Subway extension to the Vaughan Corporate Centre in 2015. The impacts can also be mitigated by the gradual implementation of ATO/ATC, increased service levels on the Yonge-University-Spadina Subway line, and other planned capacity improvements.

#### **5.4.6.2 TTC/City Ridership Forecasts**

As the ridership impacts of the Transit Project will be felt downstream on the existing Yonge Subway system, the City/TTC have undertaken modeling of future peak point ridership to 2031 in order to understand the downstream effects. The following ridership forecasts are limited to the section of the Transit Project within the City of Toronto (see Exhibit 5-13). Preliminary projections of ridership (a.m. peak hour) on the Yonge line at selected points to 2031 are estimated as follows:

**Exhibit 5-13: TTC/City Ridership Forecasts - 2031**

<b>Station</b>	<b>Existing</b>	<b>2031</b>
South at Steeles	N/A	15-17,000
South at Finch	10,500	17-19,000
South at Bloor	30,000	37-42,000

The above estimates are based on the City’s GTA model with comparisons and adjustments made using the results from the TTC’s MATIDUC model. The models incorporate changes to the GTA transit network including the following network improvements to 2031:

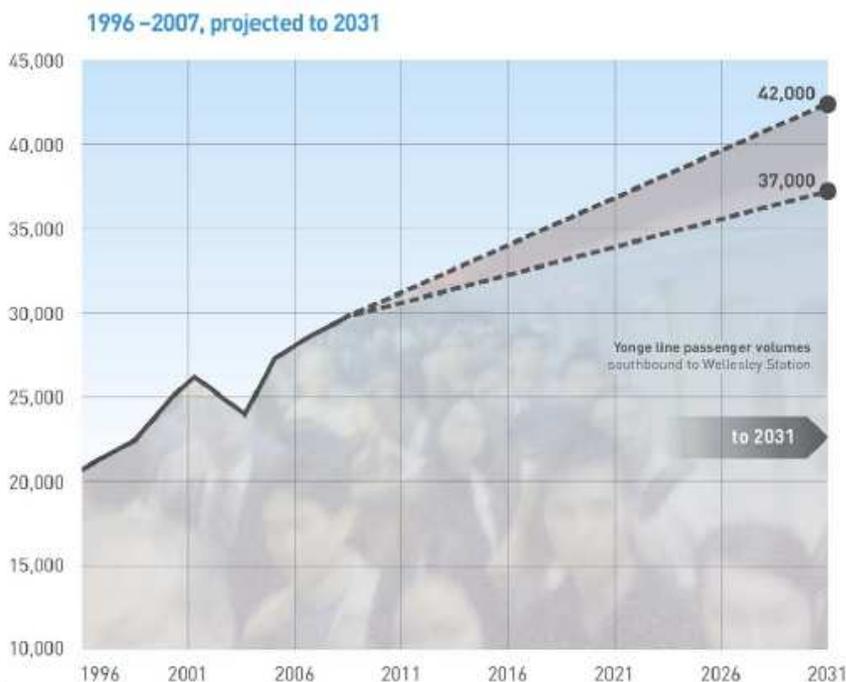
- Spadina Subway to Vaughan Corporate Centre;
- Yonge Subway to Richmond Hill Centre;

- Two zone TTC fare system at the City of Toronto boundary;
- Full implementation of Transit City lines and related bus routing changes;
- York Region population and employment forecasts for intensification in the Yonge and Spadina corridors north of Steeles and City of Toronto forecasts south of Steeles (based on Official Plan forecasts and waterfront development);
- GO ten year plan for improved GO rail service including all day service on the Richmond Hill GO line;
- Expansion of existing Highway 407 GO services;
- No Highway 407 Transitway; and,
- VIVA BRT services north of Richmond Hill Centre Station and VIVA BRT on Highway 7 connecting through Richmond Hill Centre and Vaughan Corporate Centre Station.

The models do not include the Highway 407 Transitway (although service in that corridor is represented by Highway 407 GO services). The above ridership projections are preliminary and additional work is required to assess the implications of GO rail ridership and station by station usage.

Forecasts of future ridership have been prepared for 2031 assuming that the Transit City LRT lines and both the Spadina and Yonge Subway extensions into York Region are constructed. As shown in Exhibit 5-14, in this scenario, ridership on the Yonge Subway south of Bloor Street is expected to grow from the current level of 30,000 passengers per hour in the morning peak to 37,000 to 42,000 passengers per hour in 2031. As was noted earlier, the assumptions made with respect to service levels and relationship to ridership between the Yonge Subway and GO Rail are complex and must be subjected to detailed assessment. Such a detailed assessment has not yet been done.

**Exhibit 5-14: Yonge Subway, AM Peak Hour / Peak Direction Volumes**



In order to better understand the relative contribution of the Transit City initiative and the Yonge Subway extension project to growth in peak point ridership south of Bloor to 2031, additional model runs were undertaken excluding these individual projects to identify their contribution to the overall growth in demand on the Yonge Subway south of Bloor. These runs indicate that, of the forecast 7,000 to 12,000 growth in ridership on the Yonge Subway south of Bloor:

- Approximately 20% is related to the extension of the Yonge Subway to Richmond Hill;
- 10% is attributable to the Transit City lines; and,
- The remaining 70% is derived from base growth in population and employment (both within the City of Toronto and externally) and the contribution of other transit network improvements.

**5.4.6.3 Metrolinx Ridership Forecasts**

Based on a more extensive transit network to 2031 than was included by TTC/City of Toronto, Metrolinx has estimated peak point ridership of 42,000 per hour south of Bloor. As well, Metrolinx has tested the diversion effect of constructing the Downtown Relief Line (Pape to Queen). The Metrolinx forecast shows Yonge line ridership south of Bloor of 25,100 per hour with 17,500 peak hour riders diverted to the Downtown Relief line from the east.

The City/TTC modeling has not tested the impact of a downtown relief line and as a result, the Metrolinx estimates of the diversionary effect (41% of Yonge line riders would

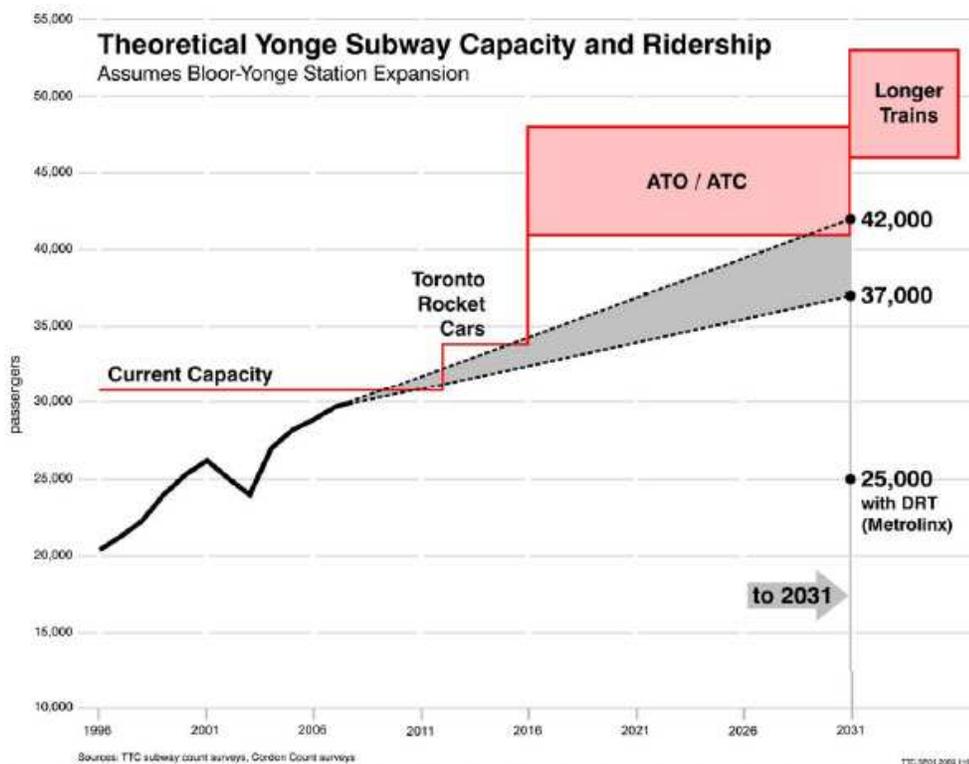
be diverted to the downtown relief line) are the only estimates available of this impact. The Metrolinx forecasts include different population and employment forecasts for Toronto/York based on the projected impacts of the Places to Grow Act. In addition, the Metrolinx model included a number of service/network improvements over and above those in the TTC/City model results outlined above, including the Highway 407 transitway, 5 minute Regional express GO rail services in the Richmond Hill GO corridor in the outlying 10 year period (2021 to 2031), extension of Highway 407 east, GO service to Guelph and the extension of Highway 404.

The Metrolinx forecasts are considered to be optimistic as the capital investment in the transit network to achieve the projected ridership levels is significant in scale.

#### 5.4.6.4 Capacity Improvement Strategy

The planned network improvements that could contribute to increased peak point ridership and the timing of the implementation of capacity improvements on the Yonge-University-Spadina Subway line were previously shown in Exhibit 1-7. Exhibit 5-15 superimposes the timing of capacity improvements relative to the projected growth in peak point ridership south of Bloor to 2031.

**Exhibit 5-15: Theoretical Capacity and Ridership**



It should be emphasized that the preliminary strategy for responding to the projected growth in Yonge Subway ridership is focused on maximizing the capacity of existing subway infrastructure. In this context, the Downtown Relief line should be considered as a lesser priority to address capacity issues into the downtown core after the

implementation of the planned capacity improvements to the existing subway system including the following:

- Toronto Rocket cars are fully implemented on the Yonge-University-Spadina line;
- ATO/ATC full implementation and operation of 105 second headways;
- Improved service levels on north-south GO rail lines; and
- Improvement to the capacity of Yonge-Bloor Station.

The above rationale is based on maximizing the use and capacity of existing transit (GO/TTC) infrastructure prior to the implementation of costly new rapid transit lines into the downtown core. The Downtown Relief line will become a higher priority particularly if employment growth in the downtown core continues as projected and after all attempts to increase the capacity of existing infrastructure have been exhausted and a new line into the downtown core is then required to respond to ridership and capacity constraints at that time. This is an important principle given funding constraints for rapid transit investments.

### **Environmental Effects**

The environmental effects of ridership exceeding capacity of the Yonge Subway as a result of the Transit Project could include the following:

- The quality and reliability of Yonge Subway service would be negatively impacted;
- The capacity of Yonge-Bloor station would be exceeded; and
- The ability of existing downtown stations to accommodate projected growth could be negatively impacted.

### **Mitigation**

In order to mitigate the downstream ridership impacts of the Transit Project, the City/TTC have established a number of requirements as follows:

- The TTC's base capital funding needs must continue to be fully funded including replacement streetcars and the Transit City lines are the first priority for implementation;
- The TTC's future base capital funding needs for rail yard expansion, the expanded subway car fleet to support reduced headways on the Yonge-University-Spadina line and increased capacity of Yonge-Bloor Station must also be funded;
- The Spadina Subway Extension and ATO/ATC on the Yonge-University-Spadina line must be in place prior to the opening of the Yonge Subway Extension;
- It will not be possible to implement improved headways on the Yonge-University-Spadina line (with ATO/ATC) without a significant investment in Yonge-Bloor Station capacity prior to the availability of the new signal system in

2016, and the Yonge- Bloor Station improvements must therefore be fully funded;

- The capacity of the Yonge Subway line to accommodate future ridership from this extension (and other network improvements that connect to the Yonge Subway) is a significant operational issue that requires further study and resolution to the satisfaction of the City of Toronto and the TTC. The current budget for the Yonge Subway project includes an allowance for storage/maintenance of Yonge Subway Extension's vehicles in an existing yard (Wilson or Davisville). Should a stand alone yard (or a satellite facility at the north end of the Transit Project) be required, the capital cost of the Transit Project will increase from the current estimate of \$2.4 billion (2008 dollars). The Subway Rail Yard Needs Study (to support the Transit Project and other planned increases on the Yonge-University-Spadina Subway line) currently being undertaken by the TTC will identify future yard requirements to 2031 including the capital cost implications for yards over and above the existing Transit Project budget, and which must be addressed to the satisfaction of the City of Toronto and the TTC;
- The estimated \$125 million cost to acquire property for the Yonge Subway project has not yet been confirmed as eligible for funding from the Province of Ontario based on draft capital cost eligibility guidelines. The TTC/City position is that property costs for the project should not be born by the TTC/City;
- The design of Transit Project stations and surface facilities be designed to a high standard of excellence in collaboration with proven architects, including integrated artwork and be environmentally sustainable consistent with City/TTC standards;
- An origin-destination study of the travel demand in the proposed service area be undertaken and that this report identify other transit projects that serve this demand;
- The feasibility of accommodating the increased ridership in stations on the Yonge-University-Spadina line must be determined and funded, with specific regard to all stations south of Eglinton on the Yonge line; and,
- The costs of measures related to the North York Service Road arising from the project are to be included as project costs.

In addition, although not a TTC/City requirement, it will be important to implement planned GO rail service improvements in parallel with the implementation of the Transit Project to off load Transit Project ridership to the extent possible by diverting downtown oriented ridership to the GO system. However, improved GO rail service should be considered necessary in combination with the Yonge Subway project not as an alternative to it.

## 5.5 Summary

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.

## 6. COMMITMENTS TO FUTURE WORK

During this Transit Project Assessment Process, The Regional Municipality of York Region (York Region), TTC and the City of Toronto have worked closely with key stakeholder agencies to address and resolve any issues or concerns. Commitments to future work for the project are listed below.

### 6.1 Permits and Approvals

York Region, TTC, and the City of Toronto will secure necessary permits for the implementation of the Transit Project, including, but not limited to:

- 1) Planning approvals (including Site Plan Approval) for above-grade structures and facilities (through York Region, City of Vaughan, Town of Markham, Town of Richmond Hill and City of Toronto);
- 2) Building permits for the stations, Emergency Exit Buildings or other ancillary features (City of Vaughan, Town of Markham, Town of Richmond Hill and City of Toronto);
- 3) Permit to Take Water from the Ministry of the Environment if dewatering exceeds 50,000 litres per day;
- 4) Permit under the Navigable Waters Protection Act, as Transport Canada has confirmed that the East Don River is navigable at Yonge Street;
- 5) Toronto Region Conservation Authority permits and approvals for work within a regulated area;
- 6) Stormwater management, in accordance with City of Toronto (south of Steeles Avenue), City of Vaughan, Town of Markham and Town of Richmond Hill, TRCA and MOE requirements;
- 7) Sewer discharge approvals, in accordance with City of Toronto, City of Vaughan, Town of Markham, Town of Richmond Hill and York Region requirements;
- 8) Ministry of Transportation approvals associated with the subway tunnel crossing under Highway 407 and the new entrance into the Commuter Parking lot on the west side of Yonge Street, just south of Highway 407;
- 9) Railway Crossing Agreement (CN York Subdivision);
- 10) Hydro One / Ontario Realty Corporation Agreements to allow for the use of the 407 Hydro Corridors for transit-related purposes (commuter parking lot and Passenger Pick-up/Drop-off (PPUDO)); and
- 11) Certificates of Approval for noise and air quality related impacts resulting from vent shafts, stations, and parking lots from MOE.
- 12) Complete Heritage Impact Assessments at Cummer/Drewry and Royal Orchard Stations as identified in the Built Heritage and Cultural Landscapes Report.

## 6.2 Planning Initiatives

York Region, TTC and City of Toronto will take a leadership role in planning initiatives, which support the Transit Project, as listed below:

- 1) For the Richmond Hill / Langstaff Gateway, York Region, TTC and Metrolinx will work cooperatively with the Municipalities and the existing property owners, taking into consideration the proposed subway alignment, Richmond Hill Station, the GO Richmond Hill Rail Line Station, future Highway 407 Transitway and Richmond Hill's emerging development plans;
- 2) The City of Toronto will initiate a planning study for Yonge Street corridor between the proposed Steeles Station to the proposed Cummer/Drewry station;
- 3) York Region and TTC will work with the Town of Markham, Town of Richmond Hill and the City of Vaughan to stimulate transit supportive development that incorporates and integrates the Transit Project alignment, stations and related commuter facilities into development plans.

## 6.3 Property Acquisition

York Region, City of Toronto and TTC will:

- 1) Proceed with a Property Protection Study during the early stages of the design of the Transit Project with the intention of ensuring that, regardless of the timing of the initiation of the Transit Project, developments in the corridor do not impact the feasibility of implementing the recommended concept;
- 2) Continue negotiations with the owner of property required for the Richmond Hill Centre station;
- 3) Continue negotiations with Ontario Realty Corporation / Hydro One for the property required for the Commuter Parking Lot and PPUDO;
- 4) For all properties required within the City of Toronto (including temporary easements to facilitate construction), the City of Toronto will acquire property by negotiation or expropriation (as required); and
- 5) For properties required within the City of Vaughan, Town of Markham and Town of Richmond Hill (including temporary easements to facilitate construction), York Region will acquire property by negotiation or expropriation (as required).

## 6.4 Subway Capacity / Subway Railyard Needs

York Region, City of Toronto and TTC will:

- 1) Work to resolve the requirements established by the TTC/City with respect to the impact of the project downstream on the existing subway system;
- 2) Integrate the results of Subway Rail Yard Needs Study into the Transit Project, as appropriate, and cooperate in the conduct of the necessary studies to implement the recommended yards strategy;

- 3) Adjust the capital cost of the Transit Project to reflect the downstream capacity, yards, and North York Service Road implications, as appropriate, based on negotiations between the parties.

## 6.5 Cummer / Drewry Station

The City of Toronto will continue discussions with adjacent property owners at the station and protect for future direct connections to the station.

The City of Toronto may require a Heritage Impact Assessment (HIA). The need for this will be determined during detailed design, based on the specific impact and in consultation with the City of Toronto.

The City of Toronto / TTC will continue to investigate the feasibility and traffic benefits of extending the North York Service Road to Drewry Avenue prior to initiating construction of the Transit Project from the north limits of Cummer / Drewry Station to the north limits of Finch Station.

## 6.6 Steeles Station Development

The underground bus terminal facilities shown in Section 4.1.4.2 represent the anticipated spatial requirements for intermodal transfers at Steeles Station between the subway and bus. This inter-regional node presents an excellent opportunity to maximize the benefits of government policies promoting compatible transit infrastructure and land use. It is understood that the extent of land, surrounding this node designated for an integrated and/or adjacent transit-supportive development with Steeles Station, will be identified by the City of Toronto, Town of Markham, City of Vaughan and York Region..

The City of Toronto, City of Vaughan, Town of Markham, York Region and TTC will work closely during their respective land use studies to optimize the interface and integration of the Steeles Station with transit supportive development.

York Region and City of Toronto will review the transportation requirements of both Yonge Street and Steeles Avenue in an effort to minimize the ultimate cross section widths of these roads which will have a direct impact on the property requirements associated with the underground bus terminal and subway station.

York Region, TTC and the City of Toronto will, in consultation with the Town of Markham and the City of Vaughan, determine the roles and responsibilities of each agency for the design, construction, operation and maintenance of the appropriate station facilities.

## 6.7 Clark Station

York Region and TTC will continue discussions with the adjacent property owners at the station to ensure station facilities are constructed to maximize redevelopment opportunities.

## 6.8 Royal Orchard Station

York Region and TTC will continue discussions with the adjacent property owners at the station to ensure station facilities are constructed to maximize redevelopment opportunities.

Part of Royal Orchard Station is located within the Vaughan Thornhill Heritage Conservation District. The City of Vaughan may require an HIA. The need for this will be determined during detailed design, based on the specific impact and in consultation with the City of Vaughan.

Additionally, the Town of Markham may require an HIA depending on the location of the proposed vent shaft area. The need for this will be determined during detailed design, based on the specific impact and in consultation with the Town of Markham.

## 6.9 Langstaff / Longbridge Station

York Region and TTC will continue discussions with the adjacent property owners at the station to ensure station facilities are designed and constructed to maximize redevelopment opportunities.

Discussions will also continue during detailed design with the local community regarding the final configuration of the commuter parking lot / PPUDO mitigation measures, including noise attenuation, stormwater management, landscaping and traffic access limited only to Yonge Street.

Additional traffic analysis will be completed during detailed design to support permit applications to MTO/407 regarding the commuter parking lot entrance and the associated traffic demand resulting from adjacent ongoing land use studies.

## 6.10 Richmond Hill Centre Station

The subway station and bus terminal facilities shown in Section 4.1.4.6 represent the anticipated spatial requirements for intermodal transfers at Richmond Hill Station between the subway, Viva, GO Rail, future Highway 407 Transitway and bus services. This inter-regional node presents an excellent opportunity to maximize the benefits of government policies promoting compatible transit infrastructure and land use. It is understood that the extent of land, surrounding the node designated for an integrated and/or adjacent transit-supportive development with Richmond Hill Centre Station, will be identified by the Town of Richmond Hill and York Region in conjunction with existing land owners.

York Region and TTC will work closely during the current land use studies in Markham and Richmond Hill to optimize the interface and integration of the Richmond Hill Centre Station subway and bus terminal with transit-supportive development, in conjunction with the existing landowners.

For Richmond Hill Centre Station, York Region and TTC will conduct further discussions with external agencies to determine the roles and responsibilities of each agency for the design, construction, operation and maintenance of the station facilities.

## 6.11 Construction Issues

York Region and TTC will conduct further research and analysis related to the construction of the Transit Project. Specific tasks include, but are not limited to the following activities:

- Developing traffic, transit and pedestrian management strategies to be included in construction contract documents;
- Examining the need and requirements for advancing the North York Service Road as part of a traffic management plan for construction of the Transit Project between Finch Station and Cummer-Drewry Station.
- Undertaking an existing building condition survey prior to, during, and post construction;
- Preparing and implementing tree and streetscape protection and restoration plans;
- Undertaking Designated Substances Surveys for any buildings or structures which require demolition and to reflect the findings in construction contract documents;
- Developing procedures for disposal of excavated materials, including contaminated soils as part of a soils management strategy, in accordance with Ministry of the Environment requirements;
- Preparing the mitigation, monitoring and contingency plans for groundwater protection in consultation with and accordance with TRCA's Guidelines for Dewatering Needs Assessment and Environmental Management Plan.;
- Preparing an erosion and sediment control plan, which complies with prevailing TRCA, York Region, Town of Markham, City of Vaughan, Town of Richmond Hill and City of Toronto water guidelines and requirements;
- Preparing an air quality monitoring and mitigation plan and protocols for inclusion in contract documents.
- Arranging for a Stage 2 archaeological assessment to be conducted at areas that have archaeological potential as identified in the Stage 1 assessment and where ground disturbances will occur during construction; and
- Undertaking stray current protection for other utilities.

## 6.12 Consultation

York Region, TTC and City of Toronto will consult with the public, property owners and stakeholder agencies (including Town of Markham, City of Vaughan, Town of Richmond Hill, as well as Toronto and York Region Police, Fire and other emergency service providers) during the detailed design of the Transit Project alignment, stations and related commuter and ancillary facilities.

### **6.13 Noise and Vibration Protocols**

York Region, TTC and City of Toronto will conduct a noise and vibration study, in accordance with the protocols established with the Ministry of the Environment. Specifically, this will include additional base line noise and vibration surveys (as required), similar to those already undertaken as part of this Transit Project Assessment Process. Post construction measurement will be undertaken to confirm “no adverse impact” as predicted in the noise and vibration impact analysis undertaken as part of this process (see Appendices for details).

### **6.14 Sustainable Development**

As part of a separate environmental initiative, the Toronto Transit Commission has developed an Environmental Plan which will guide all TTC projects in terms of sustainable development including this subway extension.

York Region has also developed a Sustainability Strategy which will influence the detailed design phase of this project.

The City of Toronto’s Change is In the Air, Climate Change Action Plan provides guidance on sustainability measures that will be applied to this project including the Green Development Standards, Green Roof/Eco-Roof Strategy, and Sustainable Transportation Strategy.

### **6.15 Canadian Environmental Assessment Act (CEAA) “Triggers” Monitoring**

York Region and TTC will continue to monitor the Transit Project for potential CEAA “triggers”, and, in the event that the CEAA applies to the Transit Project, York Region and TTC will prepare an Environmental Screening Report.

At the conclusion of this process, no CEAA requirements have been triggered. However, potential CEAA triggers to be monitored are as follows:

- 1) Possible federal project funding - It is anticipated that federal funding will be received for a portion of the capital costs of the project. However, federal funding has not been committed to date;
- 2) Potential involvement of Canadian Transportation Agency (CTA) - The recommended alignment will pass under the CN York Subdivision rail line and as such, approvals and permits for the construction and permanent operation of the subway tunnels must be obtained from CN Rail. In the event that an agreement cannot be reached between CN Rail and TTC, the crossing would require the intervention of the CTA for a federal order. The involvement of CTA would trigger the CEAA;
- 3) The crossing of the East Don River may require a permit from Transport Canada under the *Navigable Waters Protection Act*; and.
- 4) Potential involvement of the Department of Fisheries and Oceans (DFO) - The recommended alignment and construction of a bridge over the East Don River will require the removal of the existing concrete culvert. This work may require approvals or authorizations under the *Fisheries Act*, however, at this time it is believed that this

work is not a harmful alteration and will only require permits and approvals from TRCA.

York Region and TTC will continue to monitor the project for potential federal triggers and will consult with the CEA Agency and other stakeholders during design.

### **6.16 Project Implementation Issues**

York Region, the City of Toronto and the TTC will in cooperation with the appropriate funding agencies negotiate the necessary funding, service and project implementation agreements. The City of Toronto / TTC will negotiate the resolution of the requirements to move forward with, and implement the project, consistent with the City of Toronto / TTC requirements approved at the City of Toronto Council meeting on January 27/28, 2009.