Environmental Project Report
List of Volumes

New SmartTrack Stations

METROLINX TORONTO 4TRANSIT PARSONS HATCH WSP

Environmental Project Report
List of Volumes

New SmartTrack Stations

Volume V: East Harbour SmartTrack Station
- Appendix A - Initial Preferred Design
- Appendix B - Natural Environment Report
- Appendix C - Tree Inventory Report
- Appendix D - Cultural Heritage Screening Report
- Appendix E - Stage 1 Archaeological Assessment
- Appendix F - Socio-Economic and Land Use Study
- Appendix G - Air Quality Impact Assessment
- Appendix H - Noise and Vibration Impact Assessment
- Appendix I - Transportation Brief

Volume VI: King-Liberty SmartTrack Station
- Appendix A - Initial Preferred Design
- Appendix B - Natural Environment Report
- Appendix C - Tree Inventory Report
- Appendix D - Cultural Heritage Studies
- Appendix D1 – Cultural Heritage Screening Report
- Appendix D2 – Cultural Heritage Evaluation Reports/Statement of Cultural Heritage Value
- Appendix E - Stage 1 Archaeological Assessment
- Appendix F - Socio-Economic and Land Use Study
- Appendix G - Air Quality Impact Assessment
- Appendix H - Noise and Vibration Impact Assessment
- Appendix I - Transportation Brief

Volume VII: St. Clair-Old Weston Smart Track Station
- Appendix A - Initial Preferred Design
- Appendix B - Natural Environment Report
- Appendix C - Tree Inventory Report
- Appendix D - Cultural Heritage Studies
- Appendix D1 – Cultural Heritage Screening Report
- Appendix D2 – Cultural Heritage Evaluation Reports/Statement of Cultural Heritage Value
- Appendix E - Stage 1 Archaeological Assessment
- Appendix F - Socio-Economic and Land Use Study
- Appendix G - Air Quality Impact Assessment
- Appendix H - Noise and Vibration Impact Assessment
- Appendix I - Transportation Brief

Volume VIII: Climate Change

Volume IX: Consultation and Engagement

Volume X: Commitments to Future Studies, Permits and Approvals

METROLINX TORONTO 4TRANSIT PARSONS HATCH WSP

New SmartTrack Stations

Environmental Project Report

Volume II - Finch-Kennedy SmartTrack Station

July 2018 Revision 0

TORONTO METROLINX 4TRANSIT PARSONS HATCH WSP

New SmartTrack Stations - Environmental Project Report - Volume II - Finch-Kennedy SmartTrack Station

Issue and Revision Record					
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	Signatures:				

Table of Contents

List of Figures

List of Tables

List of Appendices

Glossary of Acronyms and Terms

AA	Archaeological Assessment
AAQC	Ambient Air Quality Criteria
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
ANSI	Areas of Natural and Scientific Interest
AQIA	Air Quality Impact Assessment
BHR	Built Heritage Resource
BMP	Best Management Practices
CAAQS	Canadian Ambient Air Quality Standards
CEAA	*Canadian Environmental Assessment Act*
CFIA	Canadian Food Inspection Agency
CHAR	Cultural Heritage Assessment Report
CHER	Cultural Heritage Evaluation Report
CHL	Cultural Heritage Landscapes
CHR	Cultural Heritage Resources
CHSR	Cultural Heritage Screening Report
CHVI	Cultural Heritage Value or Interest
CN/CNR	Canadian National Railway
COC	Contaminants of Concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
CP/CPR	Canadian Pacific Railway
CPTED	Crime Prevention Through Environmental Design
CSP	Corrugated Steel Pipe
CTC	Credit Valley, Toronto and Region and Central Lake Ontario
CTMP	Construction Traffic Management Plan
DBH	Diameter at Breast Height
DFO	Fisheries and Oceans Canada
DVP	Don Valley Parkway
EA	Environmental Assessment
EAA	*Environmental Assessment Act*
EAB	Emerald Ash Borer
EASR	Environmental Activity and Sector Registry
EBA	Event Based Area
ECA	Environmental Compliance Approval
ECCC	Environment and Climate Change Canada
ELC	Ecological Land Classification
EMMP	Environmental Mitigation and Monitoring Plan
EPR	Environmental Project Report
ESA	*Endangered Species Act*
ESC	Erosion and Sediment Control

ESR	Environmental Study Report
FTA	United States Federal Transit Administration
FWCA	*Fish and Wildlife Conservation Act*
GEXR	Goderich-Exeter Railway
GFA	Gross Floor Area
GHG	Greenhouse Gas
GIN	Groundwater Information Network
GTA	Greater Toronto Area
GTS	Georgetown South
HCM	Highway Capacity Manual
HIA	Heritage Impact Assessment
IBC	Initial Business Case
IPD	Initial Preferred Design
ISA	International Society of Arboriculture
LIO	Land Information Ontario
LOS	Level of Service
LRT	Light Rail Transit
masl	Metres Above Sea Level
MBCA	*Migratory Birds Convention Act*
mbgs	Metres Below Ground Surface
MNDM	Ministry of Northern Development and Mines
MNRF	Ministry of Natural Resources and Forestry
MOE	Ministry of Environment (now Ministry of the Environment and Climate Change)
MOECC	Ministry of the Environment and Climate Change
MOEE	Ministry of Environment and Energy (now Ministry of the Environment and Climate Change)
MOVES	Motor Vehicle Emission Simulator
MTCS	Ministry of Tourism, Culture and Sport
MTO	Ministry of Transportation
MUP	Multi-use Path
N/A	Not Applicable
NAPS	National Air Pollution Surveillance
NHIC	Natural Heritage Information Centre
NHS	Natural Heritage System
NPC	Noise Pollution Control
NPV	Net Present Value
NSA	Noise Sensitive Area
O. Reg.	Ontario Regulation
OBBA	Ontario Breeding Bird Atlas
OCS	Overhead Contact System
OHA	*Ontario Heritage Act*
OHT	Ontario Heritage Trust

OMB	Ontario Municipal Board
OPSS	Ontario Provincial Standard Specification
OTM	Ontario Traffic Manual
OWRA	*Ontario Water Resources Act*
PDBC	Preliminary Design Business Case
PHF	Peak Hour Factors
PHP	Provincial Heritage Properties
PPS	Provincial Policy Statement
PPUDO	Passenger Pick-up and Drop-off
PPV	Peak Particle Velocity
The Protocol	Ministry of Environment and Energy (now MOECC)/GO Transit Draft Protocol for Noise and Vibration Assessment
PSW	Provincially Significant Wetland
PTE	Permission to Enter
RCD	Reference Concept Design
RER	Regional Express Rail
RMS	Root-Mean-Square
RMSV	Root-Mean-Square Velocity
RNFP	Ravine and Natural Feature Protection
ROW	Right-of-Way
RTPC	Regional Transportation Passenger Centre
S&G	Standards and Guidelines
SAR	Species at Risk
SARA	*Species at Risk Act*
SCC	Species of Conservation Concern
SSE	Scarborough Subway Extension
SUE	Subsurface Utility Engineering
SWH	Significant Wildlife Habitat
SWHTG	Significant Wildlife Habitat Technical Guide
TAC	Technical Advisory Committee
TIP	Tree Inventory Plan
TIS	Traffic Impact Studies
TLI	Temporary Limited Interest
TMC	Turning Movement Counts
TMP	Transportation Master Plan
TPAP	Transit Project Assessment Process
TPS	Traction Power Substation
TPZ	Tree Protection Zone
The Transit Project	New SmartTrack Stations Project
TRCA	Toronto and Region Conservation Authority
TSMP	Transportation Servicing Master Plan
TSP	Total Suspended Particles

TTC	Toronto Transit Commission
TTIS	Transportation and Traffic Impact Study
TTS	Transportation Tomorrow Survey
US EPA	United States Environmental Protection Agency
v/c ratio	Volume-to-Capacity Ratio
VKT	Vehicle Kilometres Travelled
WTRP	West Toronto Railpath

1. Introduction

Metrolinx, an agency of the Province of Ontario, and the City of Toronto have proposed the development of a new rail station on the Stouffville rail corridor within the City of Toronto as part of the New SmartTrack Stations Project (the Transit Project). The Finch-Kennedy SmartTrack Station (the Project) will be located on the Stouffville rail corridor on Finch Avenue East between Kennedy Road and Midland Avenue.

The study area for the proposed Project is discussed in Section 1.1. Further details regarding the design of the proposed Project are provided in Section 2.

Metrolinx and the City of Toronto are evaluating the potential environmental effects of the Transit Project in accordance with the Transit Project Assessment Process (TPAP). The TPAP is a streamlined Environmental Assessment (EA) process that recognizes and addresses the predictable environmental effects of transit projects and is approved under the *Environmental Assessment Act* (EAA) through Ontario Regulation 231/08 - Transit Projects and Metrolinx Undertakings (O. Reg. 231/08). This Environmental Project Report (EPR) documents the TPAP for the Transit Project and has been prepared in accordance with the *Guide to Ontario's Transit Project Assessment Process* (Ministry of the Environment and Climate Change, 2014) as detailed in Volume 1 of this EPR.

Volume 9 of the EPR documents the consultation program followed for the Transit Project.

1.1 Description of the Study Area

1.1.1 Stouffville Rail Corridor

Figure 1-1 shows the Stouffville rail corridor with the existing GO stations and proposed SmartTrack stations.

Metrolinx presently operates a commuter (passenger) rail service along the Stouffville rail corridor (Kingston and Uxbridge Subdivisions) from Union Station in the City of Toronto to Lincolnville GO Station in the Town of Whitchurch-Stouffville. The CN Kingston Subdivision connects Toronto with Montreal, and is owned by Metrolinx on the section between Union Station and Pickering Junction in Durham Region, where it also forms the Lakeshore East rail corridor. North of the CN Kingston Subdivision, the CN Uxbridge Subdivision is used by Metrolinx for the Stouffville rail corridor. Oriented generally in a north-south direction, the Stouffville rail

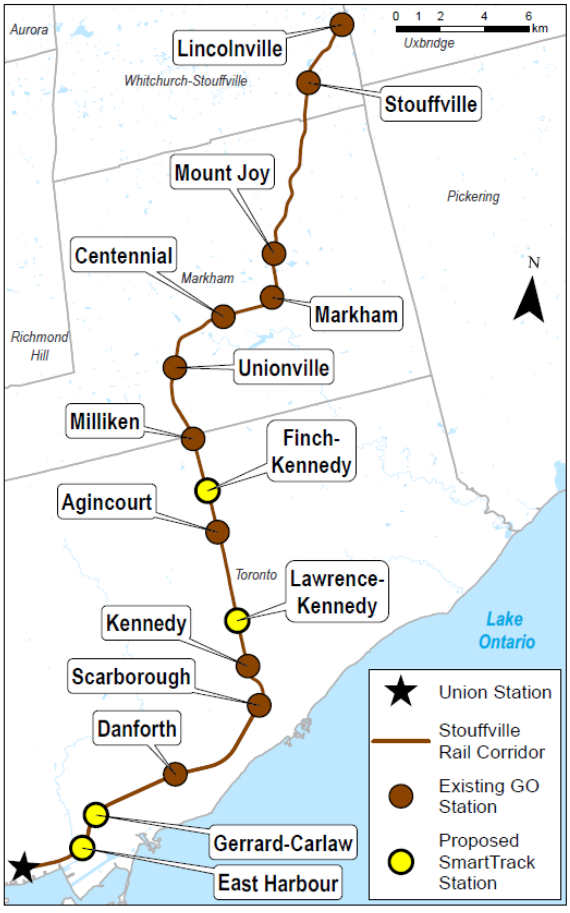


Figure 1-1: Stouffville Rail Corridor

corridor is at present primarily a single track, approximately 50 km in length, and includes 10 stations (excluding Union Station). An 11th station, Scarborough GO Station, is currently served by one Stouffville rail corridor train per day on weekdays. The Stouffville rail corridor runs through the City of Toronto, the City of Markham and Town of Whitchurch-Stouffville (both in York Region).

On weekdays, there are nine trains from Lincolnville GO Station towards Union Station between 05:15-10:14. These trains stop at all primary stations except for two trains which do not stop at Danforth GO Station. Eight trains from Union Station to Lincolnville GO Station operate between 15:11-19:18. These stop at all stations except for five trains which do not stop at Danforth GO Station. Outside of weekday peak periods, trains operate hourly in both directions between Unionville GO Station in the City of Markham and Union Station. GO buses connect the stations north of Unionville GO Station during these periods. There is presently no train service on weekends. Between Union Station and Scarborough GO Station, the Stouffville line shares tracks with the Lakeshore East line. As detailed in Section 1.2, works are underway as part of Regional Express Rail (RER) to upgrade infrastructure along the Stouffville rail corridor, including introduction of a second track between Scarborough Junction and Unionville GO Station.

In addition to the proposed Project, the Stouffville rail corridor also includes the proposed Lawrence-Kennedy SmartTrack Station (Volume 3), as well as Gerrard-Carlaw SmartTrack Station (Volume 4). The East Harbour SmartTrack Station (Volume 5) is also proposed on the shared Stouffville/Lakeshore East rail corridor.

1.1.2 Study Area

An overall study area was identified for assessment of the potential effects of the Project (Figure 1-2). This study area includes the Project footprint and extends 1 km around the Project footprint. As shown in Table 1-1, environmental study-specific study areas were also identified for assessment of the potential effects of the Project related to each technical discipline being evaluated. These study areas define the geographic extent within which existing environmental conditions are documented and the potential environmental effects of the Project are assessed. The largest of these study areas extends 1 km from the Project footprint. Therefore, the overall study area was set at 1 km to encompass all environmental study-specific study areas. The Project footprint is the area of direct disturbance required for anticipated Project construction and operation activities and represents the anticipated property requirements associated with the Project.

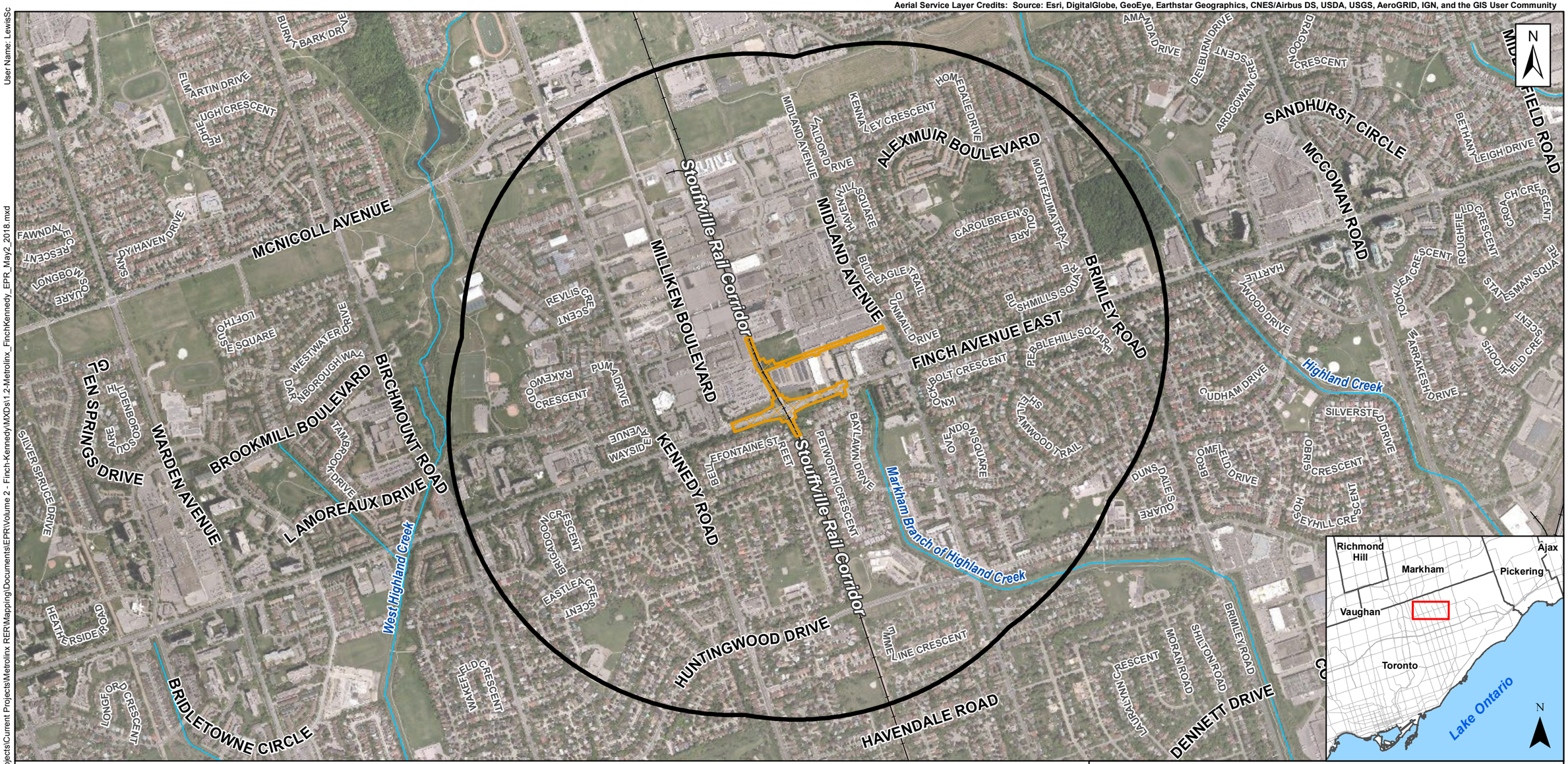
Table 1-1: Study Area by Environmental Study

Study	Study Area
Natural Environment Report	Extends 120 m from the Project footprint.
Tree Inventory Plan	Extends 6 m from the Project footprint.
Cultural Heritage Screening Report	The Project footprint and adjacent lands.
Stage 1 Archaeological Assessment	Extends 50 m from the Project footprint.
Socio-Economic and Land Use Study	Extends 500 m from the Project footprint.
Air Quality Impact Assessment	Extends 1 km from the Project footprint. Specific receptors are discussed in Section 4.
Noise and Vibration Impact Assessment	Extends 300 m from the Project footprint. Specific receptors are discussed in Section 4.
Transportation Brief	Primarily the specific intersections discussed in Section 4.

As shown in Figure 1-2, the overall study area is in the City of Toronto and is approximately bounded by Birchmount Road to the west, McNicoll Avenue to the north, Brimley Road to the east, and Havendale Road to the south.

The Stouffville rail corridor currently crosses Finch Avenue East at grade between Milliken Boulevard and Midland Avenue.

Figure 1-2: Study Area



Legend

- Study Area - 1000 Metres
- Proposed Project Footprint (approximate)
- Permanent Watercourse
- Railway

DATA SOURCES:

Roads / Railways - Ontario Open Data Catalogue
Watercourses - Land Information Ontario
Project Footprint - Initial Preferred Designs

0 250 500 1,000 Metres

Project:	**New SmartTrack Stations**
Figure Title:	**Finch-Kennedy SmartTrack Station - Study Area**
Prepared By:	4TRANSIT PARSONS HATCH WSP
Date:	**June 01 2018**
Version: FE.EPR.95-1	TORONTO
Figure:	**1-2**

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1.2 Purpose of the Project

1.2.1 Component of Regional Express Rail and SmartTrack

The Project is considered by Metrolinx and the City of Toronto to be of strategic importance to improve local access to higher-order rapid transit. The Project will play a key role in supporting the wider RER and SmartTrack initiatives as a key transit facility in Scarborough.

1.2.2 Complement to Stouffville Corridor Rail Service Expansion

Metrolinx completed a separate GO Transit Class Environmental Assessment, *Stouffville Rail Corridor Expansion - Environmental Study Report* (Metrolinx, 2014), for improvements to the Stouffville rail corridor from Scarborough Junction in the City of Toronto to Unionville GO Station in the City of Markham. The study examined the infrastructure needs to expand service along the corridor and identified appropriate improvements to enhance the quality of service and provide new transit options, including the ultimate twinning of the corridor between Unionville GO Station to south of Kennedy GO Station. Since the completion of the study, implementation of the proposed improvements has commenced with the construction of a second track on a 5-km section of the Stouffville rail corridor from Kennedy Road to Marilyn Avenue. This is the first part of a multi-year project to expand and improve 17 km of corridor from Scarborough Junction to Unionville GO Station.

The ongoing Stouffville rail corridor expansion works support the integrated RER and SmartTrack initiatives, including the development of the Project.

1.3 Project Background

1.3.1 Finch East Station Initial Business Case

In July 2016, Metrolinx issued the Initial Business Case (IBC) for the Finch-Kennedy SmartTrack Station, (previously referred to as Finch East Station), titled *RER New Stations Initial Business Case - Finch East - Stouffville Corridor* (AECOM, 2016).

Following the IBC evaluation, the station was recommended by the Metrolinx Board of Directors on June 28, 2016. In Fall 2016, the City of Toronto confirmed the location, general design concept and inclusion of the station in the SmartTrack program. The Metrolinx Board committed to continue to include the station as part of the GO Expansion program procurement on December 8, 2016. Through 2017, Metrolinx engaged with the City and internal stakeholders to refine the station concept plan. Metrolinx and the City worked together to develop the design based on an ongoing operational needs assessment, pre-environmental assessment studies, workshops, discussion, and a technical advisory committee process. Design changes are ongoing in coordination with stakeholders.

The preliminary station concept plan has evolved as new information has emerged. The station concept has been modified to:

- Shift platforms south to permit a new rail over road grade separation, in order to facilitate seamless connections with the bus facilities below the platforms.

- Remove parking and structured passenger pick-up and drop-off from the site, minimizing property requirements.[1]

1.3.2 Preliminary Design Business Case

In March 2018, Metrolinx issued the Preliminary Design Business Case (PDBC) for the Project within Appendix I of the *New Stations Initial Business Cases Technical Report* (Metrolinx, 2018). A summary of the business case is provided in Table 1-2.

The Finch-Kennedy Station continues to conform to provincial, regional and local transportation and land use policies. Real estate demand and development potential in the area remain low, as do population and employment densities. Consistent with the Growth Plan, which identifies the stretch of the Stouffville rail corridor where Finch-Kennedy Station is to be built as a priority corridor, more work is being undertaken with the City to support achieving density targets. Several nearby under-utilized or vacant lots could become transit-oriented developments and integrate with the station, such as the vacant lot at the north end of the platform on the east side of the corridor.

Most passengers are anticipated to arrive by transit, walking or cycling. This station offers optimized intermodal connections by relocating the adjacent Finch Avenue bus stops under the new rail overpass, with dedicated lay-bys. Many of the recommendations in the 2016 GO Rail Station Access Plan for walk and cycle access call for ongoing collaboration with the City of Toronto.

Ridership forecasts predict that the Finch-Kennedy Station could generate approximately 4,200 daily riders by 2031. The total includes new and existing riders, with existing riders expected to divert from their previous point of access (Milliken or Agincourt stations). The majority of trips forecasted at Finch-Kennedy station in the A.M. peak period are boardings, with the station primarily attracting riders that live along the Finch Avenue East corridor between Victoria Park Avenue and McCowan Road.

Table 1-2: Summary of Finch-Kennedy Station Business Case

2031 Ridership (A.M. Peak Period) boardings + alightings	1,100
2031 Ridership (Daily) boardings + alightings	4,200
Change in Cost from IBC	**Increase**
Change in Benefits from IBC	**Increase**
Benefits Compared to Cost	**Benefits are Positive but Less Than Costs**
Transportation User Benefits (60-year lifecycle)	$16 M
Travel Time Savings	$8 M
Vehicle Operating Cost Savings	$7 M
Decongestion on Road Network	$1 M
Safety Impacts	$1 M
Environmental Impacts[2]	$0 M

[1] City Council (EX29.1) directed staff to explore commuter parking opportunities within a larger development concept associated with land that is required to construct new local access roads on the east side of the Finch-Kennedy Station.

[2] Environmental impacts refer to the broad cost of transport on local surroundings and the Earth's atmosphere. Environmental impacts capture the effect the potential station has on greenhouse gas emissions through reductions in vehicle kilometres travelled.

1.3.3 Full Business Case

As part of Metrolinx's business case analysis approach, Metrolinx staff are currently developing full business cases for all the SmartTrack station sites that underwent a PDBC in March 2018.

2. Project Description

2.1 Initial Preferred Design

Metrolinx and the City of Toronto have sought to refine and update the station concept presented in the IBC. The result of this is the Initial Preferred Design (IPD), as shown in Appendix A. The IPD reflects design, technical feasibility and policy direction received through coordination between the City of Toronto and Metrolinx.

The IPD was used as the basis for evaluation of the Project in the EPR and will be the basis to develop a Reference Concept Design (RCD).

The Project will be located on the Stouffville rail corridor, on Finch Avenue East between Kennedy Road and Midland Avenue in the City of Toronto.

The Project is conceived as two side platforms with three station access structures providing access to both platforms. Two of the station access structures will be located on Finch Avenue East. The third station access structure will be located at the secondary access location north of Finch Avenue East, which will include provision of layby spaces for accessible passenger pick up and drop off and tunnel access to both platforms. No formal passenger pick-up and drop-off is provided. The main station access is proposed on both sides of the Finch Avenue East road-under-rail grade separation, with the provision of bus loading and unloading areas along Finch Avenue East, and vertical access to the platforms above, as well as a main station building and a secondary access structure. Bicycle parking will be provided at this station. Specific Project features are described in more detail in Section 2.3.

2.1.1 Design Refinements Subsequent to the Initial Preferred Design

As with any project in the planning phase, refinements may occur as design proceeds. Discipline-specific studies conducted for this EPR Volume based upon the IPD will be reviewed and refined as necessary during detailed design based upon further design refinements. As appropriate, design refinements will be subject to the EPR Addendum process prescribed in O. Reg. 231/08 (see Volume 1 of this EPR).

2.2 Key Design Criteria

The following key assumptions are detailed in the Finch East Station Revisions Summary Memorandum (AECOM, 2017) and guided the development of the IPD:

- The design of the station should emphasize and encourage access by walking, cycling and transit modes and connectivity and integration of these modes;
- Station access points, transit stops and station buildings should be centred on the intersection of Finch Avenue East and the Stouffville rail corridor; and
- Station facilities should be contained within the rail and road Right-of-Ways (ROWs) to the extent possible.

2.3 Key Station Components

The following Project components comprise the IPD upon which this EPR Volume is based. Refinements to the design may be made prior to construction as previously noted. These project components are as described in the Finch East Station Revisions Summary Memorandum (AECOM, 2017) and shown in the IPD provided in Appendix A.

2.3.1 Platform

There will be two side platforms to facilitate access to the tracks. A mini-platform (an accessible elevated platform located to align with the location of the designated accessible rail car) will be located towards the northern end of each platform. There will be two accessible platform access points (with elevators) for each platform to allow reliable access for riders with mobility challenges even while one elevator is being serviced. The accessible access points are located near the mini-platforms and main station buildings on both the north and south sides of Finch Avenue East. This configuration provides the potential for direct access to the northerly end of the platform from a future secondary access road.

2.3.2 Station Entrances

Key station access points are focused at the interface between Finch Avenue East and the Stouffville rail corridor. There will be barrier-free access to the station buildings from the multi-use paths along Finch Avenue East. In addition to the at-grade paths, there are two pedestrian clearways (i.e., clear zone that allows for pedestrian movement) proposed at the level of the Finch Avenue East road-under-rail grade separation. Bus loading/unloading areas and vertical access to platforms will be provided from the pedestrian clearways.

A secondary access point will be provided at the northern end of the platform via a new access road. The exact location for the secondary access road will be determined during detailed design through consultation with the City of Toronto and potentially impacted landowners.

In total, eight station entrances are proposed:

- One station access on either side of Finch Avenue East at the underpass level (a total of two accesses);
- One station access on either side of Finch Avenue East at the platform level to each of the two platforms (a total of four accesses); and
- One station access on either side of the Stouffville rail corridor close to the northern end of the platform (a total of two accesses).

It is anticipated that an access structure (or a connection to an access structure or building) will be located at each station access point.

2.3.3 Station Circulation

Direct pedestrian connections are proposed between the station and both the north and south sides of Finch Avenue East at the proposed grade separation, where bus riders will board and alight beneath the rail structure.

2.3.4 Bicycle Facilities

As per the GO Rail Station Access Plan (Metrolinx, 2016), covered bicycle parking will be provided at logical locations relative to station access points and the broader cycling network. Secure bike parking will also be provided.

2.3.5 Landscaping and Streetscaping

Space on the north and south sides of Finch Avenue East adjacent to the main station buildings will form a plaza. The plaza space will reduce the likelihood of crowding and provides a safe and welcoming area for pedestrians. Sizing of the plaza and specific landscaping features will be confirmed during detailed design.

2.3.6 Transit Access

A bus lay-by with capacity for three buses in each direction will be provided on Finch Avenue East under the rail bridge to allow for continuous operation without the need for the buses to turn around.

The bus lay-by will be designed to physically separate transit operations and vehicular operations adjacent to the main station access points on Finch Avenue East. The bus lay-by area is protected by a small, raised median ("island barrier") with fencing that discourages drivers from dropping off passengers in the bus lay-by area or on the island. Since the bus lay-by is protected by an island barrier, enough space will be provided so that arriving and departing buses can pass buses that are stationary at the lay-by. Exact details of this feature will be determined through detailed design.

No off-street bus loop facility will be provided. However, on-road bus loops utilizing local streets will be considered in the future as the area intensifies.

2.3.7 Active Transportation Access

As shown in the IPD (see Appendix A), multi-use pathways will connect the station directly with Finch Avenue East to allow for cyclists to access the main station buildings. Bicycle parking will also be provided.

The East Highland Creek Trail is the only existing cycling facility near the Project. To connect this trail with the Project, multi-use pathways will extend between the station and the intersection of Baylawn Drive with Finch Avenue East. If a cycling facility is constructed on Midland Avenue in the future, it should be connected directly to the station by means of off-street multi-use paths or on-street dedicated facilities. The City of Toronto will consider future opportunities for cycling connections to the Project.

2.3.8 Vehicular Access

It is expected that most users for the station will arrive by transit, walking or cycling. Opportunities for commuter parking are being explored by the City of Toronto through development opportunities near the station.

Access to properties impacted by the grade separation will be maintained through the provision of a secondary access road servicing the area to the north of the Project. The access road is proposed as a public (City of Toronto) road. As shown in the IPD, the access road is approximately 470 m long. The exact location and dimensions of the secondary access road will be determined during detailed design through consultation with the City of Toronto and potentially impacted landowners.

2.3.9 Accessible Loading and Unloading

Para-transit loading and unloading will be provided near the mini-platform via the secondary access road.

2.3.10 *Emergency and Service Vehicle Corridor Access*

Corridor access for emergency and service vehicles will be provided in coordination with current and planned street and block patterns. The exact location of this access will be confirmed during detailed design. The current access point for emergency and service vehicles, at the southern edge of the Finch Avenue East ROW, will be maintained. Emergency and service vehicles will stop below the underpass within the bus lay-by area.

2.3.11 *Property Acquisition*

Property is anticipated to be required to facilitate Project construction and operation. Refinement of property requirements including laydown and staging areas will occur through detailed design.

The acquisition of non-Metrolinx owned property is required to implement the Project, as defined in the IPD (see Appendix A). Property requirements are anticipated to comprise of the following:

- Full property takings - none.
- Partial property takings:
  - Private - 0.10 ha.
  - Public - 0.13 ha.
- Temporary full property takings - none.
- Temporary partial property takings - none.
- Other real estate considerations:
  - Private - 0.66 ha.
  - Public - 1.26 ha.

Other real estate considerations are anticipated to include lands for bike trails, station adjacent infrastructure, and other City initiatives.

2.3.12 *Utilities*

The owners of utility infrastructure located in the study area have been identified based on information extracted from record drawings, and are presented in Table 2-1.

Table 2-1: Utilities Present

Utility Type	Utility Owners
Power, Cables, Conduits and Lighting	• Toronto Hydro
Gas and Oil	• Enbridge Gas Distribution
Communications	• Bell Canada • Group Telecom • Rogers Cable Communications • Canadian National (CN) Signal
Sanitary, storm and water	• City of Toronto

2.3.13 Electrification

Electrification is planned for this section of the Stouffville rail corridor by 2025, consistent with the GO Rail Network Electrification TPAP (Metrolinx, 2017). Electrification at the Project is anticipated to broadly consist of a 25-kV system delivering power to electric trains using an Overhead Contact System (OCS). The OCS is an aerial supply system that delivers traction power from the Traction Power Substation (TPS) to the electric trains via contact wires and associated supports and structures, including poles and other overhead line hardware and fittings. TPSs are traction power facilities that transform the utility supply voltage for distribution to the electric trains via the OCS (Metrolinx, 2017).

2.4 Construction

A description of anticipated construction activities is provided in Table 2-2. These typical activities serve as the basis for the assessment of construction-related potential environmental effects. These activities may be expanded, further refined, or found to be unnecessary as the Project progresses through detailed design and construction.

Table 2-2: Anticipated Construction Activities

Activity	Description	Associated Equipment
Site Preparation	• Mobilization of equipment and temporary facilities to the site. • Clearing and grubbing of vegetation. • Erection of temporary and permanent fences. • Installation of environmental management features (e.g., erosion and sediment controls).	• Site compaction equipment and grading equipment. • Vegetation removal equipment. • Excavation equipment. • Haulage/dump trucks.
Site Servicing	• Relocation and/or extension of services and utilities on the site; which may include both underground and aerial services and utilities (e.g. sewers, water, electrical, communications, gas). This may also involve installation of utilities within the site.	• Excavation equipment including backhoe, dump trucks, soil removal equipment, jack hammers.
Excavation and Grading	• Excavation and grading activities may involve earth-moving activities and stockpiling, as applicable. Excavated material will be accommodated on-site to the degree practicable; however, where necessary, surplus material will be disposed of off-site. • Any off-site disposal shall be done in compliance with applicable law and standards, including as it relates to contaminated material that may be encountered. • Any groundwater encountered will be managed and disposed of in accordance with applicable law and standards.	• Site compaction equipment and general grading equipment, dump trucks, soil removal equipment. • Groundwater pumping equipment. • Excavation equipment including backhoe, dump trucks, soil removal equipment, jack hammers.
Construction of Buildings and Structures	• All buildings and structures will be constructed using standard civil construction techniques.	• Foundation placement equipment. • Augured piles, or rammed aggregate piers. • Drill rigs. • Mobile cranes and hoists. • Concrete trucks, pumps and vibrators.
Construction of Ancillary Facilities	• Ancillary facilities may include electrical transformer/supply equipment, parking areas, exterior yard facilities including lighting, electrification enabling facilities.	• Flatbed trucks, cranes, concrete trucks. • Backhoe, pavement excavation equipment. • Mobile cranes and hoists. • Concrete trucks, pumps and vibrators.
Installation of Trackwork	• Assembly of track, ties and fastenings near the station.	• Thermal welding. • Tie placement (cranes, lifting equipment). • Ballast placement equipment. • Concrete pouring equipment.

Activity	Description	Associated Equipment
Temporary Track Diversion	• Grading. • Temporary drainage. • Relocation/installation of tracks. • Temporary relocation of signals, if any. • Clear delineation and protection between active rail service and construction work zones.	• Site compaction equipment and general grading equipment, dump trucks, soil removal equipment. • Thermal welding. • Tie placement (cranes, lifting equipment). • Ballast placement. • Temporary concrete barriers
Temporary Road Closure	• All road closures will follow standard traffic control management guidelines.	• Temporary traffic control devices such as signs, signals, barriers, traffic barrels.
Management of Stormwater	• All precipitation falling within the site will be managed as stormwater within a designed system of collection, conveyance, retention and discharge features. The system will be designed and operated in compliance with applicable standards and regulatory requirements. Surface flows within the site will be managed within the site to ensure discharge to off-site receivers (i.e., municipal storm sewers) is appropriate in terms of water quantity and quality.	• Site compaction equipment and general grading equipment. • Groundwater pumping.

2.5 Operations

A description of anticipated operation activities is provided in Table 2-3. These activities represent those with the potential for operations-related environmental effects and serve as the basis for assessment of potential environmental effects. These activities may be expanded, further refined, or found to be unnecessary as the Project progresses through detailed design and during operation.

Table 2-3: Anticipated Operation Activities

Activity	Description
General Operations	• New SmartTrack service on the Stouffville rail corridor with access provided at the Project. • TTC bus service with access provided to the Project on the Finch Avenue East underpass. • Private vehicles and para-transit vehicles accessing the Project via the secondary access road to the north of the Project. • Pedestrian and cyclist movements to/from the Project and surrounding areas.

3. Existing Conditions

This section of the EPR Volume documents existing environmental conditions within each of the discipline-specific study areas (refer to Table 1-1). The purpose of characterizing existing environmental conditions is to establish baseline conditions against which potential effects are assessed, as detailed in Section 4.

Further details on existing environmental conditions within each of the discipline-specific study areas and the methodologies used to obtain this information are provided in Appendices B through I of this Volume.

3.1 Natural Environment

This section provides an overview of existing conditions within the natural environment study area. Further details are provided in Appendix B of this Volume.

Refer to Section 4.2 for natural environment effects assessment, including discussion of mitigation measures and proposed monitoring activities.

3.1.1 Methodology

The study area for the natural environment extends 120 m from the Project footprint as defined by the IPD (see Appendix A).

Available background information was collected and reviewed from several sources, including but not limited to Fisheries and Oceans Canada (DFO), the Ministry of Natural Resources and Forestry (MNRF), the City of Toronto, and Toronto and Region Conservation Authority (TRCA).

Aquatic investigations examined the Markham Branch of Highland Creek and focused on describing general habitat and documenting habitat features. Fish habitat information was collected where feasible and relevant.

Vegetation communities were mapped and classified using the Ecological Land Classification (ELC) for Southern Ontario system (Lee H. W., 1998) with the 2008 catalogue code update (Lee, 2008).

A vascular plant species inventory was completed for the study area.

Prior to site investigations, a desktop screening was completed to identify potential Species at Risk (SAR) habitat and other potential wildlife habitat associated with approximated vegetation communities and watercourses. During the site investigations, all direct wildlife observations and wildlife signs (including browse, tracks/trails, animal scat, bird nesting activity, tree cavities, burrows, excavated holes and vocalizations) were recorded. Incidental wildlife species observations were noted.

Significant Wildlife Habitat (SWH) was evaluated based on site-specific attributes within the study area compared to the SWH Ecoregion Criteria Schedules for Ecoregion 7E (Ministry of Natural Resources and Forestry, 2015).

A SAR Screening Table was developed to indicate the potential of a given SAR species to occur based on habitat and known species distribution and the corresponding the potential of a given SAR species to occur within the study area based on habitat and known species distribution and the corresponding potential and severity of impacts to the species associated with the proposed works.

3.1.2 Description of Existing Conditions

3.1.2.1 Aquatic Environment

No wetlands were observed within the study area.

The Markham Branch of Highland Creek is within TRCA's Highland Creek watershed. This watershed is largely located within an urbanized landscape. It has a high proportion of paved, impermeable surfaces. As such, the creeks within this watershed experience erosion and flooding impacts during heavy rainfalls and possibly damage to terrestrial habitats. As urban stormwater runoff is an issue within this watershed, the creeks are susceptible to carrying large amounts of untreated pollutants. As of 2016, only 11.4% of the landscape within this watershed remained as natural cover. This low percentage of natural cover has reduced opportunities to support species populations. The Highland Creek watershed is likely home to several species of fish including trout, carp, bass and salmon (Toronto and Region Conservation Authority, 2016).

The Markham Branch of Highland Creek is located immediately south of Finch Avenue East and approximately 300 m east of the rail corridor. Upstream of Finch Avenue East, the entirety of the watercourse is piped underground. The watercourse appears to originate in the study area at the outlet of two large concrete pipes where it then enters a channelized reach, consisting of a concrete-lined channel. Based on aerial photo interpretation, the entirety of the downstream channel is channelized through manicured parks and urban residential/commercial lands. The watercourse flows in a general southwest direction for approximately 3.2 km before converging into Highland Creek. The Markham Branch of Highland Creek discharges into Lake Ontario approximately 12 kilometres southeast of the study area.

Within the study area, the Markham Branch of Highland Creek flows for approximately 110 m south of Finch Avenue East. The channel originates as piped drainage flowing from twin concrete pipes that are approximately 2 m in diameter. At the time of site investigations, the flows from each of the pipes appeared to be less than 0.05 m in depth and roughly 0.3 m wide. The flows from the pipes converge together into an outlet pool that measured approximately 6 m wide (based on aerial photo interpretation) and 15 m in length with an average depth of 0.2 m. At the culvert outlet, a boom spanning the channel width was present; this contraption is typically used to contain oils and floating contaminants. Beyond the pool, the channel narrows into a run feature throughout the remainder of the watercourse within the study area. The gradient within the study area is low and flow velocity at the time of site investigations was low.

In addition to the channel bed, the banks are lined with concrete for approximately 50 m downstream, extending up the bank by approximately 1 m. In this reach, there is a very limited number of substrates present, located in pockets on the concrete channel banks. These substrates consist of fine materials (silt and sand). Above the concrete, the channel banks are vegetated with common tree and shrub species including Manitoba Maple (*Acer negundo*), Green Ash (*Fraxinus pennsylvanica*), American Elm (*Ulmus americana*), Quaking Aspen (*Populus tremuloides*), Red-osier Dogwood (*Cornus sericea*), Buckthorn (*Rhamnus cathartica*), and Riverbank Grape (*Vitis riparia*). There were patches of the channel bed covered with filamentous algae/slime, typically present in concrete-lined systems with low flows and warm temperatures. In addition to the lack of natural substrates, there was also no instream vegetation present, and as such there was no cover for potential resident fish species. No fish were observed within the study area during site investigations.

3.1.2.2 Terrestrial Environment

Vegetation within the study area consists of cultural communities including cultural meadow, cultural thicket, cultural savannah and cultural woodland, with an abundance of non-native, invasive species. These species, indicative of the long-standing disturbance to the area, were pervasive in every vegetation community in the study area.

A total of 70 vascular plant taxa were observed within the study area. Of these, 67 were identified to species; three were identified to genus (*Crataegus* sp., *Solidago* sp., *Symphyotricum* sp.) due to a lack of distinguishing characteristics at the time of the field survey. Of the identified species, 30 (45%) were native and 37 (55%) were non-native.

No provincially or federally rare species were observed. This includes species designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), species designated by the Committee on the Status of Species at Risk in Ontario (COSSARO), species listed on the *Endangered Species Act,* 2007 (ESA) or *Species at Risk Act* (SARA), as well as S1 to S3 (critically imperiled, imperiled or vulnerable) ranked species. All the native species were ranked as S5 (Secure Common and widespread within the province) or S4 (Apparently secure - Uncommon but not rare).

Five species are listed as significant by the TRCA (2007), and two species are listed as significant in the City of Toronto (Varga, 2000), as follows in Table 3-1.

Table 3-1: Locally and Regionally Significant Plant Species

Common Name	Accepted Name	TRCA Rank[3]	City of Toronto Rank[4]
Eastern White Pine	*Pinus strobus*	L4	-
White Spruce	*Picea glauca*	L3	-
Large-tooth Aspen	*Populus grandidentata*	L4	-
Northern Red Oak	*Quercus rubra*	L4	-
Eastern Poison Ivy	*Toxicodendron radicans ssp. negundo*	L4	R5
Common Evening-primrose	*Oenothera biennis*	-	U

Note: - means no associated rank.

None of the flora SAR or Species of Conservation Concern (SCC) identified through background sources were observed within the study area.

Vegetation communities are presented in the form of units, or discrete areas defined by distinct vegetation types. The vegetation communities present in the study area are all common to southern Ontario, and have been highly disturbed. These are Dry-Moist Old Field Meadow Type (CUM1-1), Mineral Cultural Thicket (CUT1), Mineral Cultural Savannah (CUS1), and Mineral Cultural Woodland (CUW1). These units are notably affected by anthropogenic disturbances including the presence of invasive species and disturbances from surrounding roads.

3.1.2.3 Wildlife

Urban/suburban tolerant wildlife species were recorded during the site investigations.

Two mammal species were observed within the study area: Grey Squirrel (*Sciurus carolinensis*) and Virginia Opossum (*Didelphis virginiana*). No other observations or signs of mammal species were recorded in the study area during the site investigations; however, the general area likely supports a range of other mammals often found in similar habitats, including: Groundhog (*Marmota monax*), Raccoon (*Procyon lotor*), Eastern Chipmunk (*Tamias striatus*), Eastern Cottontail (*Sylvilagus floridanus*), Red Squirrel (*Tamiasciurus hudsonicus*), Striped Skunk (*Mephitis mephitis*), Red Fox (*Vulpes vulpes*), and a number of small mammals that often go undetected (e.g., shrews, voles, mice) (Dobbyn, 1994).

Thirteen bird species were recorded during the site investigations. The birds observed are expected for the site conditions and with the exception of one species (Barn Swallow [*Hirundo rustica*]), all are common and widespread throughout Southern Ontario (Cadman, 2007). Background resources indicated nearby records of 124 bird species.

No avian nests were observed within surveyed vegetation areas during the general site investigation. The site visit occurred within the normal nesting bird window (approximately end

[3] Codes are defined as follows:
L3: Of concern regionally; generally secure in natural matrix; able to withstand minor disturbance.
L4: Of concern in urban matrix; generally secure in rural matrix; able to withstand some disturbance.

[4] Codes are defined as follows:
U: Uncommon native species.
R#: Rare native species (# indicates number of stations for the species in the City of Toronto).
+ or I: Introduced species.
X+: Introduced in municipality.

of March to end of August). Given that suitable nesting habitat exists within the study area, it is likely that nests may be present.

No herpetofauna were observed during the site investigations; however, the study area contains foraging habitat for, and may support, the following amphibian and reptile species found in similar urban habitats: American Toad (*Anaxyrus americanus*), Dekay's Brownsnake (*Storeria d. dekayi*), and Eastern Gartersnake (*Thamnophis s. sirtalis*) (Ontario Nature, n.d.). No specialized habitat features (e.g., amphibian breeding habitat, reptile overwintering habitat) were observed or are likely to occur in the study area. The review of background resources indicated historical records of 16 herpetofauna species; however, no habitat is present for these species in the study area.

Two insect (butterflies) species were recorded during the site investigations. The butterflies observed, Black Swallowtail (*Papilio polyxenes*) and Cabbage White (*Pieris rapae*), are expected for the site conditions and are common and widespread. The study area contains foraging habitat for, and may support, a number of other common insects found in similar urban habitats.

3.1.2.4 Significant Wildlife Habitat

No SWH has been identified within the study area.

3.1.2.5 Species at Risk

The MNRF Natural Heritage Information Centre (NHIC) database has no recent records of aquatic SAR within the study area and/or in the general vicinity. The MNRF did not provide any records of aquatic SAR and DFO SAR Mapping did not show any aquatic SAR or critical habitat within the study area and/or in the general vicinity. No fish were observed within the study area during site investigations.

The MNRF NHIC database has no recent records of flora SAR within the study area and/or general vicinity.

The NHIC database has no recent records of SAR wildlife within the study area and general vicinity. A search of the Ontario Breeding Bird Atlas (Cadman, 2007) indicated the potential for 11 bird SAR to occur within the study area. Correspondence with the MNRF indicated the potential for five wildlife SAR to occur in the general vicinity. SAR identified through the above-noted background sources with some potential to occur, and their corresponding S-rank5, ESA, 2007 and SARA status, are presented in Table 3-2.

[5] S-rank refers to The NatureServe conservation status system ranking designated at a subnational level (S-rank) for a particular next-lower geographical unit within a nation, such as a province or territory. The numbers and letters indicate the following:
S1: Critically imperiled - (typically having 5 or fewer occurrences, or 1,000 or fewer individuals).
S2: Imperiled - (typically having 6 to 20 occurrences, or 1,001 to 3,000 individuals).
S3: Vulnerable - (rare; typically having 21 to 100 occurrences, or 3,001 to 10,000 individuals).
S4: Apparently secure - (uncommon but not rare, but with some cause for long-term concern; typically having 101 or more occurrences, or 10,001 or more individuals).
S5: Secure - (common, widespread, abundant, and lacking major threats or long-term concerns).
SX: Presumed extinct or extirpated (not located despite extensive and intensive searches, with rediscovery not reasonably expected). Note that extinction is here considered a global (range-wide) phenomenon, while extirpation applies to loss within a particular national or subnational area, with the entity still extant elsewhere.
SH: Possibly extinct or extirpated (of historical occurrence but not known recently extant, with some reasonable hope of rediscovery).
SR or ?: Recorded within a nation or subnation, but local status not available or not yet determined. When combined with a global rank of G1 to G3, local status is 'Indeterminate,' but the entity is nevertheless presumed vulnerable, if still extant.

Table 3-2: Species at Risk

Common Name	Accepted Name	S-Rank	ESA, 2007 Status	SARA Status
Peregrine Falcon	*Falco peregrinus anatum/tundrius*	S3B	Special Concern	Special Concern
Small-footed Bat	*Myotis leibii*	S2S3	Endangered	Endangered
Little Brown Bat	*Myotis lucifugus*	S4	Endangered	Endangered
Tri-coloured Bat	*Perimyotis subflavus*	S3?	Endangered	Endangered
Northern Long-eared Bat	*Myotis septentrionalis*	S3	Endangered	Endangered
Chimney Swift	*Chaetura pelagica*	S4B, S4N	Threatened	Threatened
Barn Swallow	*Hirundo rustica*	S4B	Threatened	Threatened
Bank Swallow	*Riparia*	S4B	Threatened	Threatened

One SAR, Barn Swallow, was observed foraging within the study area during the site investigation. In the study area, there is limited suitable foraging habitat over fields and open aquatic features for this species, and moderate potential for nesting habitat in nearby buildings. No confirmed nesting habitat was recorded in nearby buildings.

There is moderate potential for Peregrine Falcon to occur as a foraging visitant throughout the study area. However, there is limited suitable nesting habitat for this species on taller buildings in the vicinity of the study area. While appropriate foraging habitat exists in the study area for this species, its habitat is not protected by the ESA, 2007. Peregrine Falcon is protected under the *Fish and Wildlife Conservation Act*, 1997 (FWCA).

There is low potential for endangered bat species to forage throughout the study area over fields and open aquatic features. Habitat suitable for maternity colonies for these species is extremely limited in the vicinity of the study area as no mature forests, abandoned buildings, or cavity trees were identified during site investigations.

There is low potential for Chimney Swift to occur as a foraging visitant throughout the study area, and there is limited potential for suitable nesting habitat for this species in the study area. The commercial and residential areas in the study area are relatively new, and if chimneys are present, they are likely capped. No suitable chimneys were observed during site investigations.

There is low potential for Bank Swallow to occur as a foraging visitant throughout the study area, and no breeding habitat for this species was observed within the study area during site investigations. Bank Swallow requires eroding vertical banks, such as those found in gravel pits or lakeshores.

3.1.2.6 Significant Natural Heritage Features

Based on TRCA mapping, the southeastern part of the study area is located within the TRCA's Regulated Area.

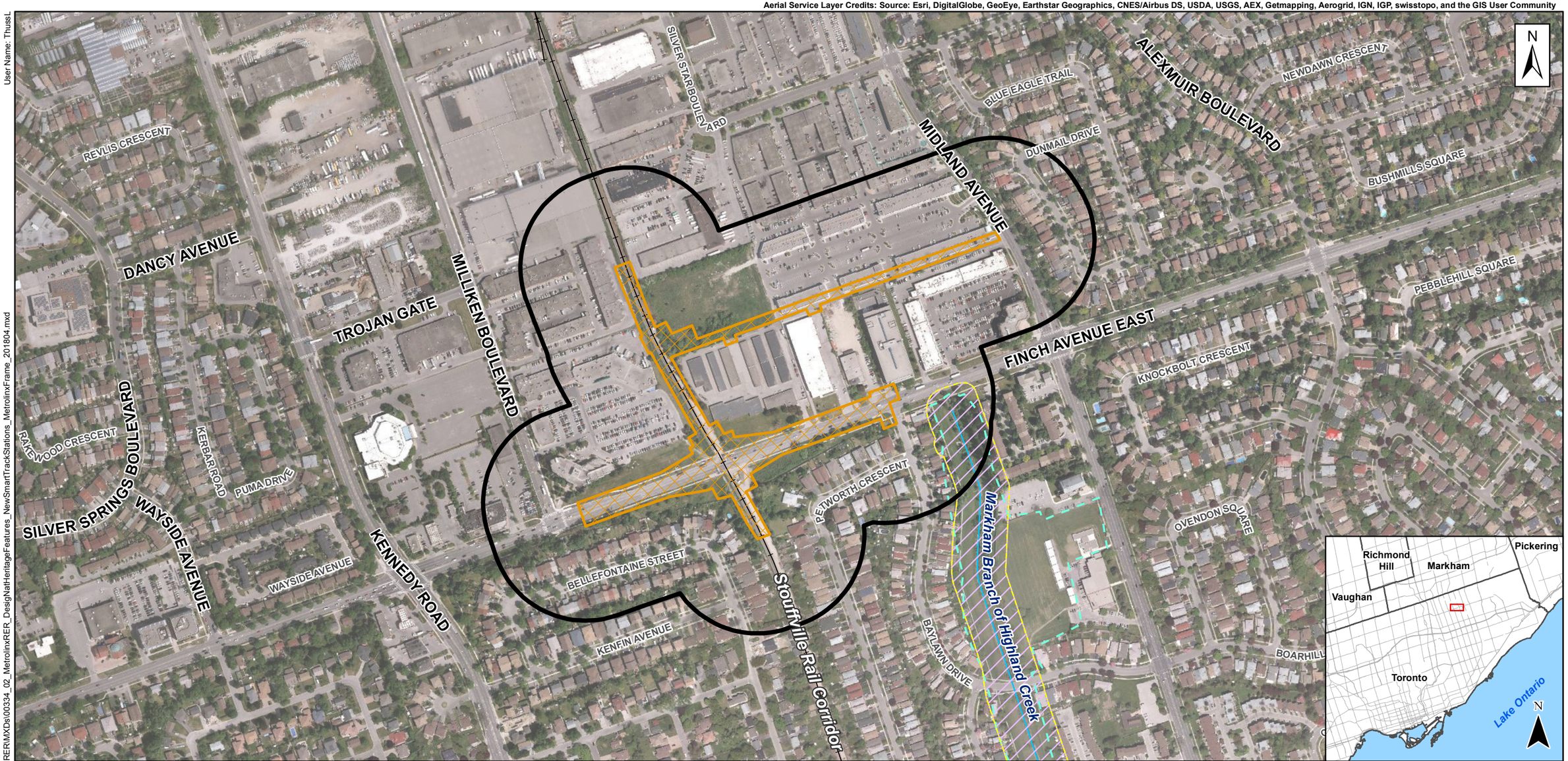
Based on the City of Toronto's online mapping, a portion of the City of Toronto's Natural Heritage System (NHS) and Ravine and Natural Feature Protection (RNFP) areas also fall within the study area.

Figure 3-1 shows designated natural heritage features within the study area.

N: rank for non-breeding populations in the province.
B: rank for breeding populations in the province.

Figure 3-2: Tree Locations

Aerial Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Legend

- Study Area - 120 Metres
- Proposed Project Footprint (approximate)
- Permanent Watercourse
- Railway

Natural Environment Features

- TRCA Regulation Limit
- Natural Heritage System
- Ravine and Natural Feature Protection Bylaw

DATA SOURCES:

Roads and Railways - Ontario Open Data
Project Footprint - Initial Preferred Designs
Watercourses - Land Information Ontario
Regulation Limit - Toronto and Region Conservation Authority
Natural Heritage System - City of Toronto
Ravine and Natural Feature Protection Bylaw - City of Toronto

0 50 100 200 300 Metres

Project:	**New SmartTrack Stations**
Figure Title:	**Finch-Kennedy SmartTrack Station - Designated Natural Heritage Features**
Prepared By:	4TRANSIT / PARSONS HATCH WSP
Date:	**April 20 2018**
Version: FE.NE.90-1	**Review:**
Figure: 3-1	

User Name: ThussL

Document Path: L:\Projects\2017\00334_02_MetrolinxRER\MXDs\00334_02_MetrolinxRER_DesignNatHeritageFeatures_NewSmartTrackStations_MetrolinxFrame_201804.mxd

3.2 Geology and Groundwater

This section provides an overview of existing geology and groundwater conditions within the study area.

Refer to Section 4.3 for geology and groundwater effects assessment, including discussion of mitigation measures and proposed monitoring activities.

3.2.1 Methodology

Topographic, surficial geology and bedrock geology mapping available through Natural Resources Canada and the Ontario Geological Survey, as well as other relevant background documentation was reviewed. Water well records were obtained from the Ministry of the Environment and Climate Change (MOECC).

3.2.2 Description of Existing Conditions

3.2.2.1 Landforms and Physiography

The study area is situated on the South Slope Physiographic Region (Chapman & Putnam, 1984). This region lies between the lower elevation Iroquois Lake Plain physiographic region along Lake Ontario and the higher elevation Oak Ridges Moraine physiographic region. The study area is also located south of the Peel Plain physiographic region. The South Slope rises approximately 100 m to 120 m in an average of 10 km (Chapman & Putnam, 1984).

The Project is approximately 180 m above sea level (masl) and the study area slopes downward in a northeast to southwest direction.

3.2.2.2 Soils and Bedrock Geology

The site exists in a drumlinized till plain physiographic landform. In the vicinity of the study area the slope is composed largely of bevelled till, with faint drumlins (Chapman & Putnam, 1984). Native soils in the vicinity are mostly formed from glacial ice deposits and consist of young tills, generally clayey silt tills and sandy silt till (Sharpe, 1980).

The study area primarily consists of silty sand to sandy silt till (Newmarket Till) (Ontario Geological Survey, 2010). Based on the surficial geology, the soil permeability of the study area is considered to be low to medium.

The study area consists of interbedded grey-green to dark grey shale and fossiliferous calcareous siltstone to bioclastic limestone of the Georgian Bay Formation (Ontario Geological Survey, 2011).

3.2.2.3 Groundwater Resources

The expected direction of shallow groundwater flow is to the southeast towards Highland Creek.

Water well records were obtained from the MOECC for the study area. In total, 15 water well records were identified within the study area, none of which are within the Project footprint. The wells vary in depth ranging from 6.1 m to 11.3 m below ground surface (mbgs). The static water level was available from one well record only, and was recorded as 5.2 mbgs.

The study area does not contain any wellhead protection areas, intake protection zones, or significant groundwater recharge areas. A portion of the study area is located within a Highly Vulnerable Aquifer Area. A Highly Vulnerable Aquifer is an aquifer that is “particularly

susceptible to contamination because of its location near the ground's surface or where the types of materials in the ground around it are highly permeable" (Credit Valley, Toronto and Region and Central Lake Ontario (CTC) Source Protection Region, 2015).

No evidence of groundwater seepage was observed within the study area.

3.3 Tree Inventory

This section provides an overview of existing trees within the study area. Further details are provided in Appendix C of this Volume.

Refer to Section 4.4 for tree effects assessment, including discussion of mitigation measures and proposed monitoring activities.

3.3.1 Methodology

The study area for the Tree Inventory Plan (TIP) extends 6 m beyond the Project footprint as defined in the IPD (see Appendix A).

A desktop review was undertaken using online mapping, including the City of Toronto's interactive mapping tool. Relevant guidelines and documents were also reviewed and followed to guide the fieldwork component and inform the assessment, including relevant City of Toronto by-laws, the ESA and Canadian Food Inspection Agency (CFIA) directive (D-03-08) (Canadian Food Inspection Agency, 2017).

Trees were identified based on categories as follows:

1. Trees with diameters of 30 cm or more situated on private property within the Project Footprint.
2. Trees with diameters of 30 cm or more situated on private property, within the study area.
3. Trees of all diameters situated on City-owned parkland within the study area.
4. Trees of all diameters situated within lands designated under City of Toronto Municipal Code, Chapter 658, Ravine Protection.
5. Trees of all diameters situated within the City road allowance adjacent to the Project Footprint.

Categories 1 and 2 relate to the City of Toronto Private Tree By-law (City of Toronto, 2015), Category 3 relates to the City of Toronto Parks By-law (City of Toronto, 2017), Category 4 relates to the City of Toronto Ravine and Natural Feature Protection By-law (City of Toronto, 2016) and Category 5 relates to the City of Toronto Trees on City Streets By-law (City of Toronto, 2015).

Site visits were undertaken within the study area limits. Individual trees greater than 10 cm Diameter at Breast Height (DBH) within the Stouffville rail corridor and on private property for which permission to enter was granted were identified either alphabetically and/or tagged. Trees that were inaccessible or located on private property where no Permission to Enter (PTE) had been obtained were identified alphabetically. Trees and shrubs less than 10 cm DBH were assessed in the field. Where the canopy of trees overlapped, trees were assessed as a grouping and labelled accordingly.

Parameters were derived from International Society of Arboriculture (ISA) Best Management Practices (International Society of Arboriculture, 2008). These criteria were applied during the fieldwork to provide a holistic assessment of trees within the study area.

A TIP was prepared identifying tree locations and identification numbers/letters within the study area.

3.3.2 Description of Existing Conditions

The site is characterized by commercial, retail and service industry uses.

Vegetation observed throughout the study area consists of a high percentage of non-native species that have either been planted or occur naturally and range in size from 10 cm to 80 cm DBH.

A total of ±702 trees of any size were assessed within the study area, consisting of 111 individual trees labelled 1101 to 1118 and A to Z1, A2, and 591 trees in 11 groupings (TG-1 to TG-11). Approximately 644 trees (individuals and in groupings) are less than 10 cm DBH.

A majority of the vegetation in the study area is located within the municipal ROW of Finch Avenue East as individual street trees, open space planting and trees in groupings which are part of a regeneration planting program. Trees consist of Silver Maple (*Acer saccharinum*), Norway Maple (*Acer platanoides*), Manitoba Maple (*Acer negundo*), Little Leaf Linden (*Tilia cordata*), Thornless Honeylocust (*Gleditsia var. inermis triacanthos*), Colorado Spruce (*Picea pungens*), Kentucky Coffee Tree (*Gymnocladus dioicus*), Horsechestnut (*Aesculus hippocastanum*), Hackberry (*Celtis occidentalis*), Cherry (*Prunus spp*.), White Ash *(Fraxinus americana*), Sugar Maple (*Acer saccharum*), Pear (*Pyrus spp*.), Black Locust (*Robinia pseudoacacia*), Basswood (*Tilia americana*), American Elm (*Ulmus americana*), Eastern White Pine (*Pinus strobus*), White Spruce (*Picea glauca*), Eastern Cottonwood (*Populus deltoides*), Eastern Red Cedar (*Juniperus virginiana*), Austrian Pine (*Pinus nigra*), Crabapple (*Malus spp*.), Scots Pine (*Pinus sylvestris*), Chinese Elm (*Ulmus parvifolia*), Tamarak (*Larix laricina*), Staghorn Sumac (*Rhus typhina*) and Viburnum spp.

North of Finch Avenue East along and adjacent to the rail corridor there are Austrian Pine, Manitoba Maple, Colorado Blue Spruce (*Picea pungens 'Glauca'*), Norway Maple, One-Seeded Hawthorn (*Crataegus monogyna*), Hawthorn (*Crataegus spp*.), Apple, Eastern Cottonwood, Pear, Green Ash (*Fraxinus pennsylvanica*), White Ash, Weeping Willow (*Salix babylonica*), Buckthorn (*Rhamnus spp.)*, Willow (*Salix spp*.), Crabapple, Colorado Spruce, Kentucky Coffee Tree and Little Leaf Linden.

Herbaceous species, groundcovers and shrubs consist of Ragweed, Garlic Mustard, Crown-vetch, Red Osier Dogwood (*Cornus sericea*), grasses, several species of Goldenrod and Aster and Riverbank grape.

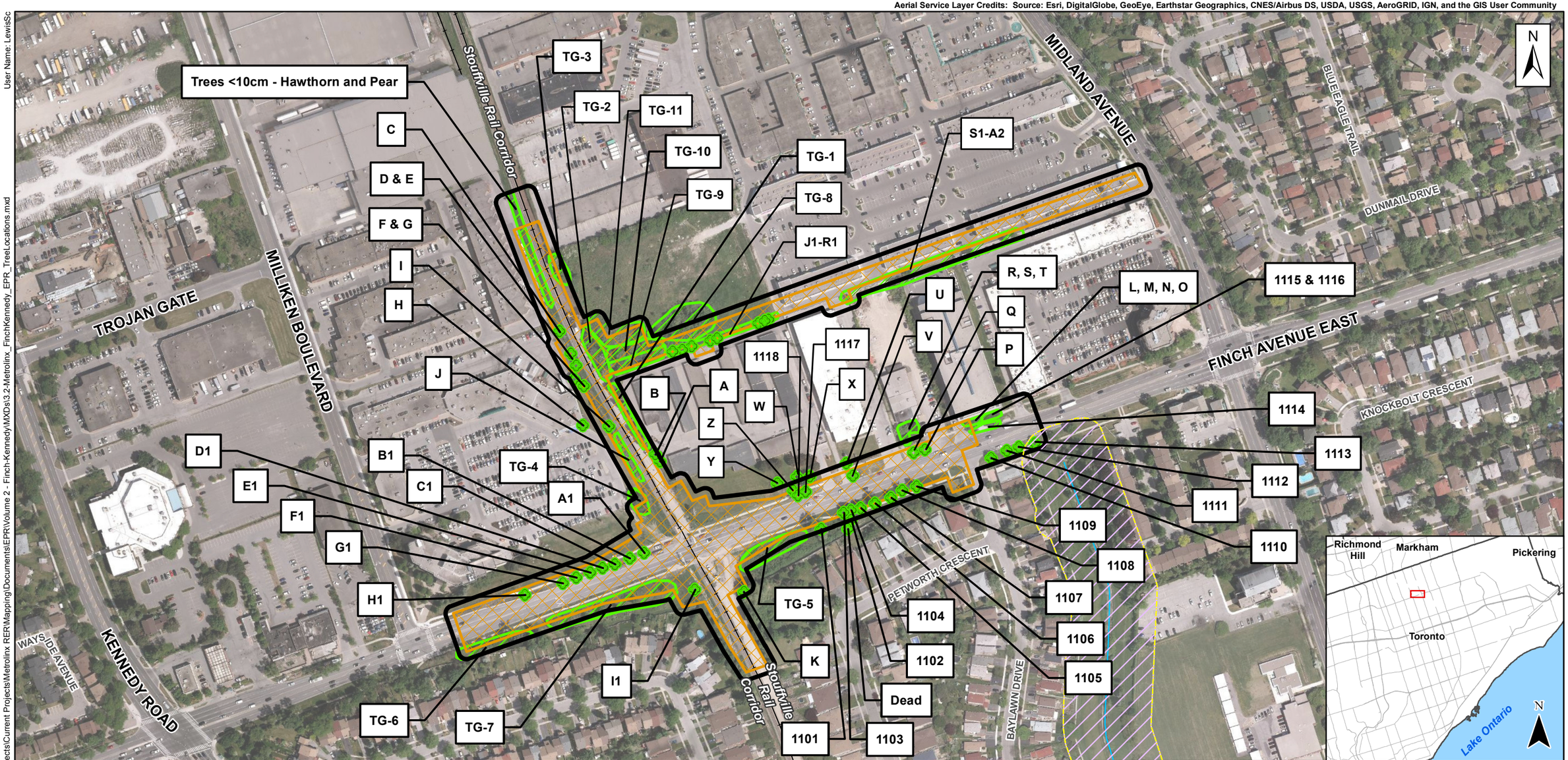
A majority of trees are in good condition; however, some trees show signs and symptoms of abiotic and biotic defects leading to decline.

Kentucky Coffee Tree was observed in the study area within the boulevard of Finch Avenue East. This tree is listed as 'Threatened' under the ESA, 2007; however, since this tree has been planted as a street tree, it is considered cultivated and not subject to the policies and regulations of the ESA.

Figure 3-2 identifies tree locations within the study area.

Figure 3-2: Tree Locations

Aerial Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Study Area - 6 Metres
- Proposed Project Footprint (approximate)
- Permanent Watercourse
- Railway
- Existing Individual Tree (Not OLS Surveyed)
- Tree Grouping
- A — Identification Number for Existing Individual Tree or Grouping
- TRCA Regulation Limit
- Ravine and Natural Feature Protection Bylaw

DATA SOURCES:

Roads and Railways - Ontario Open Data Catalogue
Watercourses - Land Information Ontario
Project Footprint - Initial Preferred Designs

0 40 80 160 240 Metres

Project:	**New SmartTrack Stations**
Figure Title:	**Finch-Kennedy SmartTrack Station - Tree Locations**
Prepared By:	4TRANSIT PARSONS HATCH WSP
Date:	**June 04 2018**
Version: FE.TI.90-1	**Review:**
Figure: 3-2	

Document Path: \\Cadt100da01\WMM Planning\Projects\Current Projects\Metrolinx RER\Mapping\Documents\EPR\Volume 2 - Finch-Kennedy\MXDs\3.2-MetrolinxFinchKennedy_EPR_TreeLocations.mxd

User Name: LewisSc

3.4 Cultural Environment

This section provides an overview of existing cultural environment conditions within the study area, including Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs), and archaeological resources. Further details are provided in Appendices D and E of this Volume of the EPR, respectively.

Refer to Section 4.5 for cultural environment effects assessment, including discussion of mitigation measures and proposed monitoring activities.

3.4.1 Built Heritage Resources and Cultural Heritage Landscapes

3.4.1.1 Methodology

The study area for the Cultural Heritage Screening Report (CHSR) encompasses the broadest area that might be affected, which includes the Project footprint as defined in the IPD (see Appendix A) and immediately adjacent lands, encompassing the broadest area that might be affected.

The CHSR was conducted in accordance with the Metrolinx Interim Cultural Heritage Management Process (Metrolinx, 2013) and the Standards and Guidelines for Conservation of Provincial Heritage Properties (Ministry of Tourism, Culture and Sport, 2010) issued under the *Ontario Heritage Act* (OHA).

The following tasks were undertaken in the preparation of the CHSR:

- Reviewed primary and secondary (e.g., historical maps, photographs, aerial photographs, tax assessment rolls) source material to provide information about property history and current properties that have known or potential Cultural Heritage Value or Interest (CHVI);
- Conducted an overview of the historic background of the area to address the uses of the land and the development of the area;
- Conducted a property visit to confirm and identify properties with known or potential CHVI;
- Conducted a screening for previously identified cultural heritage resources (CHRs) and potential CHRs;
- Conducted a review of previous CHSRs, CHERs, Cultural Heritage Assessment Reports (CHARs) and HIAs previously prepared by/for Metrolinx; and
- Provided recommendations for further evaluation of potential Provincial Heritage Properties (PHPs), conditional heritage properties or adjacent lands.

The municipal heritage inventory was reviewed to identify whether properties and structures have been previously identified and/or have been designated under the OHA. Consultation with the City of Toronto was conducted to confirm those properties that are listed on the City's Heritage Register or Designated under Parts IV or V of the OHA. The Ontario Heritage Trust (OHT) provided information for properties on the OHA register of municipally designated properties and OHT easements. The Heritage Bridge list, provided by the Ministry of Transportation, was reviewed.

3.4.1.2 Description of Existing Conditions

There are no CHLs or BHRs within the study area with known or potential CHVI.

3.4.2 Archaeology

3.4.2.1 Methodology

The study area for the Stage 1 Archaeological Assessment (AA) extends 50 m from the Project footprint as defined in the IPD (see Appendix A).

Archaeological activities were carried out in accordance with the Standards and Guidelines (S&G) for Consultant Archaeologists (Ministry of Tourism, Culture and Sport, 2011).

The Stage 1 AA involved a review of documents including historic maps, aerial photographs and local histories. Property inspections were conducted of the rail corridor and property visible from the corridor.

Archaeological recommendations were made based on background historical research, locations of known or registered archaeological sites, previous AAs, and indicators of archaeological potential as outlined in Section 1.3.1 of the 2011 S&G.

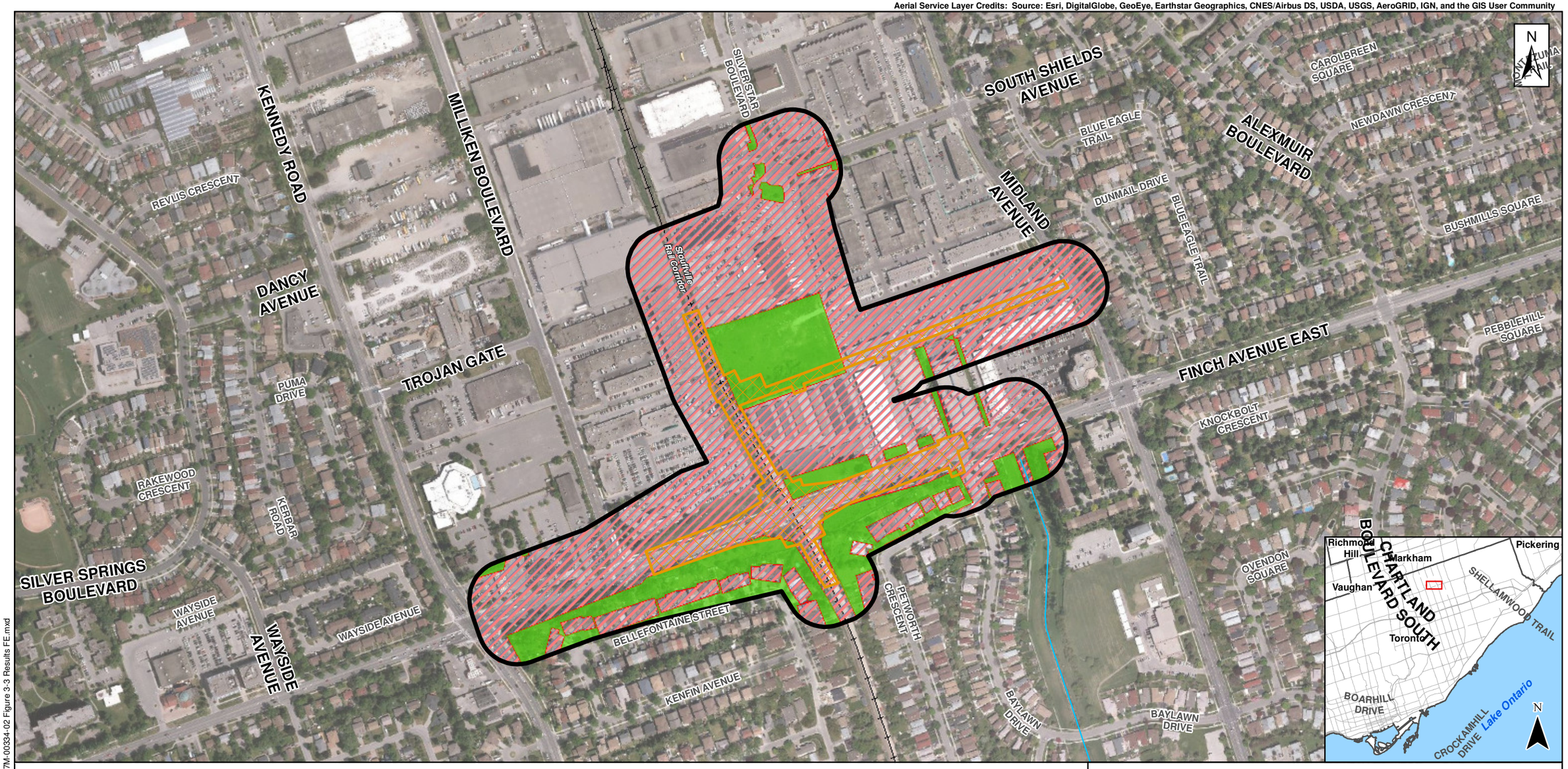
3.4.2.2 Description of Existing Conditions

The Stage 1 AA found that based on the presence of primary water sources (Markham Branch of Highland Creek) and historic transportation routes (Finch Avenue East, Kennedy Road, Midland Avenue and the rail corridor), the property holds potential for the recovery of both pre-contact and post-contact period archaeological resources. While the development of the surrounding lands and the rail corridor resulted in disturbances of lands within the study area, a Stage 2 AA is required to determine the extent of that disturbance where deeply buried archaeological resources may be present, as well as in the areas that have been found to be undisturbed. The Stouffville rail corridor (Uxbridge Subdivision) has been identified as disturbed and no further archaeological assessment will be required.

Figure 3-3 presents the results of the Stage 1 AA showing areas of archaeological potential requiring Stage 2 AA.

Figure 3-3: Stage 1 Archaeological Assessment Results

Aerial Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Study
- Proposed Project Footprint (approximate)
- Permanent Watercourse
- Railway
- Stage 2 Required: Test Pit Survey
- Disturbed

DATA SOURCES:

Roads and Railways - Ontario Open Data Catalogue
Watercourses - Land Information Ontario
Project Footprint - Initial Preferred Design

0 50 100 200 300 Metres

Project:	**New SmartTrack Stations**
Figure Title:	**Finch-Kennedy SmartTrack Station - Stage 1 Archaeological Assessment Results**
Prepared By:	4TRANSIT PARSONS HATCH WSP
Date:	**July 12 2018**
Version: FE.AA.95-1	**Review:**
Figure:	**3-3**
Page:	

Document Path: T:\17M-00334-02\Arch\MXD\Vol 3\17M-00334-02 Figure 3-3 Results FE.mxd

3.5 Socio-Economic and Land Use

This section provides an overview of existing socio-economic and land use conditions within the study area. Further details are provided in Appendix F of this Volume.

Refer to Section 4.6 for socio-economic and land use effects assessment, including discussion of mitigation measures and proposed monitoring activities.

3.5.1 Methodology

The study area for the Socio-economic and Land Use Study extends 500 m from the Project footprint as defined in the IPD (see Appendix A).

A desktop review and site visit to determine existing conditions were undertaken for the study area. The desktop review included relevant policy and planning documents at the provincial and municipal levels, and data provided by the City of Toronto, Statistics Canada, TRCA and Toronto Transit Commission (TTC).

Photographs from the site visit are provided in Appendix F of this Volume.

3.5.2 Description of Existing Conditions

3.5.2.1 Planning Policy Context

The following provincial and municipal policies were considered in the context of project planning:

- Provincial Policy Statement (PPS) (Ministry of Municipal Affairs and Housing, 2014);
- Growth Plan for the Greater Golden Horseshoe (Ministry of Municipal Affairs, 2017);
- Metrolinx Regional Transportation Plan (Metrolinx, 2012);
- TRCA Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (O.Reg. 166/06) (Toronto and Region Conservation Authority, 1990);
- City of Toronto Official Plan (City of Toronto, 2015); and
- City of Toronto Zoning By-law 569-2013, Former City of Scarborough Employment District Zoning By-law No. 24982 (Milliken) and Former City of Scarborough Tam O'Shanter Community Zoning By-law No. 12360 (City of Toronto, 2013).

Land use designations in the study area are shown on Figure 3-4. The City of Toronto Official Plan (City of Toronto, 2015) designates lands within the study area as *Employment Areas, Neighbourhoods, Mixed Use Areas, Parks and Natural Areas*, and *Utility Corridors*. The Project footprint is primarily covered by the *Utility Corridors* designation, recognizing the presence of the existing Stouffville rail corridor.

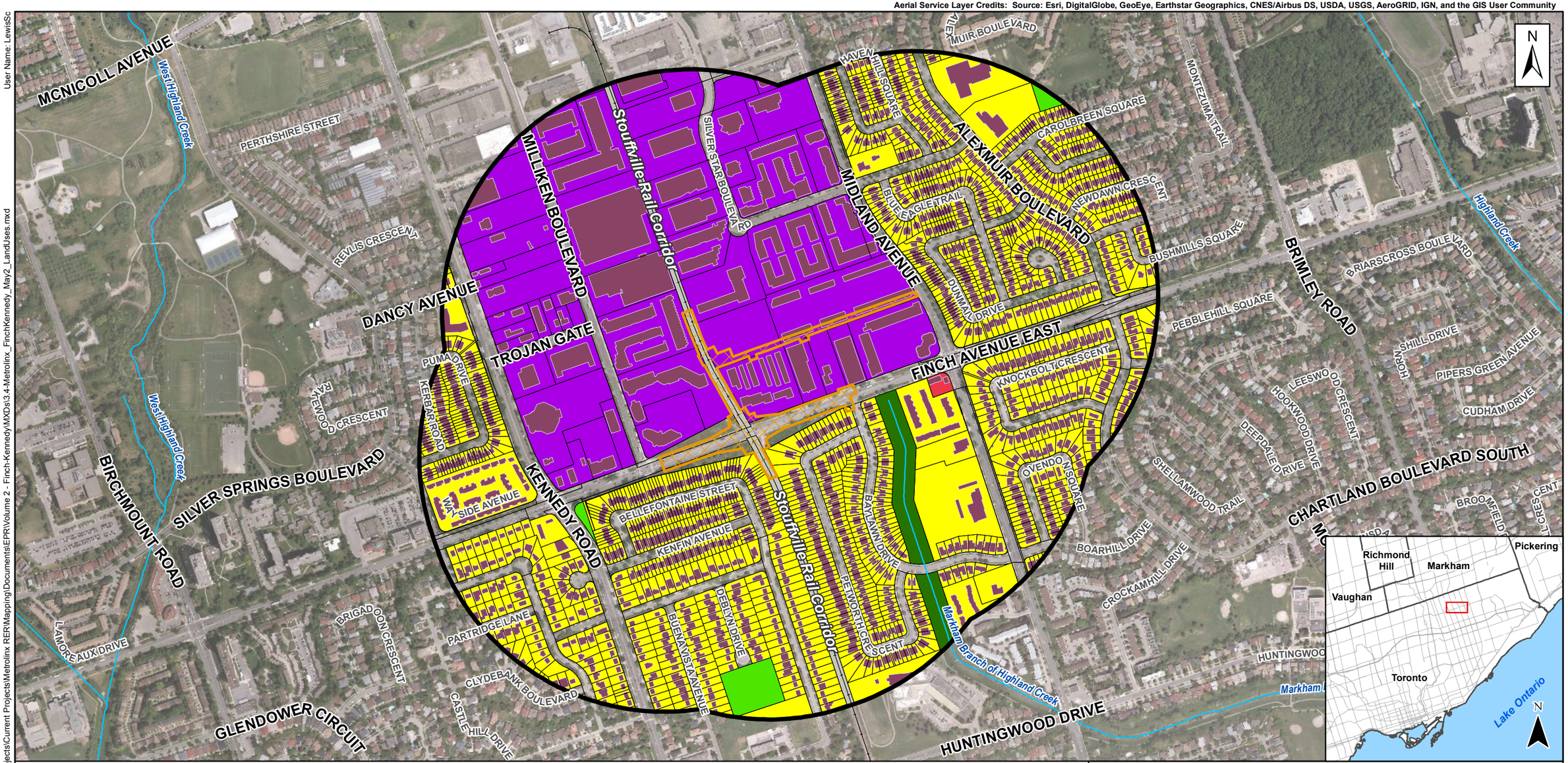
The Project footprint is zoned as follows in the City of Toronto Zoning By-law 569-2013: *Employment* (EH 0.5); *Residential and Semi-Detached* (RS x270); *Residential Townhouse* (RT f 6.0; a204 x237); and *Utility and Transportation* (UT). All the zones identified permit transportation uses under the condition that the transportation uses comply with all requirements for a building on the subject lot.

The Project footprint is zoned as follows in the Former City of Scarborough Employment District By-law No. 24982: *Community Commercial* (CC); *Recreational* (RU); *Employment* (E); *Industrial* (M); *General Industrial* (MG); *Special Industrial* (MS); and *Industrial District Commercial* (MDC). Transit stations are a permitted use in these zones.

The Project footprint is zoned as follows in the Former City of Scarborough Tam O'Shanter Community Zoning By-law No. 12360: *Street Townhouse Residential* (ST); and R*ailway Corridor* (RWY). Transit stations are a permitted use in these zones (City of Toronto, 2013).

Figure 3-4: Land Use Designations within the Study Area

Aerial Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Study Area - 500 Metres
- Proposed Project Footprint (approximate)
- Permanent Watercourse
- Railway
- Building Footprint

Land Use Designations

- Neighbourhoods
- Mixed Use Areas
- Natural Areas
- Parks
- Employment Areas
- Utility Corridors

DATA SOURCES:

Roads and Railways - Ontario Open Data Catalogue
Watercourses - Land Information Ontario
Project Footprint - Initial Preferred Designs
Land Use Designations - Toronto Official Plan 2015
Parcel Fabric, Building Footprints, All Points of Interest - Toronto Open Data

0 110 220 440 660 Metres

Project:	**New SmartTrack Stations**
Figure Title:	**Finch-Kennedy SmartTrack Station - Land Use Designations Within the Study Area**
Prepared By:	4TRANSIT PARSONS HATCH WSP
Date:	**June 01 2018**
Version: FE.SE.95-1	**Review:**
Figure:	**3-4**

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3.5.2.2 *Neighbourhood Characteristics*

The study area falls within four neighbourhoods identified by the City of Toronto's neighbourhood profile maps: Milliken, L'Amoreaux, Agincourt North and Agincourt South-Malvern West. These neighbourhoods are located within the (former) City of Scarborough, now part of the City of Toronto.

The Agincourt North and Agincourt South-Malvern West neighbourhoods are mainly suburban residential neighbourhoods with an area of concentrated industrial uses north of Finch Avenue East. The residential buildings within these neighbourhoods are generally low-density detached or semi-detached houses.

The L'Amoreaux neighbourhood is a suburban residential neighbourhood predominantly of single-family detached homes and townhomes dating from the late 1950s.

The Milliken neighbourhood is mainly a suburban residential neighbourhood, with limited commercial-retail and open space concentrated along McCowan Road at Alton Towers Circle, and a concentration of industrial uses to the west of Middlefield Road and east of Markham Road.

Table 3-3 summarizes some of the key features of the neighbourhoods within the study area by category. These are also mapped on Figure 3-5.

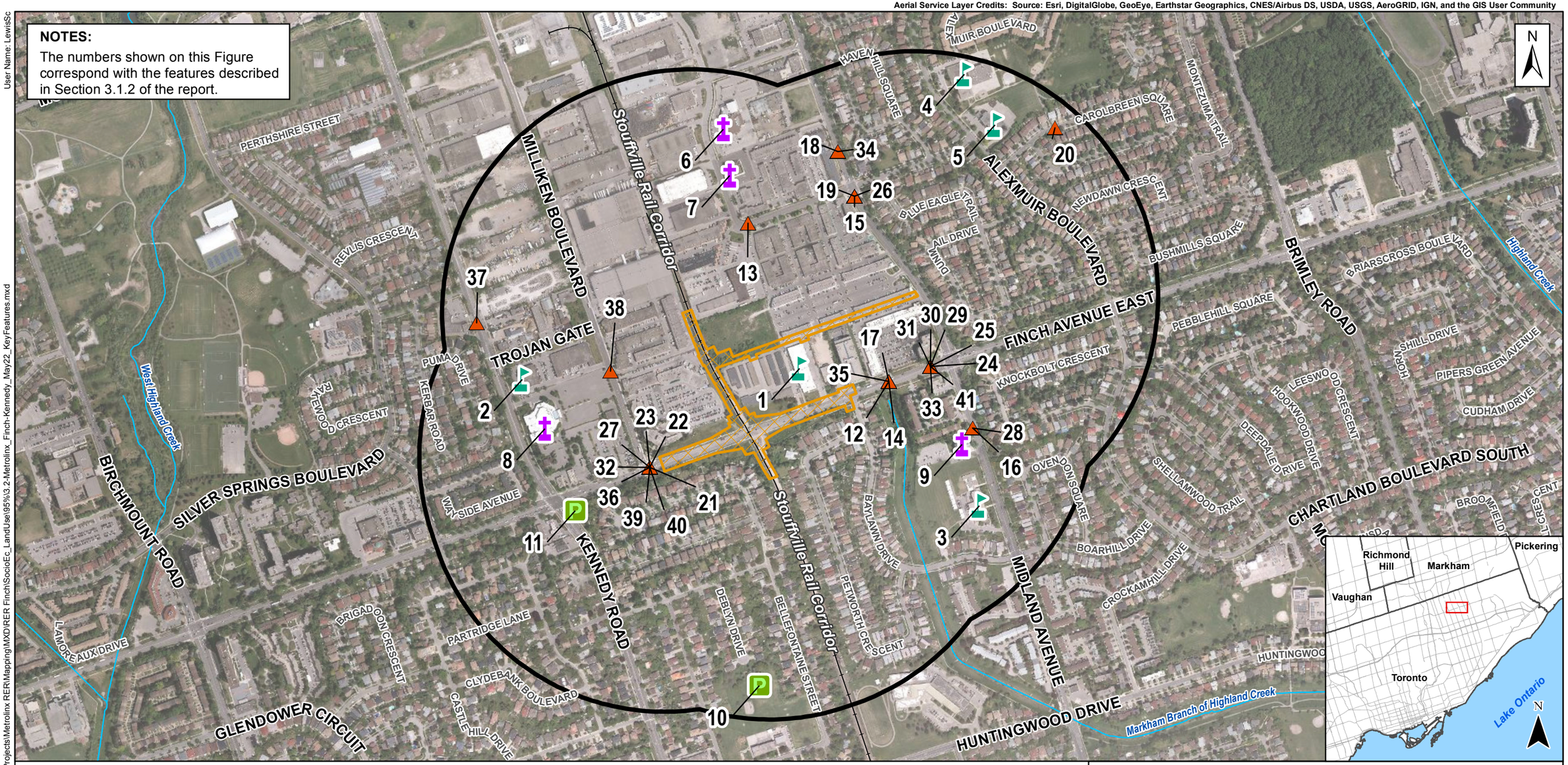
Table 3-3: Features within the Study Area

Feature ID (Shown on Figure 3-5)	Feature Type	Feature Name
1	School	North American Muslim Foundation Islamic Academy
2	School	Kennedy Language Instruction for Newcomers to Canada (LINC) Centre
3	School	Monsignor Fraser College - Midland Campus
4	School	Alexmuir Junior Public School
5	School	St. Marguerite Bourgeoys Catholic School
6	Place of Worship	Scarborough Chinese Alliance Church
7	Place of Worship	Scarborough Community Alliance Church
8	Place of Worship	Agincourt Pentecostal Church
9	Place of Worship	Our Lady of the Rosary Church
10	Parks & Open Space	Knott Park
11	Parks & Open Space	Kennedy Parkette
12	Human Services	Excellent Education Centre
13	Human Services	Danforth College
14	Human Services	Taztech Educational Centre
15	Human Services	Brain Lightning Education Service
16	Human Services	Ivy Yin-Yuk Leung Art Studio
17	Human Services	General Driving School
18	Human Services	Lolart Enjoy Education Inc
19	Human Services	Sylvan Learning Centre
20	Human Services	Agincourt Learning
21	Human Services	Dentistry for Children
22	Human Services	Backcare Sports Injury Rehab
23	Human Services	Cardiology Diagnostic Service Ltd
24	Human Services	Finch Medical Centre
25	Human Services	Finch Midland Chiropractic

Feature ID (Shown on Figure 3-5)	Feature Type	Feature Name
26	Human Services	Scarboro Village Medical
27	Human Services	Your Total Health Centre
28	Human Services	A & A Learning Centre
29	Human Services	Scarborough Medical Centre
30	Human Services	Steeles-Kennedy Injury Rehab
31	Human Services	Scarborough Fertility & Women
32	Human Services	Flint Physiotherapy Clinic
33	Human Services	Hai Tian Health Centre
34	Human Services	Chinese Family Service of Ontario
35	Human Services	Toronto Health Centre
36	Human Services	East Rehabilitation Centre
37	Human Services	Recho Rehab
38	Human Services	Milliken Rehab Centre
39	Human Services	Riverview Medical Rehab
40	Human Services	Sleep Management Group
41	Human Services	A A Rehab Centre

Figure 3-5: Key Features

Aerial Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Study Area - 500 Metres
- Proposed Project Footprint (approximate)
- Permanent Watercourse
- Railway
- Human Services
- Parks & Open Spaces

Institutional

- Place of Worship
- School

DATA SOURCES:

Roads and Railways - Ontario Open Data Catalogue
Watercourses - Land Information Ontario
Project Footprint - Initial Preferred Designs

0 110 220 440 660 Metres

Project:	**New SmartTrack Stations**		
Figure Title:	**Finch-Kennedy SmartTrack Station - Key Features**		
Prepared By:	4TRANSIT PARSONS HATCH WSP	**Date:**	**June 01 2018**
Version: FE.SE.95-1	**Review:**	**Figure:** 3-5	

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3.5.2.3 *Aesthetics/Visual Character*

The study area has the following general characteristics in terms of built form:

- One storey buildings with a few two storey buildings;
- Sites are arranged with large surface parking areas;
- Buildings are oriented toward onsite parking and/or inwardly to the site (as opposed to the street frontage);
- Buildings have functional designs with few windows, and many blank walls facing the street;
- Buildings and sites are designed without people-oriented features such as weather protection, designated walkways, lighting, or signage;
- Buildings are set back from the street; and
- Landscape areas are located along the street frontage and intermittently within parking lots.

The area south of Finch Avenue East, east of Midland Avenue and west of Kennedy Road, is predominantly residential with few institutional and commercial uses. The southern portion of the study area has the following characteristics in terms of built form:

- Large yards in front of suburban houses;
- Large mature trees in front yards near the street;
- Four car driveways;
- Two-storey residential homes as well as bungalows;
- Minimal landscaping, mainly turf; and
- Lack of sidewalks in certain residential blocks.

The overall built form is automobile-oriented throughout the study area due to:

- The scale of buildings;
- Site configurations with large surface parking areas and buildings being set back from the street;
- Width of streets;
- Block size;
- Lack of diversity of land uses;
- Inward oriented landscaping; and
- Limited pedestrian and cyclist amenities beyond narrow and one-sided sidewalks.

3.5.2.4 *Utilities*

The owners of utility infrastructure located in the study area have been identified based on information extracted from record drawings and are listed in Table 2-1.

3.5.2.5 *Current Development Applications*

Table 3-4 provides a description of active development proposals and applications in the study area at the time this EPR was written.

Table 3-4: Active Development Applications

Address File #	Application Summary	Application Status	Non-Residential Gross Floor Area (GFA) (m^2)
2989 Kennedy Road *Site Plan Application Number 17 113678 ESC 39 SA*	A Site Plan application for an addition to an existing industrial building, and to build a mezzanine within the existing building, all to house a construction supply sales and warehouse operation.	Under Review	3,216
2981 Kennedy Road *Site Plan Application Number 16 103438 ESC 39 SA*	Site Plan Application to construct a 1-storey warehouse with accessory office space; the two existing buildings on site will be demolished.	Notice of Approval Conditions	2,520
4140 Finch Avenue East *Site Plan Application Number 15 215969 ESC 41 SA*	A Site Plan Application for a partial demolition and interior alterations to allow for a private school in an existing industrial building.	Under Review	2,367

3.6 Air Quality

This section provides an overview of existing air quality conditions within the study area. Further details are provided in Appendix G of this Volume.

Refer to Section 4.7 for air quality effects assessment, including discussion of mitigation measures and proposed monitoring activities.

3.6.1 Methodology

The Air Quality Impact Assessment (AQIA) study area is bound by one kilometre to the north and south along the Stouffville rail corridor from the Project. Sensitive receptors are limited to within 300 m to either side of the rail corridor. Further information on sensitive receptors is provided in Section 4.7.

Local air quality impacts were assessed by estimating contaminant concentrations resulting from the transit operations in three scenarios:

1. Current Scenario: conditions currently on the rail corridor (2017);
2. No-Build Scenario: 2028 horizon (future scenario) including electrification and Stouffville rail corridor expansion, but with no Project; and
3. Full Build Scenario: 2028 horizon (future scenario) including electrification, Stouffville rail corridor expansion and the Project.

For the three scenarios, contaminant concentrations on sensitive receptors within the study area were determined.

The impacts were compared to the Ontario Ambient Air Quality Criteria (AAQC) and the Canadian Ambient Air Quality Standards (CAAQS). The air quality thresholds represent desirable levels of contaminants in ambient air, and are not enforceable within any of the jurisdictions.

The assessment was conducted using an emission rate calculation model. The local impacts of all emissions were predicted using an air dispersion model. The United States Environmental Protection Agency's (US EPA) Motor Vehicle Emission Simulator (MOVES) model was used to determine vehicle emission rates for passenger cars on the access road, and transit buses in bus lanes. The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) was used to determine the dispersion of the emissions associated with the three scenarios.

The potential for an adverse effect is considered to exist when the modelled concentration and the ambient background concentration summed for a contaminant exceeds the air quality threshold at a sensitive receptor. If the ambient background concentration of a contaminant already exceeds the threshold, then the potential for an adverse effect already exists, without considering the Project.

Concentrations of the Contaminants of Concern (COCs) resulting from background sources were estimated by analysing historical monitoring data from Environment and Climate Change Canada (ECCC) National Air Pollution Surveillance (NAPS) stations as well as MOECC air monitoring stations in the vicinity of the Stouffville rail corridor.

The 90th percentile background concentration for each COC was determined from the stations listed in Table 3-5. The 90th percentile over the five-year data set is considered to be representative of ambient background conditions for averaging periods of 30 minutes, one hour, eight hours, and 24 hours. For COCs with an annual averaging period, the highest recorded annual mean over the five years of data from the designated ambient stations was used.

A credible worst-case analysis has been undertaken for this assessment. The contribution from the Project and the ambient background concentrations can vary from day to day, depending on meteorological conditions and operational characteristics. If the credible worst-case analysis indicates that a significant number of sensitive receptors may be subject to air quality that does not meet the air quality thresholds, then a more detailed analysis will be conducted for that specific receptor/community (mitigation); otherwise, no further local air quality impact assessment is required (Ministry of Transportation, 2012).

Table 3-5: Air Monitoring Stations for Contaminants of Concern

Contaminant of Concern	Station ID	Station Name (Location)	Availability of Data
Particulate Matter ($PM_{2.5}$)	MOECC - 31103 MOECC - 33003 MOECC - 34020	Toronto Downtown Toronto East Toronto North (Hendon/Yonge Street)	2011-2015
Nitrogen Dioxide (NO_2)	MOECC - 31103 MOECC - 33003 MOECC - 34020	Toronto Downtown Toronto East Toronto North (Hendon/Yonge Street)	2011-2015

Contaminant of Concern	Station ID	Station Name (Location)	Availability of Data
Ozone	MOECC - 31103 MOECC - 33003 MOECC - 34020	Toronto Downtown Toronto East Toronto North (Hendon/Yonge Street)	2011-2015
Carbon Monoxide (CO)	MOECC - 35125	Toronto West (Resources Road)	2011-2015
Acrolein	NAPS - 60418	Toronto (Ruskin/Perth Street)	2002-2006
Benzene, 1,3-Butadiene	NAPS - 60427	Toronto (223 College Street)	2011-2015
Acetaldehyde, Formaldehyde	NAPS - 64401	Egbert (RR56/10th Side Road)	2006-2010
Benzo(a)pyrene	NAPS - 60427	Toronto (223 College Street)	2010-2014

3.6.2 Description of Existing Conditions

Table 3-6 summarizes ambient background concentrations within the study area.

Table 3-6: Summary of Ambient Background Concentrations within the Study Area

Contaminant	Averaging Period	Background Concentration (µg/m³)	Air Quality Threshold (µg/m³)	% of Threshold
		90th Percentile		
$PM_{2.5}$	24 h	15.9	27	59%
	Annual	7.55	8.8	86%
NO_2	1 h	48	79 400	61% 12 %
	24 h	40	200	20 %
	Annual	**29**	22.6	**128%**
Ozone	1 h	81	n/a	n/a
	24 h	65	n/a	n/a
	Annual	47	n/a	n/a
CO	1 h	435	36,200	1 %
	8 h	435	15,700	3 %
Acrolein	1 h	0.24	4.5	5 %
	24 h	0.24	0.4	60 %
Benzene	24 h	0.9	2.3	39 %
	Annual	**0.6**	0.45	**133 %**
1,3-Butadiene	24 h	0.09	10	1 %
	Annual	0.06	2	3 %
Acetaldehyde	30 min	1.5	500	0.3 %
	24 h	1.5	500	0.3 %
Formaldehyde	24 h	4.2	65	7 %
Benzo(a)pyrene	**24 h**	**0.00012**	0.00005	**240 %**
	Annual	**0.00007**	0.00001	**700 %**

Note: **Bold** values indicate exceedances to air quality thresholds from 90 percentile background concentrations

Annual NO_2, annual benzene, annual benzo(a)pyrene, and 24 h benzo(a)pyrene ambient background concentrations exceed the air quality thresholds. The elevated ambient background levels of these contaminants are a widespread occurrence across urban Ontario, and levels are desired to be decreased by the MOECC.

3.7 Noise and Vibration

This section provides an overview of existing noise and vibration conditions within the study area. Further details are provided in Appendix H of this Volume.

Refer to Section 4.8 for noise and vibration effects assessment, including discussion of mitigation measures and proposed monitoring activities.

3.7.1 Methodology

The study area for the Noise and Vibration Impact Assessment extends 300 m from the Project footprint as defined in the IPD (see Appendix A). Sensitive receptors within identified Noise Sensitive Areas (NSAs) were selected based on the geographical and land use context and as per the Ministry of Environment and Energy (now MOECC)/GO Transit Draft Protocol for Noise and Vibration Assessment (Ministry of Environment and Energy and GO Transit, 1994) (the Protocol). Existing and predicted noise and vibration levels were assessed at sensitive receptor locations to characterize the effects of the Project and identify where mitigation is required. Further information on sensitive receptors is provided in Section 4.8.

A site visit was undertaken to confirm the suitability of the selected NSAs and receptor locations.

PTE was obtained for the residential property at 108 Petworth Crescent, on the east side of the rail corridor which is representative of the residential receptors in the area of the Project. Sound and vibration level measurements were taken within the backyard of this property.

The following scenarios formed part of the assessment:

- Scenario 1, existing conditions (2017);
- Scenario 2, future conditions without Project, which consists of year 2028 future electric train volumes, but without the Project; and
- Scenario 3, future with Project, which consists of year 2028 future electric train volumes, plus the proposed Project.

The review of construction noise is based on the Noise Pollution Control Publication 115 (NPC-115) and NPC-118 (part of the MOE Model Municipal Noise Control By-law (Ministry of the Environment, 1978), the United States Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (Federal Transit Administration, 2006) and the City of Toronto Municipal Code Chapter 591 - Noise (City of Toronto, 2009).

NPC-115 stipulates specific sound emission standards for various pieces of construction equipment. This publication does not set receptor-based sound level limits due to construction activities but rather sets limits for noise generated by each individual piece of equipment.

Table 3-7 lists maximum noise emission levels for typical construction equipment.

Table 3-7: NPC-115 Maximum Noise Emission Levels for Typical Construction Equipment

Type of Equipment Maximum Sound Level (dBA)	Quiet Zone Maximum Sound Level (dBA)	Residential Area Sound Emission Standard (dBA)	Distance[3] (m)	Power Rating (kW)
Excavation Equipment [1] (January 1, 1981 and later)	83	83	15	Less than 75 kW
	85	85	15	75 kW or Greater
Pneumatic Equipment [2]	85	85	7	-
Portable Compressors (January 1, 1981 and later)	70	76	7	-

(1) Excavation equipment includes bulldozers, backhoes, front end loaders, graders, excavators, steam rollers and other equipment capable of being used for similar applications.
(2) Includes pavement breakers.
(3) Distances based on NPC-103 Procedures (Section 6, 7 and 9).

NPC-118 sets sound emission standards for motorized conveyances of various types. This publication does not set receptor-based sound level limits due to heavy vehicle operation but sets limits for noise generated by each individual piece of equipment.

Table 3-8 lists maximum noise emission levels for standard diesel heavy vehicles.

Table 3-8: NPC-118 Maximum Noise Emission Levels for Standard Diesel Heavy Vehicles

Date of Manufacture	Maximum Sound Level (dBA)	Distance (m)
Prior to January 1, 1979	100	15
January 1, 1979 and after	95	15

Key elements of the City of Toronto Noise By-law (City of Toronto, 2009) related to construction activities include By-law No. 1400-2007 (Construction Noise) (City of Toronto, 2009) and place limits on the timing of construction activity during nighttime and on Sundays and statutory holidays. The FTA *Transit Noise and Vibration Impact Assessment* guide (Federal Transit Administration, 2006) includes 90 dBA $L_{eq\ (1hr)}$ and 80 dBA $L_{eq\ (1hr)}$ daytime and nighttime construction noise criteria for residential land uses. It should be noted that these sound levels cannot be enforced in Canada; however, the FTA criteria can be used to help gauge whether construction sound levels at the receptor level are acceptable or not.

There are no federal or provincial construction vibration limits. Vibration levels due to construction are governed municipally, on the basis of the City of Toronto By-law No. 514-2008 (Construction Vibration) (City of Toronto, 2008). As per the By-law, if any structures fall within the Zone of Influence, construction vibration monitoring will be undertaken to ensure that the vibration levels are never exceeded. The Zone of Influence is defined as the area of land adjacent to or within the construction site, delineated at a Point of Reception where the Peak

Particle Velocity (PPV) is measured to be greater or equal to 5 mm/s. Table 3-9 lists the City of Toronto prohibited vibration limits.

Table 3-9: City of Toronto Prohibited Vibration Limits

Frequency of Vibration (Hz)	Vibration Peak Particle Velocity (mm/s)
Less than 4	8
4 to 10	15
More than 10	25

The operations noise assessment is based on the Protocol. An objective of the Protocol is that the daytime (i.e., 07:00 to 23:00 hours) Equivalent Continuous Sound Level, L_{eq} (16 hrs), produced by future rail service operation of the GO Transit project under assessment, does not exceed the higher of:

a. The ambient sound level (combined with the sound level from existing rail service); or

b. 55 dBA.

The Protocol also has an objective that the night-time (i.e. 23:00 to 07:00 hours) Equivalent Continuous Sound Level L_{eq} (8 hrs) produced by the future rail service operation of the GO Transit project does not exceed the higher of:

a. The ambient sound level (combined with the sound level from existing rail service); or

b. 50 dBA.

To assess the impact at a Point of Reception, the Adjusted Noise Impact level is used. The Adjusted Noise Impact level is the difference in sound level between pre-project and post-project noise. In accordance with the Protocol, if the difference in sound level is 5 dB or higher, the potential to mitigate will be evaluated based on administrative, operational, economic, and technical feasibility.

Table 3-10 summarizes the adjusted noise impact rating and mitigation requirements.

Table 3-10: Summary of Impact Rating and Action of Mitigation

Change in Noise Level	Impact Rating	Mitigation Effort Required
0 to 2.99 dB	Insignificant	None.
3 to 4.99 dB	Noticeable	None.
5 to 9.99 dB	Significant	Investigate the potential of noise control measures to mitigate based on administrative, operational, economic and technical feasibility.
10+ dB	Very Significant	If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

The vibration assessment is also based on the Protocol. Under the Protocol, the desirable objective is that the Root-Mean-Square Velocity (RMSV) produced by the Project does not

exceed 0.14 mm/s. However, if the existing vibration levels are above 0.14 mm/s, the future vibration velocity objective is to be no greater than existing vibration levels.

When the vibration velocity at the Point of Reception exceeds the objective by 25%, vibration control measures should be investigated within the constraints of administrative, aesthetic, economic and technical feasibility.

3.7.2 Description of Existing Conditions

Table 3-11 summarizes the noise monitoring undertaken at 108 Petworth Crescent.

Table 3-11: Noise Monitoring Summary

Receptor	Address	Measured Daytime Sound Level, Leq,16hr (dBA)	Measured Nighttime Sound Level, Leq,8hr (dBA)
M1	108 Petworth Crescent	53.9	48.1

The measured sound levels were below the 55 dBA daytime and 50 dBA nighttime limits outlined in the Protocol.

There are 5-metre-high noise barriers along the rail corridor from Finch Avenue East to Huntingwood Drive. All the modelled scenarios include these noise barriers.

Table 3-12 summarizes the vibration monitoring undertaken at 108 Petworth Crescent.

Table 3-12: Vibration Monitoring Summary

Location	Train No.	Overall Measured Vibration Level (mm/s)
M1 (108 Petworth Crescent)	1	0.11
	2	0.08
	3	0.11

As seen in the table above, the measured vibration levels were below the Protocol objective of 0.14 mm/s.

3.8 Traffic and Transportation

This section provides an overview of existing traffic and transportation conditions within the study area and the methodology used to obtain this information. Further details are provided in Appendix I of this Volume.

Refer to Section 4.9 for traffic and transportation effects assessment, including discussion of mitigation measures and proposed monitoring activities.

3.8.1 Methodology

Prior to beginning the analysis, and to assess the existing conditions within the study area, a desktop review of background information was conducted from a number of sources including the City of Toronto, Metrolinx and TTC.

Site visits were conducted at the Project location and surrounding road network which enabled a “hands on” perspective of the existing transportation elements, conditions and constraints affecting the current and future site, including traffic operations, site access/egress, on-street

parking regulations and conditions, plus pedestrian and cycling connectivity. The site visit complemented the desktop review.

Existing traffic data on the boundary road network was obtained. All available turning movement counts at the key intersections were used in the traffic analysis. These include counts previously received from the City of Toronto.

A Transportation Brief was completed to estimate the amount of vehicular traffic generated by the Project in order to determine whether a full Transportation and Traffic Impact Study (TTIS) is required. Typically, a TTIS is conducted if a proposed development generates at least 100 net additional peak hour, peak direction vehicle trips. This is a general guideline defined by the City of Toronto and is based on the threshold above which the site-generated traffic might result in a noticeable change in the level of service on abutting roads, generate the need for transportation infrastructure (e.g. traffic control signals) or require the implementation of mitigation measures such as the construction of separate turn lanes (City of Toronto, 2013).

A 10-year horizon (2028) was assumed for this study.

Total future traffic conditions were determined by adding the site-generated automobile trips with the future growth traffic volumes.

These traffic volumes were then input into Synchro 9 so that the intersection Level of Service (LOS), delay and critical movements could be identified. In Synchro 9, users model the operations of signalized and unsignalized intersections by specifying factors such as: lane configuration, signal timings, traffic volumes, pedestrian volumes, heavy vehicle percentages and other traffic and design factors. Synchro 9 outputs the LOS, volume-to-capacity ratios (v/c ratios), vehicle delay, queue lengths and more in order to provide an indication of the operating characteristics of the intersection.

A site circulation assessment was completed using the AutoTURN 10 software package to ensure adequate manoeuvrability through the site. AutoTURN is an add-on program to AutoCAD that enables users to conduct an analysis of the turning path of different-sized and types of vehicles. It illustrates the “footprint” of a vehicle’s maneuvers, so that potential conflicts are identified, and modifications can be developed to address any potential problems.

3.8.2 Description of Existing Conditions

3.8.2.1 Road Network

The boundary road network consists of Finch Avenue East, Kennedy Road, Midland Avenue, Milliken Boulevard, Baylawn Drive and Silver Star Boulevard.

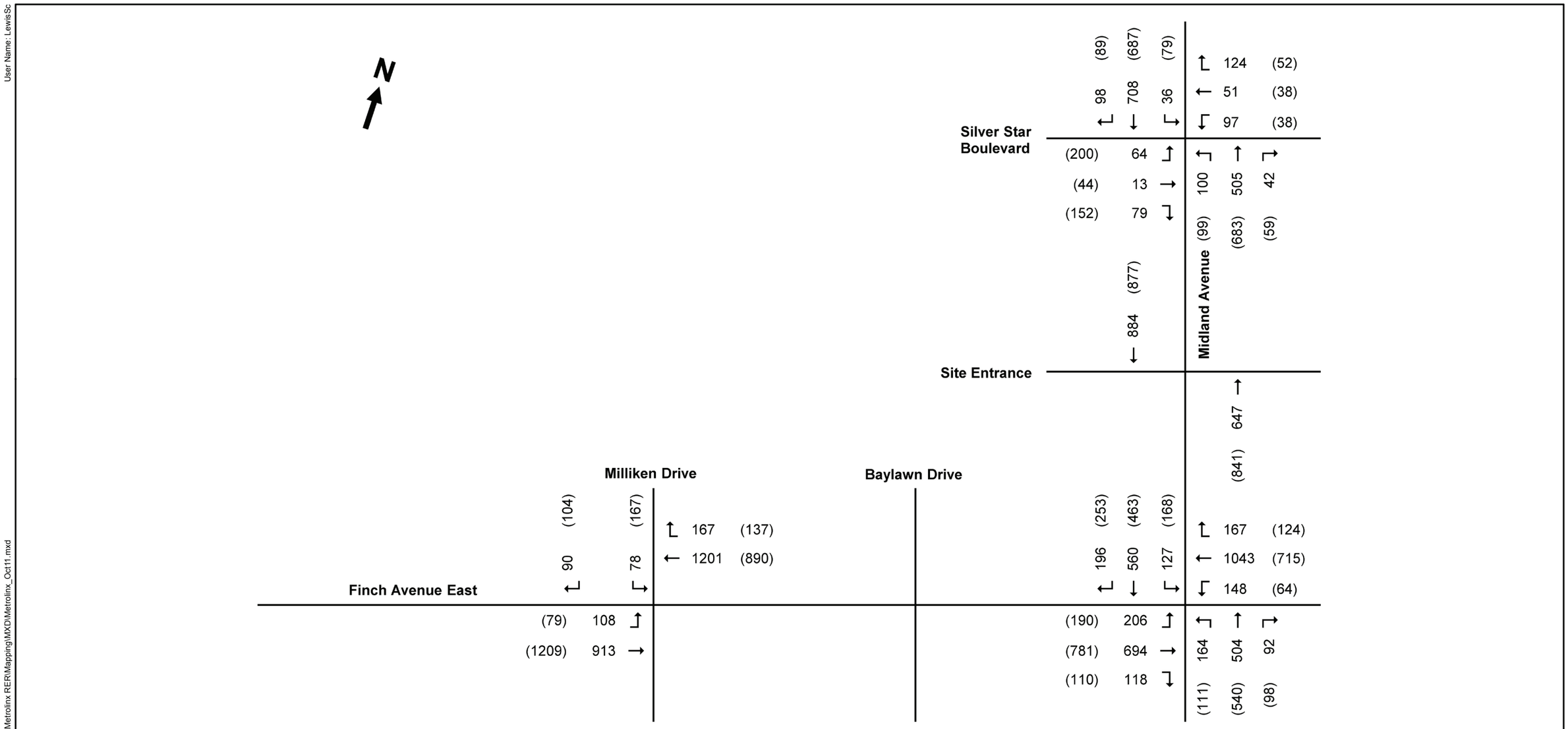
The focus of the study is on the operations and impacts on the following signalized intersections:

- Finch Avenue East and Midland Avenue;
- Midland Avenue and Silver Star Boulevard & South Shields Avenue; and
- Finch Avenue East and Milliken Boulevard.

The unsignalized intersection of the proposed secondary access road from Midland Avenue was also assessed. Currently, there are two existing driveways that provide access to commercial and industrial buildings at this location.

Existing traffic volumes are shown in Figure 3-6 for the A.M (07:00-09:00) and P.M (16:00 to 18:00) peak hours.

User Name: LewisSc



Legend

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

Project:	**New SmartTrack Stations**		
Figure Title:	**Finch-Kennedy SmartTrack Station - Existing Traffic Volumes**		
Prepared By:	4TRANSIT PARSONS HATCH WSP	**Date:**	**February 09 2018**
Version: FE.TT.95-1	**Review:**	**Figure:** 3-6	

Document Path: L:\MMM Planning\Projects\Current Projects\Metrolinx RER\Mapping\MXD\Metrolinx_Oct11.mxd

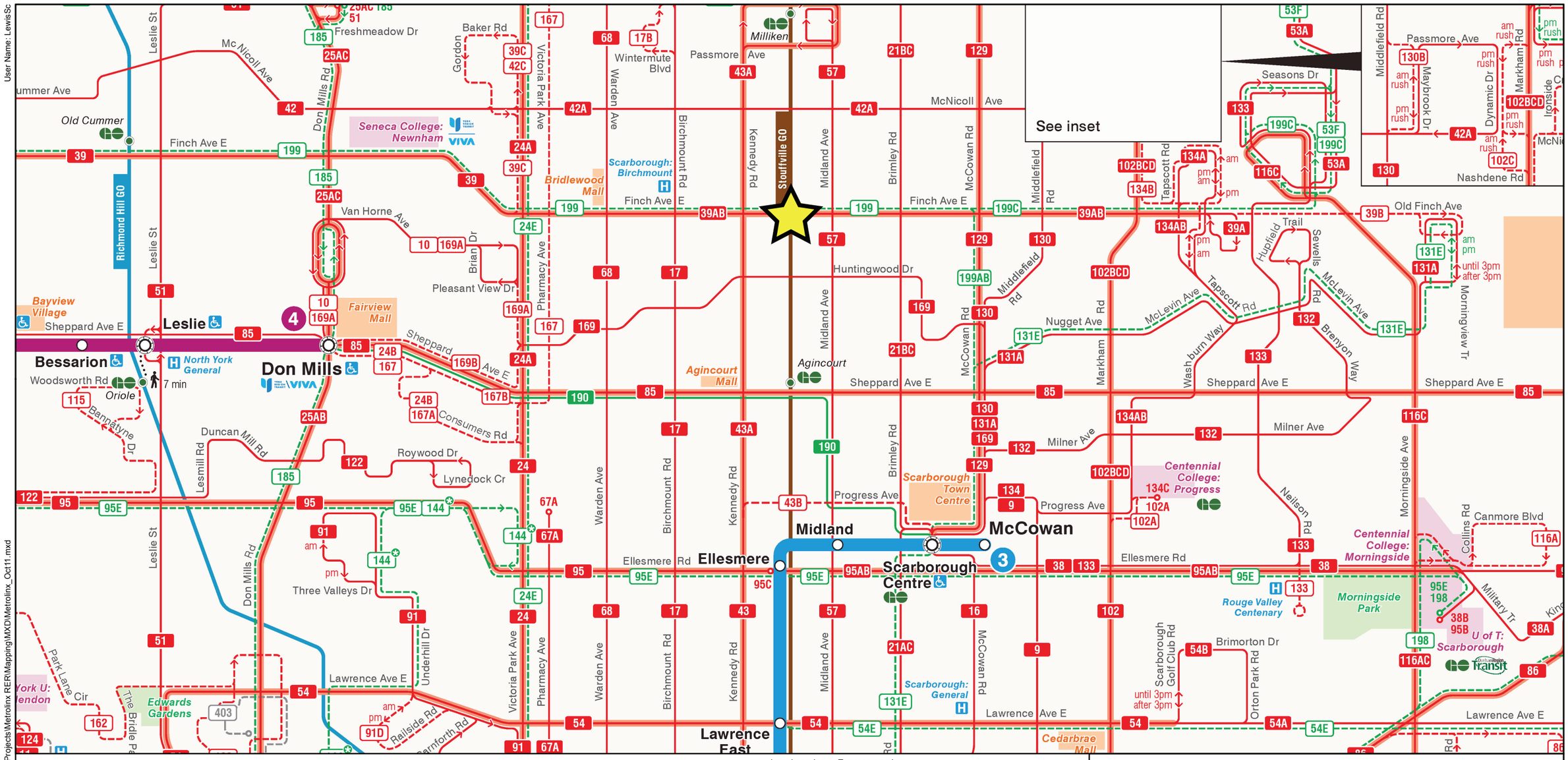
3.8.2.2 Transit Network

The existing Stouffville rail corridor is owned by Metrolinx. Metrolinx operates a commuter (passenger) rail service in generally a north-south direction along the Kingston and Uxbridge Subdivisions, from Union Station in the City of Toronto to Lincolnville GO Station in the Town of Whitchurch-Stouffville. The CN Kingston Subdivision connects Toronto with Montreal, and the section between Union Station and the Pickering Junction in Durham Region is owned by Metrolinx as part of the shared Lakeshore East corridor. North of the CN Kingston Subdivision, the CN Uxbridge Subdivision is used by Metrolinx for the Stouffville rail corridor.

The TTC currently services the study area with several surface transit routes providing access to other areas of the City with connections to the surrounding municipalities in the Greater Toronto Area (GTA). Four routes operate in the vicinity of the Project: Routes 39A and 39B - Finch East, Route 43 - Kennedy, Route 57 - Midland, and Route 199 - Finch Rocket. Route 39 A and B and Route 43 are part of the 10-minute network, an initiative introduced by the TTC in 2015 which provides service at a frequency of 10 minutes or better, all day, every day (Toronto Transit Commission, 2015).

Figure 3-7 shows existing TTC routes in the study area.

Figure 3-7: TTC Routes



3.8.2.3 *Cycling, Pedestrian and Trail Network*

There is presently no dedicated cycling infrastructure in the form of bike lanes or trails in the study area.

The existing public transit service in the study area is bike-friendly, with bike racks provided on TTC buses servicing Routes 39A and 39B - Finch East, Route 43 - Kennedy, Route 57 - Midland, and Route 199 - Finch Rocket.

The boundary roads in the study area have sidewalks on both sides, and access to the East Highland Creek Trail south of Finch Avenue East is provided between Midland Avenue and Baylawn Drive.

Beyond the sidewalks that connect the majority of the neighbourhood, there are few other pedestrian-oriented features that make the study area supportive of people traveling on foot.

4. Effects Assessment, Mitigation and Monitoring

4.1 Methodology

The methods used to conduct the effects assessment were designed to meet the requirements of the TPAP. During the process the following was considered:

- The key activities associated with the construction and operation of the Project as defined in the IPD and detailed in Section 2 of this Volume;
- Existing environmental conditions of the study area as detailed in Section 3 of this Volume; and
- Issues raised by the public, stakeholders and Indigenous communities during consultation and engagement activities conducted to date and detailed in Volume 9.

Potential environmental effects resulting from the construction and operation of the Project were identified, analyzed, and described. Mitigation measures were then identified to minimize or avoid potential effects. Monitoring activities were also identified where warranted to evaluate effectiveness of proposed mitigation measures and provide feedback for adaptive management.

Where applicable, relevant methodologies undertaken are discussed in this section.

Volume 8 of this EPR includes a specific discussion on climate change as it pertains to the Transit Project.

4.2 Natural Environment

4.2.1 Overview

The Project has the potential to result in temporary effects (e.g., effects to wildlife due to anticipated vegetation removals, effects to the Markham Branch of Highland Creek due to erosion and sedimentation during construction) and permanent effects (e.g., long term colonization and spread of invasive species) to the natural environment. Potential effects associated with this Project may result from direct loss of habitat as well as indirect and accidental effects resulting from construction, and operations/maintenance activities.

It is anticipated that effects can be mitigated through implementation of well-established and site-specific mitigation measures. The Vegetation Compensation Protocol for Metrolinx RER Projects will be implemented for the Project.

4.2.2 Potential Effects, Mitigation and Monitoring Measures

Potential effects, corresponding mitigation measures and monitoring activities relating to the natural environment are described in Table 4-1.

Further details on potential effects, mitigation and monitoring are provided in Appendix B of this Volume.

Table 4-1: Natural Environment - Potential Effects, Mitigation and Monitoring

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
Construction			
Aquatic Environment	Effects to the Markham Branch of Highland Creek are anticipated to be minimal given that proposed works in the area of the CSP culverts are limited. With no increase to the proposed footprint of the CSP culvert, effects associated with the Project will be limited to temporary, indirect effects of construction activities which may include: • Erosion and downstream transport of sediment associated with staging areas, including exposed soils, stockpiled soils or other materials from clearing and grubbing; • Entry of debris from the Stouffville rail corridor during construction (e.g., aggregate) into the creek; • Trampling of riparian vegetation; • Equipment leaks or spills may occur, resulting in accidental contamination; and • An increase in impervious surface area, which may result in increased stormwater runoff No in-water works are anticipated at this time. Note: The Markham Branch of Highland Creek is a warmwater	Potential effects to the aquatic environment from construction of the Project can be managed through implementation of the following mitigation measures: • Ensure equipment and materials storage is located in designated and properly contained areas located well away from the watercourse. • Develop an Erosion and Sediment Control (ESC) Plan prior to construction for implementation throughout construction. The ESC Plan will include consideration of the Greater Golden Horseshoe Area Conservation Authorities' Erosion and Sediment Control Guideline for Urban Construction (Greater Golden Horseshoe Area Conservation Authorities, 2006) and Ontario Provincial Standard Specification (OPSS) 805 (Erosion and Sediment Control Measures) (Ministry of Transportation, 2015). This plan will encompass all areas of soils disturbance, particularly in the vicinity of the Markham Branch of Highland Creek. The ESC Plan will include the following measures: • All disturbed areas/construction zones that drain to the watercourses will be isolated using standard perimeter silt fencing to isolate the general construction zone up and downstream. The silt fencing will be heavy duty/reinforced fencing, but with no exposed mesh that might entangle wildlife. • Locate all salvaged or stockpiled materials a safe distance from the edge of the watercourse and stabilize to prevent migration of any sediment or other material to the watercourse. • Stabilize and re-vegetate all work areas or other disturbed surfaces draining to the watercourse and/or in the floodplains as soon as feasible following construction as described above. • No equipment shall ford or otherwise enter the watercourse. • Control all activity to prevent entry of any petroleum products, debris or other potential contaminants/deleterious substances, in addition to sediment as outlined above, to the watercourses. Conduct storage, refueling or maintenance of equipment and vehicles at least 30 m	• On-site inspection and maintenance by an Environmental Inspector will be undertaken on a regular basis (e.g., monthly) or as required (e.g., following storm events) over the course of construction to ensure the effectiveness of ESC measures and other mitigation measures.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
	tributary, and is not sensitive to changes in thermal regime.	away from the watercourse. An Emergency Preparedness and Response Plan will govern spill response. • Retain and protect as much of the natural vegetation as reasonably possible to help ensure bank stability and control erosion. • In the event in-water works are identified to be required during detailed design, the project team will consult with TRCA, MNRF and DFO to identify restricted activity timing windows. • During detailed design and prior to construction, a Stormwater Management Report will be completed to determine potential effects and mitigation measures. The report will be completed in consultation with the TRCA and the MOECC. Stormwater management design will consider guidance provided by the MOECC Stormwater Management Planning and Design Manual (2003) and MTO Drainage Management Manual (2008), as well as the TRCA Stormwater Management Criteria (2012) and Low Impact Development Stormwater Management Planning and Design Guide (2010). The approach to stormwater management will aim to prevent temperature spikes in watercourses. • Measures to mitigate a potential loss of green space and reduce storm runoff will be identified in detailed design. • A Flood Contingency Plan will be developed during detailed design and prior to construction. • Staging and storage of construction equipment will be avoided within flood plain areas. • Efforts should be made to coordinate with Toronto Hydro, Toronto Water and other utility companies that may be affected by utility relocations to help minimize the overall impacts of the Project on the natural heritage system. • Infrastructure and utility works will either be completed by Metrolinx as part of this Project, or by utility companies. Metrolinx and its Contractors will follow TRCA regulatory requirements.	
Terrestrial Environment	Both direct and indirect effects to vascular flora and vegetation communities within the Project	Potential effects to vascular flora and vegetation communities from construction of the Project can be managed through implementation of the following mitigation measures:	• On-site inspection and maintenance by an Environmental Inspector will be undertaken on a regular basis (e.g.,

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
	footprint are anticipated from construction of the Project. Direct effects from vegetation removal are anticipated, but are expected to be minimal based on the developed/commercial nature of the study area. Much of the vegetation is early successional and disturbance tolerant species. Removals will likely impact some young to mid-aged trees located within the Stouffville rail corridor. Removal of non-woody vegetation within cultural meadow units is also expected. As discussed in Appendix B, the vegetation communities within the study area are considered common and widespread across the broader landscape, and no sensitive species were observed. Additionally, many of the effects are anticipated to be temporary in nature with temporarily disturbed areas restored following construction. The anticipated vegetation community loss based on the IPD has been estimated as: • Cultural meadow: 0.72 hectares • Cultural thicket: 0.18 hectares There is potential for indirect effects to adjacent retained vegetation features during the construction phase, including the following: • Vegetation clearing/damage beyond the construction area	• Retain existing vegetation within the study area to the extent practicable. Vegetation removal will be kept to a minimum, limited to within the construction disturbance area and should be scheduled to occur outside of the overall bird nesting season of April 1st to August 31st, following the mitigation measures described for migratory birds. • Areas for vegetation removal will be refined during detailed design, if required (e.g., change in construction disturbance area, final staging areas). • ESC fencing will be installed prior to vegetation clearing, and maintained throughout construction. • Construction fencing and/or silt fencing, where appropriate, will be installed and maintained to clearly define the construction disturbance area and prevent accidental damage to vegetation, or intrusion to adjacent vegetated areas. Fencing will be monitored and repaired as necessary throughout the construction period and will be removed and disposed of accordingly, post-construction. • Re-stabilize all disturbed areas, incorporating re-vegetation using plantings and native seed mix appropriate to the site conditions. Exposed soils will be revegetated as soon as possible to reduce erosion. • Carry out clearing, grubbing, site preparation and tree protection activities with consideration for relevant OPSS (e.g., OPSS 201 (Ministry of Transportation, 2011), OPSS.PROV 801 (Ministry of Transportation, 2018)). When practicable, prune or top the vegetation instead of grubbing/uprooting, if required. • Implement dust control practices (e.g., wetting with water) in dust-sensitive areas. • Any damaged trees will be pruned or removed through the implementation of proper arboricultural techniques, under supervision of an Arborist. • Mitigation measures specific to trees will be adhered to, including municipal by-law permitting requirements where applicable, that are summarized in the Tree Inventory Plan. These measures will be	monthly) or as required (e.g., following storm events) over the course of construction to ensure the effectiveness of ESC measures and other mitigation measures. • On-site inspection will be undertaken as required during construction to ensure that only specified trees are removed, fencing is intact and there is no damage caused to the remaining trees and adjacent vegetation communities. Construction and/or silt fencing will be repaired if it is damaged. Any damaged trees will be pruned through the implementation of proper arboricultural techniques, under supervision of an Arborist or Forester. • Regular inspections of dust emissions (frequency to be defined prior to project construction) will be undertaken to confirm dust control watering frequency and rates are adequate. • Post-planting monitoring of restoration areas will occur for one year after installation. One site visit will be conducted during the subsequent growing season to confirm survival of plantings and/or seed mix. Should the plantings and/or seed mix not survive, additional seeding and/or plantings will be undertaken one year thereafter with one additional monitoring visit in the following growing season.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities

	(e.g., due to air emissions and dust deposition);
	• An increase in downstream runoff that can result in erosion effects on receiving vegetation.
	• Colonization and spread of invasive species.
	• Spills of fuel and/or application of other hazardous materials (e.g., de-icing substances during winter months). Spills have the potential to affect retained vegetation.
		further detailed in an Arborist Report, to be completed during detailed design.
		• The Arborist Report will contain at a minimum the following information in addition to details of tree location, size, species, conditions and category:
		  • Recommendations for tree/vegetation protection and preservation measures for all trees / vegetation that are to be retained;
		  • Details of tree pruning;
		  • Details of all trees/vegetation recommended for removal, including removal measures;
		  • Mitigation and monitoring measures to ensure success of preservation and removal measures;
		  • Should vegetation compensation be required, it will be in accordance with the Metrolinx Vegetation Compensation Protocol; and
		  • Mapping.
		• Remove and dispose of all construction-related debris following construction in appropriately designated areas, which will be determined during detailed design.
		• Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx RER projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol:
		  • **For Municipal/Private Trees**: Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting/compensation approach for municipal and private trees. The goal is to reduce the administrative permitting burden for trees along long stretches of rail corridor.
		  • **For Trees within Metrolinx Property**: Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with
			• Restoration/compensation monitoring will be confirmed through regulatory agency consultation during detailed design.
			• Additional restoration/compensation monitoring may be required based on the results of additional surveys and consultations with regulatory agencies.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
		Conservation Authorities and municipalities to develop the final compensation plan. • **Conservation Authorities:** For vegetation removals within Conservation Authority lands where required, applicable removal and restoration requirements will be followed. • **Federal Lands**: For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed. • **Tree End Use**: Metrolinx will develop options for the end use of trees removed from Metrolinx property (e.g., reuse/recycling options). • Machinery is to arrive on site in a clean condition in accordance with the Clean Equipment Protocol for Industry (Halloran et al, 2003). • Soil stockpiles will be managed in accordance with the Soil Management Plan as per above. Re-stabilize disturbed areas, incorporating re-vegetation using plantings and/or native seed mix appropriate to the site conditions. Ash trees, leaves, logs, or wood chips will not be removed out of the Regulated Area, as identified on the CFIA website (Canadian Food Inspection Agency, 2017). This is necessary to prevent the spread of the Emerald Ash Borer (EAB) to un-infested areas in Ontario. All wood must be disposed of at a registered Waste Facility. • Restoration/compensation will be confirmed through regulatory agency consultation during detailed design. • Additional restoration/compensation measures may be required based on the results of additional surveys and consultations with regulatory agencies.	
Wildlife	• Effects to wildlife are expected to be minimal given the urban nature of the study area, and that no critical habitats have been identified. The majority of the species observed to be utilizing the study area are common,	The mitigation measures outlined above to protect vegetation will also protect associated wildlife habitat functions. It is also necessary to ensure the protection of breeding birds and other animals that may nest or otherwise be encountered incidentally where construction is proposed. For the protection of wildlife in general, the following measures are recommended:	• On-site inspection will be undertaken as required during construction to ensure that only specified trees are removed, fencing is intact and there is no damage caused to the remaining trees and adjacent vegetation communities. Construction and/or silt fencing will be repaired if it is

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
	disturbance-tolerant, urban species. • Wildlife may be directly affected due to anticipated vegetation removals as a result of construction. This vegetation could provide habitat for common urban wildlife and can be expected to provide nesting habitat for birds. Birds nesting in these areas may be protected by the *Migratory Birds Convention Act, 1994* (MBCA), as discussed in Appendix B. • In addition, there is potential for wildlife (e.g., snakes, small mammals) to enter the proposed work areas. The majority of the wildlife species with potential to occur in the study area are common, tolerant species, and to which effects can be managed through the implementation of recommended mitigation measures. • Dust and noise created by construction activities may also temporarily disturb and displace wildlife present within the study area. These wildlife species are likely accustomed to noise given the urban nature of the study area.	• Any wildlife incidentally encountered during construction will not be knowingly harmed and will be allowed to move away from the construction area on its own if at all possible. • In the event that an animal encountered during construction does not move from the construction zone, or is injured, the Environmental Inspector will be notified. • Dust will be controlled as described above.	damaged. Any damaged trees will be pruned through the implementation of proper arboricultural techniques, under supervision of an Arborist or Forester. • Regular inspections of dust emissions (frequency to be defined prior to project construction) will be undertaken to confirm dust control watering frequency and rates are adequate.
Migratory Birds	• Clearing of trees, shrubs, ground vegetation and structures has the potential to disturb or destroy	• To reduce the possibility of contravention of the MBCA, vegetation removal should be scheduled to occur outside of the overall bird nesting season of April 1 to August 31. Some birds may nest before	• Regular monitoring, to be defined prior to pre-construction land clearing, will be undertaken to confirm that

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities

	nests of migratory birds. Migratory birds may nest within these areas, most of which are protected by the MBCA (1994), as discussed in Appendix B. Potential effects include disturbance to nesting activity or possible loss of any nests present in the year of construction, depending on timing. Any migratory birds that are found nesting are protected under the MBCA.	and after this peak bird nesting season due to annual seasonal fluctuations. If a nest of a migratory bird is found within the construction area outside of this nesting period it still receives protection.
		• If vegetation must be removed during the overall bird nesting season:
		  • Nest and nesting activity searches will be conducted in areas defined as simple habitat[6] (i.e., the CUM1-1 community) by a qualified Biologist no more than 24 hours prior to vegetation removal. Nesting activity will be documented when it consists of confirmed breeding evidence, as defined by Ontario Breeding Bird Atlas (OBBA) criteria (Cadman, 2007).
		  • If an active nest or confirmed nesting activity of a migratory bird is observed in simple habitat, regardless of the timing window recommended, a species-specific buffer area following ECCC guidelines will be applied to the nest or confirmed nesting activity wherein no vegetation removal will be permitted until the young have fledged from the nest. The radius of the buffer will depend on species, level of disturbance and landscape context (Environment and Climate Change Canada, 2014) which will be confirmed by a qualified Biologist, but will protect a minimum of 10 m around the nest or nesting activity.
		  • The results of all nest searches will be documented at the end of each survey day in a Technical Memorandum, including information on the searcher, date, time conducted, weather conditions, habitat type, vegetation community type, observations of breeding activity, observations of confirmed nests including
			activities do not encroach into nesting areas or disturb active nesting sites.

[6] Simple habitats refer to habitats that contain few nesting spots or few species of migratory birds, where identification of active nests or confirmed nesting activity can be completed with confidence. According to ECCC (2014), examples of simple habitat include the following:

1. Urban parks consisting mostly of lawn with a few isolated trees;
2. Vacant lot with few possible nest sites;
3. Previously cleared area where there is a lag between clearing and construction activities (and where ground nesters may have been attracted to nest in cleared areas or in stockpiles of soil); or
4. Structure such as a bridge, beacon, tower or building (often chosen as a nesting spot by robins, swallows, phoebes, nighthawks, gulls and others).

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
		co-ordinates, and, if required, the buffer applied to identified breeding/nesting sites. • If vegetation removal must occur in complex habitats within the above-listed timing windows and absolutely cannot be avoided, the same best management practices (BMPs) such as nest and nesting activity searches described above will be undertaken. • Suitable human-made structures within the study area should be inspected for evidence of active bird nests during the breeding bird season prior to the onset of construction activities in order to determine appropriate nesting preventative measures (e.g., netting).	
Significant Wildlife Habitat	• No SWH has been identified within the study area. No direct or indirect effects to SWH are anticipated from the construction of the Project.	• Since no effects are anticipated, no mitigation measures specific to SWH are required for the construction of the Project.	• No monitoring activities are required.
SAR	Two avian SAR were confirmed or have moderate potential to occur within the study area. There is potential for these SAR to be present in the study area and encountered incidentally within the construction envelope, and therefore there is some risk of harm to these species (as detailed in Appendix B). Potential construction phase effects to these species are as follows: • Barn Swallow - There is limited suitable foraging habitat over fields and open aquatic features for this species. Foraging habitat is not protected under the *ESA,* 2007, and there is moderate potential for nesting habitat in nearby buildings which will not be affected by the Project. Thus,	While there are no specialized habitat elements for SAR species in the Project footprint, there is potential for some species to move through the study area during construction, and therefore be encountered and disturbed or possibly harmed incidentally by construction activities. Therefore, there is some risk of harm to these species. To protect SAR, the following mitigation measures will be implemented: • In the event that a SAR, or potential SAR, is found within the construction area, work that could potentially harm the species will cease. • It is recommended that construction timing occur outside of the breeding season to ensure no impact to the breeding SAR birds, where possible, and where not possible that additional mitigation such as nest surveys be completed, as described above. • If a nesting migratory bird (or SAR protected under the ESA, 2007) is identified within or adjacent to the construction site, the measures outlined above will be followed. • Cultural woodland and cultural thicket communities will be examined closely for the presence of Butternut within 25 m of the Project footprint.	• No monitoring activities are required over and above the regular on-site inspection and maintenance by an Environmental Inspector, as outlined above.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
	effects to this species are limited to incremental fragmentation of foraging habitat, and the minor risk of direct effects to individuals during the construction phase. • Peregrine Falcon - The tall buildings that could provide suitable nesting habitat for this species are not anticipated to be affected by construction, and thus effects to this species are limited to incremental fragmentation of foraging habitat and the minor risk of direct effects to individuals during construction. This species is active year-round, and nests from early April to May.		
Significant Natural Heritage Features	• No effects exceeding those described in the previous sections are anticipated to occur to the Markham Branch of Highland Creek and its associated regulated area/NHS, from the construction of the Project.	• Mitigation measures outlined above will also address effects to the Markham Branch of Highland Creek and its associated regulated area/NHS.	• No monitoring activities are required beyond those identified above.
Operation and Maintenance			
Aquatic Environment	• The new station will result in an increase of impermeable surface, which may lead to increased stormwater runoff. • Use of chemical pesticides to clear vegetation to maintain the ROW also has the potential to affect hydrological features if not applied correctly.	• Control all activity to prevent entry of any petroleum products, debris or other potential contaminants/deleterious substances, in addition to sediment as outlined above, to the watercourses. Conduct storage, refueling or maintenance of equipment and vehicles at least 30 m away from the watercourse. An Emergency Preparedness and Response Plan will govern spill response. • Retain and protect as much of the natural vegetation as reasonably possible to help ensure bank stability and control erosion.	• Contractors and rail staff will be responsible for monitoring the effects of herbicide application. Any significant concerns will be reported to superiors for timely resolution.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
	• Spills of fuel and/or application of other hazardous materials (e.g., de-icing substances during winter months) have the potential to affect surface water quality.	• A Flood Contingency Plan will be developed during detailed design and prior to construction.	

Terrestrial Environment	• Work undertaken to keep the rail ROW clear and free of vegetation has the potential to harm healthy trees and allow disease or rot to expand. Any use of chemical pesticides also has the potential to affect the terrestrial environment if not applied correctly.
	• Spills of fuel and/or application of other hazardous materials (e.g., de-icing substances during winter months) have the potential to affect retained vegetation.
		• Carry out clearing, grubbing, site preparation and tree protection activities with consideration for relevant OPSS (e.g., OPSS 201 (Ministry of Transportation, 2011), OPSS.PROV 801 (Ministry of Transportation, 2018). When practicable, prune or top the vegetation instead of grubbing/uprooting, if required.
		• Any damaged trees will be pruned or removed through the implementation of proper arboricultural techniques, under supervision of an Arborist.
		• Mitigation measures specific to trees will be adhered to, including municipal by-law permitting requirements where applicable, as summarized in the Project Tree Inventory Plan (Appendix C of this Volume), which will be further detailed in an Arborist Report, to be completed during detailed design. The Arborist Report will contain at a minimum the following information in addition to details of tree location, size, species, conditions and category:
		  • Recommendations for tree/vegetation protection and preservation measures for all trees/vegetation that are to be retained;
		  • Details of tree pruning;
		  • Details of all trees/vegetation recommended for removal, including removal measures;
		  • Mitigation and monitoring measures to ensure success of preservation and removal measures;
		  • Should vegetation compensation be required, it will be in accordance with the Metrolinx Vegetation Compensation Protocol; and
		  • Mapping.
			• Contractors and rail staff will be responsible for monitoring the effects of trimming and herbicide application. Any significant concerns will be reported to superiors for timely resolution.

Wildlife	• During operations, train traffic associated with the Project (e.g.,	• Wildlife present within the study area are likely somewhat adapted to these effects given the urban nature of the study area and the existing	• No monitoring activities are required.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
	stopping and starting) will result in noise, which may affect and possibly displace wildlife. The addition of the station on the existing rail corridor is not anticipated to have an effect on overall habitat connectivity.	train traffic on the rail corridor. These effects are anticipated to be minor and wildlife fencing is not warranted given the existing level of habitat fragmentation in the study area.	

Migratory Birds	• Clearing of trees, shrubs and ground vegetation for maintenance has the potential to disturb or destroy nests of migratory birds.	• To reduce the possibility of contravention of the MBCA, vegetation removal should be scheduled to occur outside of the overall bird nesting season of April 1 to August 31. Some birds may nest before and after this peak bird nesting season due to annual seasonal fluctuations. If a nest of a migratory bird is found within the construction area outside of this nesting period it still receives protection.
		• If vegetation must be removed during the overall bird nesting season:
		  • Nest and nesting activity searches will be conducted in areas defined as simple habitat[7] (i.e., the CUM1-1 community) by a qualified Biologist no more than 24 hours prior to vegetation removal. Nesting activity will be documented when it consists of confirmed breeding evidence, as defined by OBBA criteria (Cadman, 2007).
		  • If an active nest or confirmed nesting activity of a migratory bird is observed in simple habitat, regardless of the timing window recommended, a species-specific buffer area following MOECC guidelines will be applied to the nest or confirmed nesting activity wherein no vegetation removal will be permitted until the young have fledged from the nest. The radius of the buffer will depend on species, level of disturbance and landscape context (Environment and Climate Change Canada, 2014), which will be
			• No monitoring activities are required.

[7] Simple habitats refer to habitats that contain few nesting spots or few species of migratory birds, where identification of active nests or confirmed nesting activity can be completed with confidence. According to ECCC (2014), examples of simple habitat include the following:
- Urban parks consisting mostly of lawn with a few isolated trees;
- Vacant lot with few possible nest sites;
- Previously cleared area where there is a lag between clearing and construction activities (and where ground nesters may have been attracted to nest in cleared areas or in stockpiles of soil); or
- Structure such as a bridge, beacon, tower or building (often chosen as a nesting spot by robins, swallows, phoebes, nighthawks, gulls and others).

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
		confirmed by a qualified Biologist, but will protect a minimum of 10 m around the nest or nesting activity. • The results of all nest searches will be documented at the end of each survey day in a Technical Memorandum, including information on the searcher, date, time conducted, weather conditions, habitat type, vegetation community type, observations of breeding activity, observations of confirmed nests including co-ordinates, and, if required, the buffer applied to identified breeding/nesting sites. • If vegetation removal must occur in complex habitats within the above-listed timing windows and absolutely cannot be avoided, the same BMPs such as nest and nesting activity searches described above will be undertaken.	
Significant Wildlife Habitat	• No SWH has been identified within the study area. No direct or indirect effects to SWH are anticipated from the operation and maintenance of the Project.	• Since no effects are anticipated, no mitigation measures specific to SWH are required for the operation of the Project.	• No monitoring activities are required.
SAR	• During operations, train traffic associated with the Project will result in noise (e.g., stopping and starting), which may affect and possibly displace SAR.	• SAR present within the study area are likely somewhat adapted to these effects given the urban nature of the site and the existing train traffic on the rail corridor. These effects are anticipated to be minor and wildlife fencing is not warranted given the existing level of fragmentation in the study area.	• No monitoring activities are required.
Significant Natural Heritage Features	• No effects exceeding those described in the previous sections are anticipated to occur to the Markham Branch of Highland Creek and its associated regulated area/NHS from the operation and maintenance of the Project.	• Mitigation measures outlined above will also address effects to Markham Branch of Highland Creek and its associated regulated area/NHS.	• No monitoring activities are required.

4.3 Geology and Groundwater

4.3.1 Overview

No direct or indirect effects to underlying landforms and physiography, bedrock geology or groundwater are anticipated during construction or operations. However, hydrogeological and geo-environmental studies will be completed during detailed design to assess potential impacts to groundwater during construction dewatering.

It is possible that dewatering may result in temporary lowering of the groundwater table and groundwater flow direction. Impacts to groundwater users and the natural environment, as a result of dewatering, will be assessed in the hydrogeological study.

4.3.2 Potential Effects, Mitigation and Monitoring Measures

Potential effects, corresponding mitigation measures and monitoring activities relating to geology and groundwater are described in Table 4-2.

Table 4-2: Geology and Groundwater - Potential Effects, Mitigation and Monitoring

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
Construction			
Landforms and Physiography	• No effects to the underlying landforms or South Slope physiographic region are anticipated from construction.	• Since no effects are anticipated, no mitigation measures for the underlying landforms or South Slope physiographic region are required for the construction of the Project.	• No monitoring activities are required.
Soils and Bedrock Geology	• No direct or indirect effects to the bedrock geology are anticipated. Clearing of vegetation and excavation of soil associated with the construction of the Project may result in potential for direct and indirect impacts to soils during the construction phase, including: • Sedimentation and erosion of soils due to removal of vegetation, or changes in drainage patterns. • Soil contamination from chemical/fuel spills. • Mixing of topsoil and subsoil layers.	• Since no effects are anticipated, no mitigation measures for the bedrock geology are required for the construction of the Project. Potential effects from construction of the Project to soils can be managed through implementation of the following mitigation measures: • Soil and bedrock conditions, as well as bedrock elevations, will be confirmed through future geotechnical investigations to be undertaken in support of detailed design. • The TRCA's Geotechnical Engineering Design and Submission Plan Guidelines will be referenced during the detailed design phase. • Retain existing vegetation within the study area to the extent practicable. Vegetation removal will be kept to a minimum and limited to within the construction disturbance area. • Areas for vegetation removal will be refined during detailed design, if required (e.g., change in construction disturbance area, final staging areas). • Construction fencing and/or silt fencing, where appropriate, will be installed and maintained to clearly define the construction disturbance area and prevent accidental damage to vegetation, or intrusion to adjacent vegetated areas. Fencing will be monitored and repaired as necessary throughout the construction period and will be removed and disposed of accordingly, post-construction. • Develop an ESC Plan prior to construction for implementation throughout construction. The ESC Plan will include consideration of the Greater Golden Horseshoe Area Conservation Authorities'	• On-site inspection and maintenance by an Environmental Inspector will be undertaken on a regular basis (e.g., monthly) or as required (e.g., following storm events) over the course of construction to ensure the effectiveness of ESC measures and other mitigation measures. • The success of compensation vegetation will be monitored in accordance with the Vegetation Compensation Protocol for Metrolinx RER Projects. • Post-planting monitoring of restoration areas for one year after installation. One site visit will be conducted during the subsequent growing season to confirm survival of plantings and/or seed mix. Should the plantings and/or seed mix not survive, additional seeding and/or plantings will be undertaken one year thereafter with one additional monitoring visit in the following growing season. • Restoration/compensation monitoring will be confirmed through regulatory agency consultation during detailed design.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
		Erosion and Sediment Control Guideline for Urban Construction and OPSS 805 (Erosion and Sediment Control Measures) (Ministry of Transportation, 2015). This plan will encompass all areas of soils disturbance, particularly in the vicinity of the Markham Branch of Highland Creek. • Re-stabilize disturbed areas, incorporating re-vegetation using plantings and/or native seed mix appropriate to the site conditions. Exposed soils will be stabilized and re-vegetated as soon as possible to reduce erosion. • A Soil Management Plan will be developed by a Qualified Professional as defined in O. Reg. 153/04 for managing soil materials on-site (includes excavation, location of stockpiles, reuse and off-site disposal). • Soils needing to be stored temporarily will be stored in such a way as to not interfere with Project activities. • Topsoil and subsoil will not be mixed or contaminated with any other material. • The transportation, storage and handling of fuel shall be in accordance with the Technical Standards and Safety Act, 2000. • Machinery and equipment shall be inspected for leaks routinely throughout the duration of construction. • Vehicle maintenance and fuelling will be conducted at the designated and properly contained maintenance areas. • To mitigate accidental contamination from equipment leaks or spills, an Emergency Preparedness and Response Plan will govern spill response. • Restoration/compensation will be confirmed through regulatory agency consultation during detailed design. • Additional restoration/compensation measures may be required based on the results of additional surveys and consultations with regulatory agencies.	• Additional restoration/compensation monitoring may be required based on the results of additional surveys and consultations with regulatory agencies.
Groundwater	• As hydrogeological and geo-environmental studies will be completed at the next stage of	• At this time no effects are anticipated; as such, no mitigation measures specific to groundwater are required for the construction of the Project. However, this will be updated based on the findings	• No monitoring activities are anticipated to be required at this time. However, further field studies will be undertaken

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
	design, groundwater impacts (both direct and indirect) will be assessed in the hydrogeological study. Direct and indirect impacts to groundwater will be confirmed based on field investigations.	from the hydrogeological and geo-environmental studies to be completed at the next stage of design. Hydrogeological and geo-environmental studies will be provided to TRCA for review. • Ongoing engagement will occur with the CTC source protection authority during detailed design.	as part of the hydrogeological and geo-environmental studies and monitoring requirements will be determined at that time.
Operation and Maintenance			
Landforms and Physiography	• No effects to the underlying landforms or South Slope physiographic region are anticipated from the operation of the Project.	• Since no effects are anticipated, no mitigation measures for the underlying landforms or South Slope physiographic region are required for the operation of the Project.	• No monitoring activities are required.
Soils and Bedrock Geology	• No effects to the soils and bedrock geology are anticipated from the operation of the Project.	• Since no effects are anticipated, no mitigation measures for the soils and bedrock geology are required for the operation of the Project.	• No monitoring activities are required.
Groundwater	• As hydrogeological and geo-environmental studies will be completed at the next stage of design, groundwater impacts (both direct and indirect) will be assessed in the hydrogeological study. Direct and indirect impacts to groundwater will be confirmed based on field investigations.	• Mitigation measures will be determined based on the findings from the hydrogeological and geo-environmental studies to be completed at the next stage of design. Hydrogeological and geo-environmental studies will be provided to TRCA for review, once complete.	• Monitoring requirements will be determined based on the findings from the hydrogeological and geo-environmental studies to be completed at the next stage of design.

4.4 Tree Inventory

4.4.1 Overview

Tree removals are required to accommodate the Project. An Arborist Report will be completed during detailed design to identify all trees that may be impacted by the Project, including trees to be preserved, removed or injured. Mitigation measures are necessary prior to and during Project implementation to reduce the potential effects to trees associated with the Project. Additionally, recommended monitoring activities will help to confirm that mitigation measures are working effectively and provide feedback for adaptive management.

The specific trees identified in Table 4-3 for removal are also shown in Figure 3-2.

4.4.2 Potential Effects, Mitigation and Monitoring Measures

Potential effects, corresponding mitigation measures and monitoring activities relating to trees are described in Table 4-3.

Further details on potential effects, mitigation and monitoring are provided in Appendix C of this Volume.

Table 4-3: Tree Inventory - Potential Effects, Mitigation and Monitoring

Impact Type	Potential Effects	Mitigation Measures	Monitoring Activity
Construction			
Tree Removal	Trees on Metrolinx property and /or lands immediately adjacent require removal to accommodate the Project. Approximate removals based on field investigations and the IPD are as follows: • City of Toronto Categories 1 to 5 = **160 trees** [tree #'s: V, A1, to I1, 1101 to 1109, 1117, 1118, TG-1 (13), TG-5 (20), TG-6 (15), TG-7 (91)] • Metrolinx ROW = **2 trees** • TRCA Regulated Area = **0 trees** • Trees <30 cm DBH on Private Property = **196 trees** [tree #'s: C, D, E, G, I, J, P, Q, Z, J1 to T1, TG-2 (27), TG-4 (7), TG-8 (50), TG-9 (9), TG-10 (35), TG-11 (19) • Ash tree removal (not due to project) = **10 trees** **Total = 368 trees**	• Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx RER projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol: • **For Municipal/Private Trees**: Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting/compensation approach for municipal and private trees. The goal is to reduce the administrative permitting burden for trees along long stretches of rail corridor. • **For Trees within Metrolinx Property**: Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan. • **Conservation Authorities**: For vegetation removals within Conservation Authority lands where required, applicable removal and restoration requirements will be followed. • **Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed. • **Tree End Use:** Metrolinx will develop options for the end use of trees removed from	• The success of compensation vegetation will be monitored in accordance with the Vegetation Compensation Protocol for Metrolinx RER Projects. • Post-planting monitoring of restoration areas for one year after installation. One site visit will be conducted during the subsequent growing season to confirm survival of plantings and/or seed mix. Should the plantings and/or seed mix not survive, additional seeding and/or plantings will be undertaken one year thereafter with one additional monitoring visit in the following growing season. • Restoration/compensation monitoring will be confirmed through regulatory agency consultation during detailed design. • Additional restoration/compensation monitoring may be required based on the results of additional surveys and consultations with regulatory agencies.

Impact Type	Potential Effects	Mitigation Measures	Monitoring Activity
		Metrolinx property (e.g., reuse/recycling options). • The opportunity to salvage existing vegetation, particularly sensitive species, for transplanting from within the Project boundaries will be explored.	
		An Arborist Report will be prepared as the design progresses to detail proposed works, impacts and removals on private, conservation authority and /or municipal property. The Arborist Report will include: • The identification of all trees on private, conservation authority, and/or municipal property that will be impacted by the Project, including trees to be preserved, removed or injured. • Details of proposed works and impacts. • Recommendations for protection and preservation measures for all trees/vegetation that are to be retained. • Details of tree pruning. • Details of all trees/vegetation recommended for removal, including removal measures. • Appraised values of trees/vegetation to be removed. • Mitigation and monitoring measures recommended to ensure success of preservation and removal measures. • Identification of suitable restoration/compensation to accommodate site-specific impacts, mitigation and replacement measures to offset vegetation losses. • Where required, property specific landscaping and/or restoration plans for tree removals permitting and approvals.	• On-site inspection will be undertaken as required during construction to ensure that only specified trees are removed, fencing is intact and there is no damage caused to the remaining trees and adjacent vegetation communities. Construction and/or silt fencing will be repaired if it is damaged. Any damaged trees will be pruned through the implementation of proper arboricultural techniques, under supervision of an Arborist or Forester. • Regular monitoring, to be defined prior to pre-construction land clearing, will be undertaken to confirm that activities do not encroach into nesting areas or disturb active nesting sites.

Impact Type	Potential Effects	Mitigation Measures	Monitoring Activity
		• Cultural woodland and cultural thicket communities will be examined closely for the presence of Butternut within 25 m of the Project footprint	
Tree Injury	Encroachment into the Tree Protection Zone of trees within the Study Area. Tree numbers: A, B, K, N, O, T, U, W, X, Y, U1, V1, X1, Y1, Z1, A2, 1115, 1116, TG-3 (5), TG-5 (65), TG-6 (14), TG-7 (91), TG-8 (15) will be 'injured'. Impacts to trees adjacent to the work zone may result in unintended root damage or tree felling: **208 trees**. Protected trees that are close to the Project footprint, with a canopy that overhangs the work area, may require pruning of branches to facilitate works.	• An Arborist Report will be prepared as the design progresses to detail proposed works, impacts and removals on private, conservation authority and /or municipal property. The Arborist Report will detail protection and preservation measures for all trees that are to be preserved e.g. TPZ and implementation of tree protection barriers. Measures beyond the standard tree protection barriers may be required to protect trees where there is potential for tree injury (i.e., a reduction in the minimum tree protection distance or work that may be required within a TPZ). These measures cannot be determined at this stage as detailed drawings showing the limits of work, grading, and other construction activities are required to accurately determine the TPZ, potential injury and which remedial measure would be most applicable and will therefore be identified during detailed design.	• On-site inspection will be undertaken as required during construction to ensure no unauthorized encroachment into vegetated areas and TPZs, as well as monitoring and administering repair of tree protection barriers to ensure proper installation and functionality.
		• Inspect the crown of the tree for any branches or stems that may require pruning and any additional trees that may require removal.	• Certified Arborist to inspect and assess trees regularly through construction and post construction. Any trees that require pruning of branches and / or roots to be conducted through implementation of proper arboricultural techniques
Tree Protection	Trees within the study area will require tree protection barriers. Trees to be preserved are: A, B, H, K, L, O, R to U, W, X, Y, U1, V1, W1, X1, Y1, Z1, A2, 1110 to 1116, TG-3 (5), TG-5 (65), TG-6 (14), TG-7 (66), TG-8 (15). Refer to Appendix C for minimum Tree Protection Zone distances.	Install barriers for trees to be preserved. Barriers to consist of following types: • Private Property: 2.4 m height plywood barriers (3/4" thick). • City Property: 1.2 m height orange plastic web snow fence on a 38x89 mm (2"x4") wood frame	• Inspections to ensure barriers have been installed as specified, and monitoring during construction to ensure barriers are functioning as specified and to administer any necessary repairs.

Impact Type	Potential Effects	Mitigation Measures	Monitoring Activity
		Barriers to be installed per details in Appendix C. The following activities are prohibited within a TPZ: • Demolition, construction, replacement or alteration of permanent or temporary buildings, structures or pathways of any kind; • Installation of large stones or boulders; • Altering grade by adding or removing soil or fill, excavating, trenching, topsoil or fill scraping, compacting soil or fill, dumping or disturbance of any kind; • Storage of construction materials, equipment, wood, branches, leaves, soil or fill, construction waste or debris of any sort; • Application, discharge or disposal of any substance or chemical that may adversely affect the health of a tree; • Causing or allowing water or discharge, to flow over slopes or through natural areas; • Access, parking or movement of vehicles, equipment or pedestrians; • Cutting, breaking, tearing, crushing, exposing or stripping tree's roots, trunk and branches; • Nailing or stapling into a tree, including attachment of fences, electrical wires or signs; • Stringing of cables or installing lights on trees; • Soil remediation, removal of contaminated fill; • Excavating for directional or micro-tunnelling and boring entering shafts. • Tree protection barriers shall be clearly staked in the field prior to construction to ensure correct positioning of fencing and avoid unnecessary disturbance.	

Impact Type	Potential Effects	Mitigation Measures	Monitoring Activity
		• To avoid root zone impacts on trees to be retained, excavated material shall not be stored against the tree protection barrier.	

Nests of Migratory Birds	Clearing of trees has the potential to disturb or destroy nests of migratory birds.	• To reduce the possibility of contravention of the MBCA, vegetation removal should be scheduled to occur outside of the overall bird nesting season of April 1 to August 31. Some birds may nest before and after this peak bird nesting season due to annual seasonal fluctuations. If a nest of a migratory bird is found within the construction area outside of this nesting period it still receives protection.
		• If vegetation must be removed during the overall bird nesting season:
		  • Nest and nesting activity searches will be conducted in areas defined as simple habitat[8] (i.e., the CUM1-1 community) by a qualified Biologist no more than 24 hours prior to vegetation removal. Nesting activity will be documented when it consists of confirmed breeding evidence, as defined by OBBA criteria (Cadman, 2007).
		  • If an active nest or confirmed nesting activity of a migratory bird is observed in simple habitat, regardless of the timing window recommended, a species-specific buffer area following ECCC guidelines will be applied to the nest or confirmed nesting activity wherein no vegetation removal will be permitted until
			• Regular monitoring, to be defined prior to pre-construction land clearing, will be undertaken to confirm that activities do not encroach into nesting areas or disturb active nesting sites.

[8] Simple habitats refer to habitats that contain few nesting spots or few species of migratory birds, where identification of active nests or confirmed nesting activity can be completed with confidence. According to ECCC (2014), examples of simple habitat include the following:

- Urban parks consisting mostly of lawn with a few isolated trees;
- Vacant lot with few possible nest sites;
- Previously cleared area where there is a lag between clearing and construction activities (and where ground nesters may have been attracted to nest in cleared areas or in stockpiles of soil); or
- Structure such as a bridge, beacon, tower or building (often chosen as a nesting spot by robins, swallows, phoebes, nighthawks, gulls and others).

Impact Type	Potential Effects	Mitigation Measures	Monitoring Activity
		the young have fledged from the nest. The radius of the buffer will depend on species, level of disturbance and landscape context (Environment and Climate Change Canada, 2014),which will be confirmed by a qualified Biologist, but will protect a minimum of 10 m around the nest or nesting activity. • The results of all nest searches will be documented at the end of each survey day in a Technical Memorandum, including information on the searcher, date, time conducted, weather conditions, habitat type, vegetation community type, observations of breeding activity, observations of confirmed nests including co-ordinates, and, if required, the buffer applied to identified breeding/nesting sites. • If vegetation removal must occur in complex habitats within the above-listed timing windows and absolutely cannot be avoided, the same BMPs such as nest and nesting activity searches described above will be undertaken.	
Operation			
Tree Injury	• Deterioration in vitality or a decline in vigour of trees adjacent to the Project could occur over time due to new growing conditions (e.g. sunscald, compaction, root damage, broken branches and TPZ damage)	• Maintenance and seasonal pruning or tree removal to prevent woody material from falling onto the rail corridor, by a Certified Arborist or under the supervision of one.	• Routine inspections to identify dead trees or limbs adjacent to the Project that require removal or maintenance for safety. • Certified Arborist to inspect and assess trees on adjacent lands annually (at a minimum) from the Metrolinx property.
Nests of Migratory Birds	• Pruning of branches or roots or removal of trees during nesting season	• To reduce the possibility of contravention of the MBCA, vegetation removal should be scheduled to occur outside of the overall bird nesting season of April 1 to August 31. Some birds may nest before and after this peak bird nesting season due to annual seasonal fluctuations. If a nest of a	• Regular monitoring (frequency to be defined prior to vegetation removal) will be undertaken to confirm that activities do not encroach into nesting areas or disturb active nesting sites.

Impact Type	Potential Effects	Mitigation Measures	Monitoring Activity

		migratory bird is found within the construction area outside of this nesting period it still receives protection.
		• If vegetation must be removed during the overall bird nesting season:
		  • Nest and nesting activity searches will be conducted in areas defined as simple habitat[9] (i.e., the CUM1-1 community) by a qualified Biologist no more than 24 hours prior to vegetation removal. Nesting activity will be documented when it consists of confirmed breeding evidence, as defined by OBBA criteria (Cadman, 2007).
		  • If an active nest or confirmed nesting activity of a migratory bird is observed in simple habitat, regardless of the timing window recommended, a species-specific buffer area following ECCC guidelines will be applied to the nest or confirmed nesting activity wherein no vegetation removal will be permitted until the young have fledged from the nest. The radius of the buffer will depend on species, level of disturbance and landscape context (Environment and Climate Change Canada, 2014), which will be confirmed by a qualified Biologist, but will protect a minimum of 10 m around the nest or nesting activity.
		  • The results of all nest searches will be documented at the end of each survey day in a Technical Memorandum, including	

[9] Simple habitats refer to habitats that contain few nesting spots or few species of migratory birds, where identification of active nests or confirmed nesting activity can be completed with confidence. According to ECCC (2014), examples of simple habitat include the following:

- Urban parks consisting mostly of lawn with a few isolated trees;
- Vacant lot with few possible nest sites;
- Previously cleared area where there is a lag between clearing and construction activities (and where ground nesters may have been attracted to nest in cleared areas or in stockpiles of soil); or
- Structure such as a bridge, beacon, tower or building (often chosen as a nesting spot by robins, swallows, phoebes, nighthawks, gulls and others).

Impact Type	Potential Effects	Mitigation Measures	Monitoring Activity
		information on the searcher, date, time conducted, weather conditions, habitat type, vegetation community type, observations of breeding activity, observations of confirmed nests including co-ordinates, and, if required, the buffer applied to identified breeding/nesting sites. • If vegetation removal must occur in complex habitats within the above-listed timing windows and absolutely cannot be avoided, the same best management practices (BMPs) such as nest and nesting activity searches described above will be undertaken.	

4.5 Cultural Environment

4.5.1 Overview

There are no cultural heritage landscapes or built heritage resources within or adjacent to the study area with known or potential cultural heritage value or interest.

The Stage 1 AA found that based on the presence of primary water sources (Markham Branch of Highland Creek) and historic transportation routes (Finch Avenue East, Kennedy Road, Midland Avenue and the rail corridor), the property holds potential for the recovery of both pre-contact and post-contact period archaeological resources. While the development of the surrounding lands and the rail corridor resulted in disturbances of lands within the study area, a Stage 2 AA is required to determine the extent of that disturbance where deeply buried archaeological resources may be present, as well as in the areas that have been found to be undisturbed. The Stouffville rail corridor (Uxbridge Subdivision) has been identified as disturbed and no further archaeological assessment will be required.

Figure 3-3 shows areas of archaeological potential requiring Stage 2 AA.

4.5.2 Potential Effects, Mitigation and Monitoring Measures

Potential effects, corresponding mitigation measures and monitoring activities relating to the cultural environment are described in Table 4-4.

Further details on potential effects, mitigation and monitoring are provided in Appendices D and E of this Volume of the EPR.

Table 4-4: Cultural Environment - Potential Effects, Mitigation and Monitoring

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
Construction			
Built and Cultural Heritage	• No known or potential BHRs or CHLs have been identified. No effects to BHRs or CHLs are anticipated from construction.	• Since no effects are anticipated, no mitigation measures for BHRs and CHLs are required for the construction of the Project.	• No monitoring activities are required.
Archaeology	• Potential for the recovery of both pre-contact and post-contact period archaeological resources.	• Areas determined to be undisturbed will be subjected to a Stage 2 AA test pit survey at 5-meter intervals, in accordance with Section 2.1.2 of the 2011 S&G prior to construction activities to ensure no cultural heritage resources will be impacted. • Areas determined to be disturbed do not require further assessment. • Should deeply buried archaeological materials be encountered during construction, all work will cease and a professionally licenced archaeologist will be consulted to assess the cultural heritage value and significance of the archaeological deposits. • If human remains are encountered during project work, all activities must cease immediately and the local police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*. • If final limits of the Finch-Kennedy SmartTrack Station are altered and fall outside the current study area, an additional Stage 1 AA is required to assess the new footprint. • Figure 3-3, in Section 3.4.2 of this EPR Volume, indicates areas of archaeological potential requiring Stage 2 AA. Metrolinx will: • Complete all required AA (Stage 2 and Stage 3 if recommended by the Stage 2AA) as early as possible,	Further AA may identify the need for monitoring during construction.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities

		• Figure 3-3, in Section 3.4.2 of this EPR Volume, indicates areas of archaeological potential requiring Stage 2 AA. Metrolinx will:
		  • Complete all required AA (Stage 2 and Stage 3 if recommended by the Stage 2AA) as early as possible, prior to the completion of detail design, and well in advance of any ground disturbance;
		  • Undertake future work in a manner that protects archaeological sites by conserving them in their original location or through archaeological fieldwork, and endeavour to conserve significant archaeological resources in their original location through documentation, protection, and avoidance of impacts. Where activities could disturb significant archaeological resources or areas of archaeological potential, Metrolinx will take appropriate measures to mitigate impacts; and
		  • Include provisions in contract as recommended by archaeological assessment(s) (e.g. in case archaeological resources are discovered, protection of sites).
		  • All future Stage 2 AA findings will be shared with all First Nations communities that were engaged during the Stage 1 AA process.	

Operation and Maintenance			
Built and Cultural Heritage	• None	• Not applicable (N/A).	• N/A
Archaeology	• None	• N/A	• N/A

4.6 Socio-Economic and Land Use Characteristics

4.6.1 Overview

The Project has the potential to result in temporary and permanent socio-economic effects, including construction-related nuisance effects (e.g., increased noise, vibration, and dust), and visual and aesthetic effects. It is anticipated that potential effects can be mitigated through thoughtful Project design, coupled with effective implementation of mitigation measures.

The Project will bring benefits to existing communities along the Stouffville rail corridor by providing improved access to the GO rail network. The Project is expected to create public benefit by improving public transportation options. The social and economic benefit of public transit is expected to outweigh any negative residual effects. The Project is anticipated to reduce traffic congestion, and promote economic spin offs and redevelopment near the Project. The Project will also provide greater mobility for those without access to, or ability to drive, a car.

4.6.2 Potential Effects, Mitigation and Monitoring Measures

Potential effects, corresponding mitigation measures and monitoring activities relating to the socio-economic and land use environment are described in Table 4-5.

Further details on potential effects, mitigation and monitoring are provided in Appendix F of this Volume.

Table 4-5: Socio-Economic and Land Use Environment - Potential Effects, Mitigation and Monitoring

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
Neighbourhood Characteristics			
Demographics	**During Construction:** • None anticipated at this time.	**During Construction:** • None anticipated at this time.	**During Operations:** • None anticipated at this time.
	During Operations: • Potential future development around the Project and the increased transit accessibility to the study area brought by the Project may bring additional employment and revenue opportunities for local businesses and residents.	**During Operations:** • None anticipated at this time.	**During Operations:** • None anticipated at this time.
Physical Neighbourhood Composition	**During Construction:** • Nearby land uses including community groups and resources, institutional uses and places of worship, recreational uses, parks and open spaces, retail, and residential uses may experience temporary nuisance effects resulting from noise and vibration and emissions due to construction related activities. Should these nuisances be sustained for a prolonged period of time, the physical neighbourhood composition may be slowly altered as a result of individual building related changes and changes in the behaviour of pedestrians moving through the neighbourhood. • Tree and vegetation removal may affect the overall recreational and aesthetic experience of existing and future recreational facility users in the study area, including Kennedy Parkette and East Highland Creek Trail located in close proximity to the Project.	**During Construction:** • A Noise and Vibration Control Plan will be developed prior to construction. The plan will include a complaint response protocol and will indicate that surrounding property owners and tenants will be informed of anticipated upcoming construction works, including any work at night. Mitigation is documented in the Noise and Vibration Impact Assessment in Appendix H of this Volume. • An Air Quality Management Plan will be developed for implementation during construction to address construction equipment and vehicle exhaust, fugitive dust and odour. Mitigation is documented in the Air Quality Impact Assessment in Appendix G of this Volume. • Metrolinx is establishing a Vegetation Compensation Protocol for RER projects. Vegetation that is removed will be compensated for in accordance with this Protocol as documented in the Tree Inventory Plan in Appendix C of this Volume. • All stockpiled materials will be fenced and the construction footprint area will be minimized to prevent the construction zone from extending beyond that which is necessary.	**During Construction:** • Once a detailed construction vibration assessment has been completed, work that may exceed the vibration limits outlined in the City of Toronto bylaw or that may cause structural damage should be monitored. Monitoring is documented in the Noise and Vibration Impact Assessment in Appendix H of this Volume. • Regular inspections of dust emissions (frequency to be defined prior to project construction) will be undertaken to confirm dust control watering frequency and rates are adequate. • Site supervisors should monitor the site for wind direction and weather conditions to ensure that high-impact activities be reduced when the wind is blowing consistently towards nearby sensitive receptors. The site supervisor should also monitor for visible fugitive dust and take action to determine the root-cause in order to counteract this. Specific details regarding monitoring should be included in the Air Quality Management

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
	• Construction may result in the need for temporary road or lane closures changing access to nearby land uses. • The final design of the Project may introduce opportunities for inconsistent design elements such as reducing visibility and creating spaces without character.	• Access to nearby land uses will be maintained. Potentially affected residents, tenants and business owners will be notified of initial construction schedules, as well as modifications to these schedules as they occur. Potential effects to users seeking to access nearby recreational areas such as Kennedy Parkette and East Highland Creek Trail during construction will be mitigated through the installation of appropriate way-finding, regulatory, and warning signs, as per the Construction Traffic Control and Management Plan. Special directional signage may be considered to help pedestrians and cyclists avoid any potential construction activities. At a minimum, safety fencing will be used where necessary to separate work areas from pedestrians and/or cyclists. • Metrolinx will seek to develop an aesthetically pleasing design for public-facing infrastructure in consultation with the City of Toronto and adjacent landowners and through engaging the Metrolinx Design Review Panel. • Crime Prevention Through Environmental Design (CPTED) principles will be used to ensure areas with reduced visibility as a result of the construction of the station will be minimized. Please see below for further details.	Plan. Monitoring is documented in the Air Quality Impact Assessment in Appendix G of this Volume. • On-site inspection and maintenance by an Environmental Inspector will be undertaken on a regular basis (e.g., monthly) or as required (e.g., following storm events) over the course of construction to ensure the effectiveness of ESC and other mitigation measures. Monitoring is documented in the Tree Inventory Plan in Appendix C of this Volume and the Natural Environment Report in Appendix B of this Volume. • Traffic impacts to be monitored in accordance with the Construction Traffic Control and Management Plan.
	During Operations: • Enhanced transit service to the study area may attract development interest and investment in the community and bring additional travel options, further supporting the use of community groups and resources, institutions and places of worship, retail, and recreational uses, parks and open spaces. • Enhanced transit service to the study area may also provide the community with further opportunities to engage in active transportation modes. With the proliferation of active transportation-	**During Operations:** • None at this time.	**During Operations:** • None at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
	related travel, the streetscape may be transformed by the City to further accommodate these sustainable modes of transportation.		

Sensitive Land Uses	**During Construction:**
	• Nearby sensitive land uses may experience temporary nuisance effects resulting from noise and vibration and emissions due to construction equipment and other construction related activities.
		During Construction:
		• A Noise and Vibration Control Plan will be developed prior to construction. The plan will include a complaint response protocol and will indicate that surrounding property owners and tenants will be informed of anticipated upcoming construction works, including any work at night. Mitigation is documented in the Noise and Vibration Impact Assessment in Appendix H of this Volume.
		• An Air Quality Management Plan will be developed for implementation during construction to address construction equipment and vehicle exhaust, fugitive dust and odour. Mitigation is documented in the Air Quality Impact Assessment in Appendix G of this Volume.
			During Construction:
			• Once a detailed construction vibration assessment has been completed, work that may exceed the vibration limits outlined in the City of Toronto bylaw or that may cause structural damage should be monitored. Monitoring is documented in the Noise and Vibration Impact Assessment in Appendix H of this Volume.
			• If a structure falls within the Zone of Influence, the following will be required:
			  • Pre-construction consultations between the applicant and owners/occupants;
			  • Pre-construction measurements of background vibration levels;
			  • Pre-condition survey by means of a photographic record of potentially affected structure façades and all surfaces, including visible sections of building foundations, building cladding, doors, windows, interior wall finishes, surface pavement, sidewalks, signs and trees. Each of the elements should be rated on their general condition (new, good, fair, poor, severe), and visible defects will be photographed; and
			  • A vibration monitoring program to confirm that the Prohibited Construction Vibrations are not exceeded.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
			• Regular inspections of dust emissions (frequency to be defined prior to project construction) will be undertaken to confirm dust control watering frequency and rates are adequate. • Site supervisors should monitor the site for wind direction and weather conditions to ensure that high-impact activities be reduced when the wind is blowing consistently towards nearby sensitive receptors. The site supervisor should also monitor for visible fugitive dust and take action to determine the root-cause in order to counteract this. Specific details regarding monitoring should be included in the Air Quality Management Plan. Monitoring is documented in the Air Quality Impact Assessment in Appendix G of this Volume.
	During Operations: • Nearby sensitive land uses may experience nuisance effects resulting from emissions due to regular operations and maintenance.	**During Operations:** • Operations and maintenance of rail infrastructure will be carried out in accordance with applicable regulations and standards, including the MOEE/GO Transit Noise and Vibration Protocol (Ministry of Environment and Energy and GO Transit, 1994) and the Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning Publication NPC 300 (Ministry of the Environment, 2013). Mitigation requirements are documented in the Noise and Vibration Study in Appendix H of this Volume, and the Air Quality Study in Appendix G of this Volume.	**During Operations:** • None at this time.
Transit and Transportation Network			
Public Transit	**During Construction:** • Potential temporary disruptions to the existing Stouffville rail corridor during construction. • Construction may result in the need for temporary road or lane closures causing	**During Construction:** • Metrolinx will ensure the public is notified in advance of any potential service disruptions. • Site-Specific Construction Traffic Control and Management Plans will be prepared and implemented	**During Construction:** • Traffic impacts to be monitored in accordance with the Construction Traffic Control and Management Plan.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
	access restrictions to local TTC bus routes, particularly as a result of the grade separation.	prior to Project construction to maintain reasonable access through work zones, to the extent possible. • Metrolinx will consult with the TTC to establish a suitable mitigation strategy to be implemented.	
	During Operations: • Provision of new SmartTrack service to nearby residents and workers. The Project is expected to create significant public benefit by providing local access to the regional rail network. • The grade separation will reduce delays for TTC bus services using Finch Avenue East by removing the need to wait at the existing at-grade crossing for trains to pass.	**During Operations:** • None anticipated at this time.	**During Operations:** • None anticipated at this time.
Cycling and Infrastructure Network	**During Construction:** • Cyclist movement within the study area may experience temporary effects as a result of the construction activities of the Project.	**During Construction:** • Potential effects to pedestrian and cycling activities during construction will be mitigated through the installation of appropriate way-finding, regulatory, and warning signs. Special directional signage may be considered to help pedestrians and cyclists avoid any potential construction activities. At a minimum, safety fencing will be used where necessary to separate work areas from pedestrians and/or cyclists. Metrolinx will consult with the City of Toronto to establish a suitable mitigation strategy to be implemented.	**During Construction:** • Cycling network impacts to be monitored in accordance with the Construction Traffic Control and Management Plan.
	During Operations: • The project will result in increased connectivity to the overall cycling network in the study area. • Overall multi-modal connectivity to the wider public transit network will be enhanced and will subsequently encourage cycling in the local neighbourhood. • The grade separation will reduce delays for cyclists using Finch Avenue East by	**During Operations:** • City of Toronto staff should be requested to include, in their 2-year review of the Ten-Year Cycling Network Plan scheduled in 2018, a review of the cycling infrastructure and routes in the vicinity of the Project in order to identify possible improvements to the cycling network (both on-street and on trails) to enhance convenience and safety for cyclists accessing this station. • The provision of tactile strips across the bike lanes in advance of the pedestrian crossing locations,	**During Operations:** • None anticipated at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
	removing the need to wait at the existing at-grade crossing for trains to pass.	supplemented by stop signs and/or other advisory signs, should be provided to advise cyclists of possible pedestrian activity in the area. • Cycling facilities and bike storage should be provided at the Project on both sides of Finch Avenue East to encourage access to the Project by bicycle in a safe and convenient manner. • Traffic control signals should be installed at the Finch Avenue East/Baylawn Drive intersection to facilitate the safe crossing of Finch Avenue by cyclists using the cycling facilities that begin west of Baylawn Drive.	
Movement	**During Construction:** • Construction may result in the need for temporary road or lane closures changing access to nearby land uses. • Pedestrian and cyclist movement within the study area may experience temporary effects during construction. • The construction of the grade separation may temporarily affect access to existing commercial and institutional uses in the study area. Construction may force pedestrians to use a detour.	**During Construction:** • Access to nearby land uses will be maintained. Potentially affected residents, tenants and business owners will be notified of initial construction schedules, as well as modifications to these schedules as they occur. Potential effects to users seeking to access nearby recreational facilities such as Kennedy Parkette and East Highland Creek Trail during construction will be mitigated through the installation of appropriate way-finding, regulatory, and warning signs, as per the Construction Traffic Control and Management Plan. Special directional signage may be considered to help pedestrians and cyclists avoid any potential construction activities. At a minimum, safety fencing will be used where necessary to separate work areas from pedestrians and/or cyclists. Metrolinx will consult with the City of Toronto and the TTC to establish a suitable mitigation strategy to be implemented. • Site-specific Construction Traffic Control and Management Plans will be prepared and implemented prior to Project construction to maintain reasonable access through work zones, to the extent possible, and include construction signage and safety fencing requirements. • Adequate construction hauling routes will be determined in consultation with the City of Toronto.	**During Construction:** • Traffic impacts to be monitored in accordance with the Traffic Control and Management Plan.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
		• It is recommended that temporary construction staging be implemented according to Ontario Traffic Manual (OTM) Book 7 on Temporary Conditions. • Minimize grade separation construction time to the extent feasible.	

	During Operations:
	• Potential increase in pedestrian and vehicle traffic as a result of the Project, as detailed in the Transportation Brief in Appendix I and Section 4.9 of this Volume.
	• The Project will bring increased pedestrian and cyclist access and to the study area by incorporating new sidewalks and cycling lanes into its design.
	• The Project will provide greater mobility for those without access to, or ability to drive a car.
	• The grade separation will benefit overall movement by reducing delays to traffic caused by trains crossing Finch Avenue East. It will also benefit the operation SmartTrack and GO service. Enhanced pedestrian and cycling connectivity will also be provided along Finch Avenue East owing to the grade separation as pedestrians and cyclists will not have to wait at a crossing.
		During Operations:
		• Mitigation recommendations are documented in the Transportation Brief in Appendix I of this Volume (see also Section 4.9 of this Volume). These include:
		  • The introduction of parking/stopping restrictions within the Finch Avenue East underpass to restrict the use of this area for transit service only.
		  • The introduction of No Stopping regulations on Midland Avenue in the vicinity of the proposed east-west access driveway to ensure adequate sightlines, improve operations, and to prohibit informal PPUDO activities from occurring on-street at this location.
		  • The provision of tactile strips across the bike lanes in advance of the pedestrian crossing locations, supplemented by stop signs and/or other advisory signs, to advise cyclists of possible pedestrian activity in the area.
		  • Wayfinding signage and lighting should also be considered and installed around the proposed station.
		  • The Project will be highly accessible by connecting buses on Finch Avenue East with direct access to the station platforms via stairs and elevators from the underpass.
		  • Sidewalks, stairs and elevators will be provided on both sides of Finch Avenue East on two levels as part of the grade separation to provide direct access to both the northbound and southbound platforms.
			During Operations:
			• None anticipated at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
		• Cycling facilities and bike storage will be provided at the Project on both sides of Finch Avenue East to encourage access to the Project by bicycle in a safe and convenient manner. • Traffic control signals should be installed at the Finch Avenue East/Baylawn Drive intersection to facilitate the safe crossing of Finch Avenue by cyclists using the cycling facilities that begin west of Baylawn Drive.	
Utilities			

Utilities	**During Construction:**
	• Utility relocation and/or service interruptions to nearby properties may be required. Protection of utility infrastructure may also be necessary. These effects could be either temporary or permanent.
	• The following potential utility conflicts were identified in the Project footprint at the time of report preparation:
	  • Toronto Hydro
	  • Enbridge Gas Distribution
	  • Bell Canada
	  • Group Telecom
	  • Rogers Cable Communications
	  • CN Signal
	  • City of Toronto sanitary, storm and wastewater
		During Construction:
		• Effects to utilities during construction will be confirmed through detailed design. Additional subsurface utility engineering (SUE) investigations may be conducted during detailed design, as required, to confirm existing utilities. A review of existing and proposed future utilities plans, in addition to on-going consultation with utility companies and the City of Toronto, should be conducted during the detailed design stage.
		• Any relocations, service interruptions, or utility protection projects should be identified as early as possible to allow for project coordination and construction management plans to be created with consideration of utility needs.
		• Utility relocations will be coordinated to minimize the overall impacts on existing natural heritage systems.
			During Construction:
			• None anticipated at this time.

	During Operations: • Access to utilities may require temporary access permission (easements) for maintenance activities.	**During Operations:** • Potential access requirements as a result of maintenance activities to be determined in consultation with the relevant utility owners during detailed design.	**During Operations:** • None anticipated at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
		• Any utility conflicts are anticipated to have been identified and resolved prior to the construction stage of the Project. Subsequently, no further mitigation strategies related to utilities are anticipated to be required during the operational stage.	
Property			

Property	**During Construction:**
	• The Project includes new platforms, tunnels, the secondary access road to the north of Finch Avenue East, and other associated structures. Property requirements will be confirmed as part of the detailed design process.
	• Temporary use of adjacent lands may be required for construction purposes (e.g., access, establishment of equipment storage/staging/laydown areas, stockpiling of materials).
	• The acquisition of non-Metrolinx owned property is required to implement the Project, as defined in the IPD. Property requirements are anticipated to comprise of the following:
	  • Full property takings - none.
	  • Partial property takings:
	  ▪ Private - 0.10 ha
	  ▪ Public - 0.13 ha
	  • Temporary full property takings - none.
	  • Temporary partial property takings - none.
	  • Other real estate considerations:
	  ▪ Private - 0.66 ha
	  ▪ Public - 1.26 ha
	• Other real estate considerations are anticipated to include lands for bike trails, station adjacent infrastructure, and other
		During Construction:
		• Specific property requirements will be determined during detailed design. Ongoing consultation with affected property owners will help identify appropriate site-specific mitigation measures. Where access to property is required, ongoing consultation with affected landowners will help identify appropriate site-specific mitigation measures. Communications with stakeholders to identify local and site-specific issues may include discussions on topics such as:
		  • Construction access;
		  • Road closures/realignments;
		  • Construction schedule; and
		  • Enquiries/complaint procedures.
		• The effects to properties will be mitigated by providing fair market value compensation in accordance with applicable laws and through negotiations with affected property owners. At this time, the final design of the Project is not available and these requirements will be addressed at future stages of the project. Appropriate agreements will be executed.
		• Temporary use of adjacent lands will be managed through the use of construction easements or temporary limited interests (TLIs).
			During Construction:
			• None anticipated at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
	City initiatives. The construction of the grade separation may temporarily affect access to existing commercial and institutional uses in the study area.		
	During Operations: • The grade separation will remove direct access from Finch Avenue East to properties located on the north side of the road between the Stouffville rail corridor and Baylawn Drive. • There is potential for an increase in property values for properties located in proximity to the Project due to an increase in transit service. • Temporary access to adjacent properties may be required for maintenance activities.	**During Operations:** • A secondary access road will be constructed to the north of Finch Avenue East to provide access to the Project and to properties where direct access from Finch Avenue East is being removed. The location of the secondary access road may be refined as design progresses and consultation will occur with affected property owners regarding the location of the secondary access road. • Consultation and agreements with adjacent property owners will be obtained where temporary access is needed for maintenance activities.	**During Operations:** • None anticipated at this time.
Visual Characteristics			

Site and Surroundings	**During Construction:**
	• Temporary visual and aesthetic effects may be experienced as a result of temporary storage sites for equipment, staging/laydown areas, stockpiling of materials and other construction activities.
	• Tree and vegetation removal may pose undesirable aesthetic effects to the surrounding land uses.
		During Construction:
		• Construction schedule delays will be avoided to the extent possible in order to minimize the duration of construction and corresponding visual impacts.
		• Metrolinx is establishing a Vegetation Compensation Protocol for RER projects. Vegetation that is removed will be compensated for in accordance with this Protocol as documented in the Tree Inventory Plan in Appendix C of this Volume, and the Natural Environment Report in Appendix B of this Volume.
		• Additional potential mitigation measures include:
		  • Provide a screened enclosure for the development site, with particular attention to the waste disposal and material storage areas.
		  • Provide temporary lighting and wayfinding signs and cues that help people navigate the public realm around the construction site.
		  • Consider improving the aesthetic quality of the enclosure with graphics and/or artistic images that
			During Construction:
			• None anticipated at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
		create visual interest for those viewing from the public realm and neighbouring lands. • The design considerations for buffers and screening of nuisances or unwanted effects should: ▪ Be appropriately located to obscure the view and access to the nuisances or unwanted impact; and ▪ Be designed to be relative to the magnitude of the nuisance or unwanted impact. • Provide temporary landscaping along the borders of the construction site between site fencing/enclosure and walkways, where space allows.	
	During Operations: • The Project may have a visual impact upon existing and proposed development.	**During Operations:** • Metrolinx will seek to develop an aesthetically pleasing design for public-facing infrastructure in consultation with the City of Toronto and adjacent landowners and through engagement with the Metrolinx Design Review Panel.	**During Operations:** • None anticipated at this time.
Built Form	**During Construction:** • None anticipated at this time.	**During Construction:** • None anticipated at this time.	**During Construction:** • None anticipated at this time.
	During Operations: • The visual/aesthetic effects of the completed site will depend upon a variety of characteristics including: form of the development (massing, height, relationship to neighbouring land uses and the public realm); building façade materials; fenestration and visual permeability; landscape design; and lighting (functional and decorative). The aesthetic quality and effects of the completed Project will be the result of a combination of landscaping; compatible building massing, façade design and detailing; and public realm design.	**During Operations:** • A lighting plan should be developed where the quality of light produced, and type of light sources used on the exterior of buildings, signs, pedestrian walkways, and other areas of the site, are compatible with, and appropriate to the overall design and use of the site. Mitigation measures may include: • External visors on floodlights; • Optimal light location, height and settings; • Light shields such as walls of hedges; • Various intensities and control of lighting of the Project for different scenarios; and • Shielded fixtures with efficient light bulbs surrounding the Project.	**During Operations:** • None anticipated at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation

	• This project may spur an improvement in the visual environment compared to what exists today, by providing improved street lighting and public visibility.
	• Light spillage effects may occur from lighting at the Project required for both the station itself, as well as ancillary infrastructure. Light reflected on trains at night may increase light spillage into adjacent properties.
		• Additional potential mitigation measures include:
		  • Blank walls that are adjacent to gathering areas, outdoor amenity spaces, and pedestrian walkways should have aesthetic character improved with any combination of architectural detailing, landscape features, art, or other elements that provide visual relief and interest.
		  • Paving should be reduced to the minimum necessary to accomplish site circulation with other areas set aside for landscaping or pedestrian zones as needed.
		  • The landscape design should add visual interest, define pedestrian zones, and provide visual screens and buffers for incompatible uses.	

Public Realm	**During Construction:** • Adverse effects may arise from the presence of construction materials; equipment; modular construction trailers for housing on-site offices and facilities, which will either temporarily eliminate the public realm or impede access to it. • Potential impact to ability of individuals to use and move through the study area during construction.	**During Construction:** • Provide well connected, clearly delineated, and appropriately signed walkways and cycling route options. • Provide temporary lighting and wayfinding signs and cues for navigation around the construction site. • Safety fencing will be used where necessary to separate work areas from pedestrians and/or cyclists. • All stockpiled materials will be fenced and the construction footprint area will be minimized to prevent the construction zone from extending beyond that which is necessary.	**During Construction:** • None anticipated at this time.
	During Operations: • It is expected that the Project and accompanying increases in connectivity will promote improvements to the public realm. • Longer-term increased ability for individuals to travel to and through the public realm in the vicinity of the Project.	**During Operations:** • The landscape design and public realm features should add visual interest, define pedestrian zones, distinguish private and public realms, delineate different spaces and use areas on site, contribute to comfort and health of users, provide visual screens and buffers for incompatible uses. • The overall site design and station architecture should provide necessary infrastructure and the careful arrangement of uses to accordingly provide for accessibility throughout.	**During Operations:** • None anticipated at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
Crime Prevention Through Environmental Design	**During Construction:** • None anticipated.	**During Construction:** • None anticipated at this time.	**During Construction:** • None anticipated at this time.
	During Operations: • The Project is considered to be supportive in further activating land uses in the study area by increasing pedestrian traffic, and bringing new customers in via transit.	**During Operations:** • CPTED principles will be used to ensure areas with reduced visibility as a result of the construction of the Project will be minimized. • The building façade materials and fenestration should allow for passive surveillance and be fitting with the context of the neighbouring uses. • The site design should integrate uses, transportation facilities, landscape elements, public spaces and buildings in such a way that they support safe, efficient, and comfortable use.	**During Operations:** • None anticipated at this time.
Policy Context - Zoning			
Provincial Policies	**During Construction:** • None anticipated.	**During Construction:** • None anticipated at this time.	**During Construction:** • None anticipated at this time.
	During Operations: • The Project achieves policy objectives as outlined in the Provincial Policy Statement, the Growth Plan for the Greater Golden Horseshoe, and the Metrolinx Regional Transportation Plan.	**During Operations:** • None anticipated at this time.	**During Operations:** • None anticipated at this time.
Municipal Policies	**During Construction:** • None anticipated	**During Construction:** • None anticipated at this time.	**During Construction:** • None anticipated at this time.
	During Operations: • The project is considered to be supportive of the Official Plan and zoning objectives of the area.	**During Operations:** • Metrolinx, as a Provincial Crown Agency, is not generally subject to municipal permitting and approval requirements; regardless, Metrolinx works in co-operation with local municipalities to adhere to the intent of the relevant permit/approval requirements to the extent possible.	**During Operations:** • None anticipated at this time.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Recommendation
Current Development Applications			
Current Development Applications	**During Construction:** • Potential effects to the development proposed at 4140 Finch Avenue East will be confirmed as design progresses. • No further direct effects to the lands that are under development application within the surrounding area are anticipated during the construction of the Project.	**During Construction:** • To be confirmed as design progresses.	**During Construction:** • To be confirmed as design progresses.
	During Operations: • Implementation of the Project may make the area more attractive for new growth and development.	**During Operations:** • None anticipated at this time.	**During Operations:** • None anticipated at this time.

4.7 Air Quality

4.7.1 Overview

The Project's air quality impacts were predicted at a selection of representative sensitive receptors within the study area, as shown in Figure 4-1.

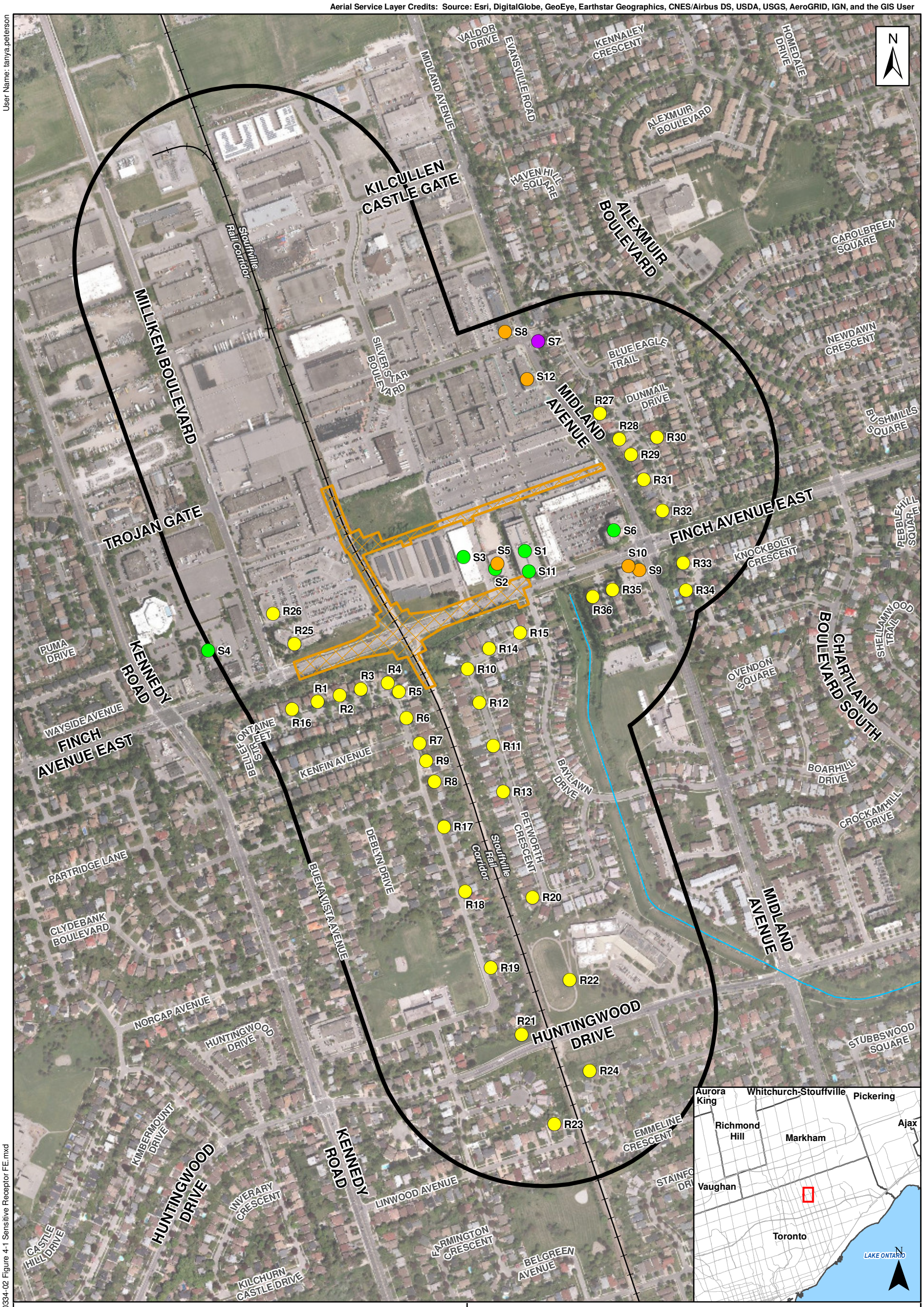
The modelling results for the selected COCs for the most impacted sensitive receptor are reported in Table 4-6. For most COCs, the residential receptor #4 (R4), located at 99 Bellefontaine Street, 130 m southwest of the station is the most impacted receptor. For CO, the sensitive receptor S3 located at 4140 Finch Avenue East (near the access road), is the most impacted receptor for the eight-hour average concentrations. More detail about the most impacted receptor for each COC is available in Appendix G.

Table 4-6 shows the changes in air quality due to the development of the Project. The comparison of the modelling results between the 2028 Full-Build Scenario and 2028 No-Build Scenario shows the impacts on local air quality due to the introduction of the Project. The increase observed in Table 4-6 in concentrations of COCs from the No-Build Scenario to Full-Build Scenario is due to the operation of the bus lay-by facilities and secondary access road. The increase is not substantial and the 2028 Full-Build modelling results are below air quality thresholds. The Station is anticipated to contribute to improved regional air quality by eliminating passenger cars from the roads, which is not assessed within this localized AQIA.

Figure 4-1: Sensitive Receptors

Aerial Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

User Name: tanya.peterson



Legend

- Study Area
- Proposed Project Footprint (approximate)
- Railway
- Permanent Watercourse

Sensitive Receptor

- DayCare
- Educational Facility
- Medical Facility
- Residential

0 50 100 200 300 Metres

DATA SOURCES:

Roads and Railways - Ontario Open Data Catalogue
Watercourses - Land Information Ontario
Station Footprint - Initial Preferred Designs

Project:	**New SmartTrack Stations**
Figure Title:	**Finch-Kennedy SmartTrack Station - Air Quality Sensitive Receptor Locations**
Prepared By:	4TRANSIT PARSONS HATCH WSP
Date:	**June 21 2018**
Version: FE.AQ.90-1	**Review:**
Figure:	**4-1**

Document Path: T:\17M-00334-02\MXD\Vol 3\17M-00334-02 Figure 4-1 Sensitive Receptor FE.mxd

Table 4-6: Summary of COC Concentrations at the Most Impacted Sensitive Receptor (Project-Specific Impacts)

COC	Averaging Period	Curent 2017 Conditions (µg/m³)	Future 2028 No-Build (µg/m³)	Future 2028 Full-Build (µg/m³)	Air Quality Threshold (µg/m³)
NO_2	1 h	0.1131	0.0000	3.92565	79 400
	24 h	0.0498	0.0000	1.69238	200
	Annual	0.0126	0.0000	0.49149	22.6
CO	1 h	0.0045	0.0000	1.3979	36200
	8 h	0.0034	0.0000	1.0447	15700
$PM_{2.5}$	24 h	0.001	0.0000	0.44701	27
	Annual	0.0001	0.0000	0.12961	8.8
Acetaldehyde	30 min	0.00005	0.0000	0.01790	500
	24 h	0.00002	0.0000	0.00643	500
Acrolein	1 h	0.0002	0.0000	0.00249	4.5
	24 h	0.0001	0.0000	0.00107	0.4
Benzene	24 h	0.0002	0.0000	0.00133	2.3
	Annual	0.0000	0.0000	0.00039	0.45
1,3-Butadiene	24 h	0.0000	0.0000	0.00032	10
	Annual	0.0000	0.0000	0.00009	2
Benzo(a)pyrene	24 h	0.0000	0.0000	0.00000	0.00005
	Annual	0.0000	0.0000	0.00000	0.00001
Formaldehyde	24 h	0.0010	0.0000	0.01692	65

The cumulative impacts due to the Project were calculated by aggregating the Project-specific modelling results with the 90th percentile ambient background concentrations. As shown in Table 4-7, the cumulative air quality impacts of the Project are predicted to be below the air quality thresholds, with the exception of annual NO_2, annual benzene and annual and 24 h benzo(a)pyrene, which already exceed the air quality thresholds from the 90th percentile ambient background concentrations.

Although improvements in mobile vehicle technology, fuel efficiency and exhaust control efficiency are anticipated between now and 2028, the emission sources at the Station (which include the bus lane and secondary access road), in close proximity to the assessed receptors will result in an elevation of COC concentrations in the study area. This increase is not substantial and the Full-Build Scenario modelling predicted concentrations and cumulative concentrations are below air quality thresholds, with the exception of the COCs with elevated ambient background levels. The Project is predicted not to have an adverse effect on air quality within the study area.

Table 4-7: Summary of COC Concentrations at the Most Impacted Sensitive Receptor (Cumulative Impacts[10])

COC	Averaging Period	Background Values (µg/m³)	Current 2017 Cumulative Concentrations	Future 2028 No-Build Cumulative Concentrations	Future 2028 Full-Build Cumulative Concentrations	Air Quality Threshold (µg/m³)	Percent of Threshold 2017	Percent of Threshold 2028 No-Build	Percent of Threshold 2028 Full-Build
NO_2	1 h	48.1	48.2	48.1	52.1	79 400	12.1%	60.9% 12.0%	65.9% 13.0%
	24 h	40.3	40.3	40.3	42.0	200	20.2%	20.1%	21.0%
	Annual	**29.0**	**29.01**	**29.0**	**29.49**	22.6	**128.4%**	**128.3%**	**130.4%**
CO	1 h	435.1	435.1	435.1	436.4	36200	1.2%	1.2%	1.2%
	8 h	435.1	435.1	435.1	436.1	15700	2.8%	2.8%	2.8%
$PM_{2.5}$	24 h	15.9	15.9	15.9	16.3	27	58.7%	58.7%	60.4%
	Annual	7.55	7.55	7.55	7.68	8.8	85.8%	85.8%	87.3%
Acetaldehyde	30 min	1.6	1.6	1.6	1.6	500	0.3%	0.3%	0.3%
	24 h	1.6	1.6	1.6	1.6	500	0.3%	0.3%	0.3%
Acrolein	1 h	0.24	0.2	0.2	0.2	4.5	5.3%	5.3%	5.4%
	24 h	0.24	0.2	0.2	0.2	0.4	60.0%	60.0%	60.3%
Benzene	24 h	0.9	0.9	0.9	0.9	2.3	39.1%	39.1%	39.2%
	Annual	**0.6**	**0.6**	**0.6**	**0.6**	0.45	**133.3%**	**133.3%**	**133.4%**
1,3-Butadiene	24 h	0.09	0.09	0.09	0.09032	10	0.9%	0.9%	0.9%
	Annual	0.06	0.06	0.06	0.06009	2	3.0%	3.0%	3.0%
Benzo(a)pyrene	**24 h**	**0.00012**	**0.00012**	**0.00012**	**0.00012**	0.00005	**240.0%**	**240.0%**	**240.0%**
	Annual	**0.00007**	**0.00007**	**0.00007**	**0.00007**	0.00001	**700.0%**	**700.0%**	**700.0%**
Formaldehyde	24 h	4.2	4.2	4.2	4.2	65	6.5%	6.5%	6.5%

[10] Cumulative concentrations represent the credible worst-case predictions

4.7.2 Potential Effects, Mitigation and Monitoring Measures

Potential effects, corresponding mitigation measures and monitoring activities relating to air quality are described in Table 4-8.

Further details on potential effects, mitigation and monitoring are provided in Appendix G of this Volume.

Table 4-8: Air Quality - Potential Effects, Mitigation and Monitoring

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Activity
Construction			

Air Quality	• Air emissions associated with construction activities may include:
	  • Total Suspended Particles (TSP), Particulate Matter less than 10 µm (PM_{10}) and Fugitive dust emissions resulting from:
	  • Stockpiling of soils and other friable materials.
	  • Granular material loading and unloading activities.
	  • Transportation of soils and other friable materials via dump trucks.
	  • Soil excavation and filling activities required for the new station;
	  • Movement of heavy and light vehicles on paved and unpaved roads;
	  • Demolition of structures necessary to accommodate the new station; and
	  • Cutting of existing concrete.
	• Emissions resulting from the combustion engines of construction equipment (COCs, and GHG emissions).
		• An Air Quality Management Plan will be developed for implementation during construction to address construction equipment and vehicle exhaust, fugitive dust and odour. Potential mitigation measures that may be included in the Air Quality Management Plan include:
		  • Dust suppression measures (e.g., application of water wherever appropriate, or the use of approved non-chloride chemical dust suppressants, where the application of water is not suitable) will conform to recognized standard specifications such as the Cheminfo Services Inc. March 2005 publication "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" prepared for Environment Canada;
		  • Use of dump trucks with retractable covers for the transport of soils and other friable materials;
		  • Minimize the number of loadings and unloading of soils and other friable materials;
		  • Minimize drop heights, use enclosed chutes, and cover bins for debris associated with deconstruction of affected structures;
		  • Washing of equipment and/ use of mud mats where practical at construction site exits to limit the migration of soil and dust off-site;
		  • Dust monitoring in locations where it has been determined that a particulate bound contaminant of concern exists in native soil;
		  • Stockpiling of soil and other friable materials in locations that are less exposed to wind (e.g., protected from the wind by suitable barriers or wind fences/screens, or covered when long-term storage is required) and away from sensitive receptors to the extent possible;
			• Construction activities will be monitored by a qualified Environmental Inspector who will frequently review the efficacy of the mitigation measures and construction best management practices to confirm they are functioning as intended. In the event that mitigation is found to not be effective, revised mitigation measures designed to improve effectiveness will be implemented. Dust levels will be monitored to assess the effectiveness of dust suppression measures, and suppression measures will be adjusted as required. Monitoring will continue throughout the construction phase until activities are complete, exposed soils have been stabilized, and construction waste has been removed from site.
			• A complaint response protocol for nuisance effects such as dust will be established.
			• Site supervisors should monitor the site for wind direction and weather conditions to ensure that high-impact activities be reduced when the wind is blowing consistently towards nearby sensitive receptors. The site supervisor should also monitor for visible fugitive dust and take action to determine the root-cause in order to counteract this. Specific details regarding monitoring should be included in the Air Quality Management Plan.

Feature	Description of Potential Effect	Mitigation Measures	Monitoring Activity
		• Reduction of unnecessary traffic and implementation of speed limits; • Permanent stabilization of exposed soil areas with non-erodible material (e.g., stone or vegetation) as soon as practicably possible after construction in the affected area is completed; • Ensuring that all construction vehicles, machinery, and equipment are equipped with current emission controls, which are in a state of good repair; and • Dust-generating activities should be minimized during conditions of high wind.	
Operations and Maintenance			
Air Quality	• During the operation of the Project, there are minimal predicted impacts to air quality. The areas surrounding the station structures are naturally ventilated, so there is minimal risk to human exposure to COCs. Roadway dust, emergency generator exhausts (greenhouse gases (GHGs) and COCs), and any air handling equipment (GHG and COCs) for conditioned spaces are also potential sources of operation air emission sources. • Air emissions will be generated by the combustion engines of passenger vehicles along the secondary access road area and from the buses lanes. • Air emissions will also be generated by the combustion engines of emergency generators located at the Project (COCs and GHG emissions). • Air emissions from the combustion of natural gas in heating and ventilation equipment located at the Project (COCs, and GHG emissions).	• Operations and maintenance of rail infrastructure will be carried out in accordance with applicable regulations and standards. Required approvals, including MOECC Environmental Activity and Sector Registry (EASR) and Environmental Compliance Approval (ECA), will be obtained as applicable. • To improve air quality around the station during maintenance and operation, several measures can be implemented, such as: • Improve walkways and trail connections to the station to increase the number of passengers that are walking or cycling to access the station; • Ensure fleet vehicles are properly maintained and kept in good working condition in terms of engine emission tune-ups; • Testing of any standby emergency generators to occur for minimum duration and testing to be conducted one generator at a time, where applicable; and • Adherence to EASR recommendations for exempt equipment (per O. Reg. 524/98) that has minimal air quality impacts, as well as obtain an EASR registration for station equipment as required (O. Reg.419/05 and Reg.1/17).	• Metrolinx maintains ongoing inspection schedules to monitor the effectiveness of its GO Transit operations. A complaints procedure is in place during operations to address any concerns raised by neighbouring land owners, municipalities, or the public-at-large.

4.8 Noise and Vibration

4.8.1 Overview

Sensitive receptors within the identified NSAs were selected based on the geographical and land use context in the vicinity of the Project. Sensitive receptor locations and NSAs are shown in Figure 4-2.

Construction noise levels were predicted as per the Roadway Construction Noise Model methodology contained in the FTA Transit Noise and Vibration Impact Assessment publication (Federal Transit Administration, 2006). The sound levels at the receptor locations for each piece of equipment were then summed to determine the overall construction sound levels at each identified noise receptor. Table 4-9 presents the predicted construction sound levels at each receptor.

Construction sound levels are not expected to exceed the FTA criteria for any receptors.

Table 4-9: Construction Noise Impact Assessment

Receptor	Daytime Criterion, L_{eq} 1hr (dBA)	Nighttime Criterion, L_{eq} 1hr (dBA)	Daytime/Nighttime Predicted Sound Level, L_{eq} 1hr (dBA)	Exceeds Criterion?
R1	90	80	69	No
R2	90	80	70	No
R3	90	80	71	No
R4	90	80	71	No
R5	90	80	69	No
R6	90	80	66	No
R7	90	80	65	No
R8	90	80	69	No
R9	90	80	70	No
R10	90	80	67	No
R11	90	80	67	No
R12	90	80	65	No
R13	90	80	63	No
R14	90	80	72	No

Table 4-10 presents the predicted operations sound levels for all three scenarios. There are currently 5 m high noise barriers along the rail corridor from Finch Avenue East to Huntingwood Drive. All the modelled scenarios include these noise barriers.

The term “below objective” is noted in Table 4-10 in cases where the daytime (i.e., 07:00 to 23:00 hours) L_{eq} (16 hrs) produced by future rail service operation of the GO Transit project under assessment, does not exceed the higher of:

a. The ambient sound level (combined with the sound level from existing rail service); or

b. 55 dBA.

During night-time hours (i.e., 23:00 to 07:00 hours), “below objective” is noted when the L_{eq} (8 hrs) produced by the future rail service operation of the GO Transit project does not exceed the higher of:

a. The ambient sound level (combined with the sound level from existing rail service); or

b. 50 dBA.

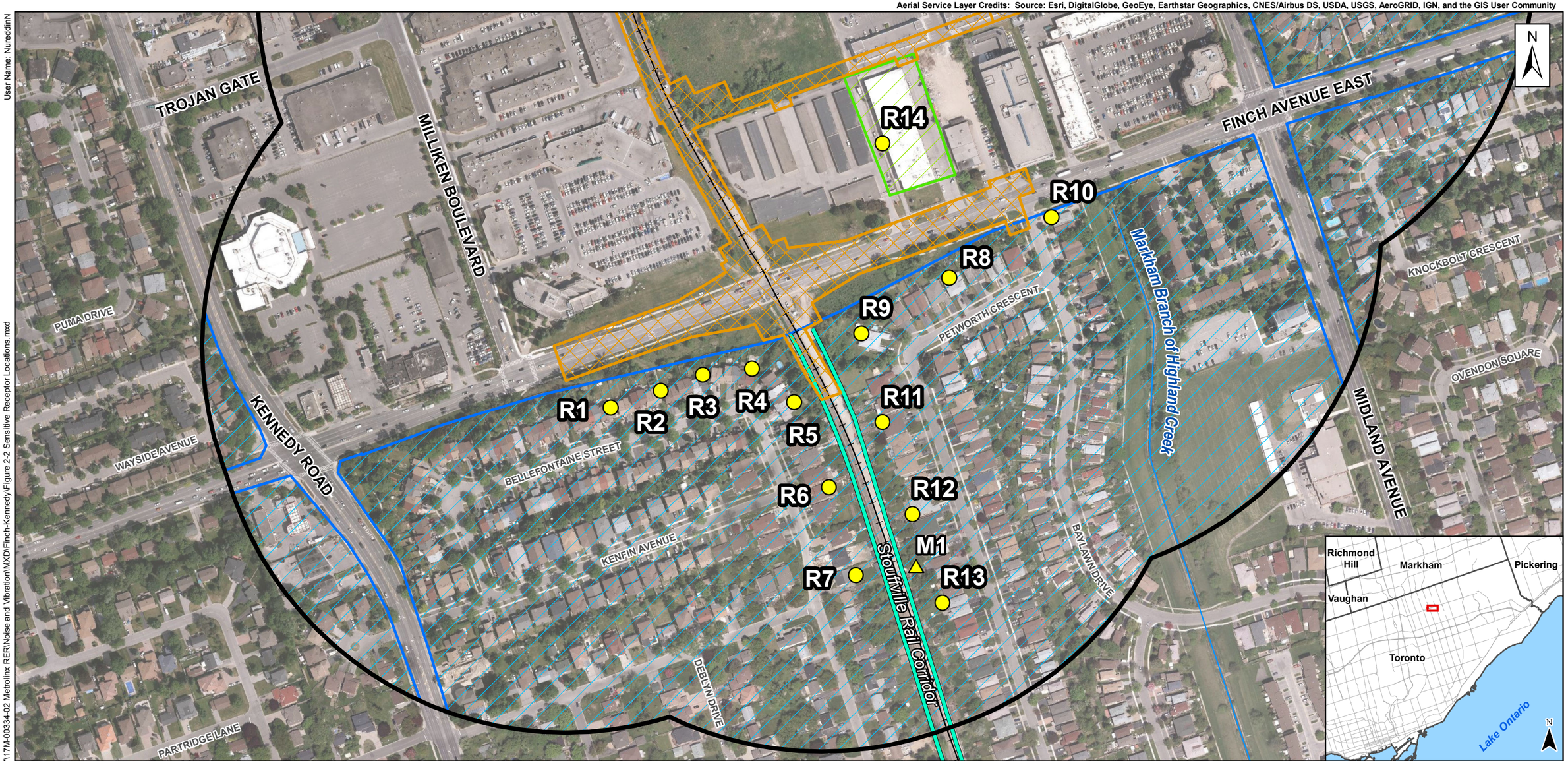
Table 4-10: Operations Noise Impact Assessment

Receptor	Period (1)	Predicted Sound Levels (dBA)			Adjusted Impact Level (4)	Adjusted Impact Rating	Investigate Mitigation?
		Sc. 1 Existing	Sc. 2 Without Project (2)	Sc. 3 With Project (3)			
R1	Daytime	61.2	62.8	62.9	+0.1	Insignificant	No
	Nighttime	51.7	54.7	54.9	+0.2	Insignificant	No
R2	Daytime	61.0	62.4	62.4	0.0	Insignificant	No
	Nighttime	51.4	55.4	55.5	+0.1	Insignificant	No
R3	Daytime	60.8	63.1	63.0	-0.1	Insignificant	No
	Nighttime	51.1	56.0	56.2	+0.2	Insignificant	No
R4	Daytime	59.9	63.5	63.2	-0.3	Insignificant	No
	Nighttime	50.8	58.2	58.3	+0.1	Insignificant	No
R5	Daytime	55.9	60.3	59.9	-0.4	Insignificant	No
	Nighttime	47.4	55.9	55.7	-0.2	Insignificant	No
R6	Daytime	53.1	57.9	57.4	-0.5	Insignificant	No
	Nighttime	44.4	51.1	50.8	-0.3	Insignificant	No
R7	Daytime	49.0	53.8	53.4	-	Below Objective	No
	Nighttime	38.4	48.7	49.2	-	Below Objective	No
R8	Daytime	62.2	63.5	63.6	+0.1	Insignificant	No
	Nighttime	52.8	55.1	55.2	+0.1	Insignificant	No
R9	Daytime	58.5	61.6	61.5	-0.1	Insignificant	No
	Nighttime	48.2	55.8	56.2	+0.4	Insignificant	No
R10	Daytime	63.4	64.7	64.8	+0.1	Insignificant	No
	Nighttime	52.4	54.4	54.5	+0.1	Insignificant	No
R11	Daytime	54.1	57.4	57.3	-0.1	Insignificant	No
	Nighttime	43.7	51.8	51.9	+0.1	Insignificant	No
R12	Daytime	53.1	56.1	55.9	-0.2	Insignificant	No
	Nighttime	42.5	49.9	49.7	-	Below Objective	No
R13	Daytime	48.6	52.9	52.8	-	Below Objective	No
	Nighttime	40.9	48.2	48.1	-	Below Objective	No
R14	Daytime	57.0	58.0	58.1	+0.1	Insignificant	No
	Nighttime	45.4	48.8	48.9	-	Below Objective	No

(1) Daytime is defined as the 16-hour period from 07:00-23:00 (Leq 16), and nighttime as the 8-hour period from 23:00-07:00 (Leq 8).
(2) 10-year train volume forecasts with electrification.
(3) 10-year train volume forecasts with electrification and with Project.
(4) Scenario 3 minus Scenario 2.

Figure 4-2: Sensitive Receptor Locations

Aerial Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Study Area - 300 Metres
- Proposed Project Footprint (approximate)
- Railway
- Permanent Watercourse
- Intermittent Watercourse
- Existing Barrier
- Receptor
- Monitoring Location
- Proposed Development Noise Sensitive Area
- Existing Noise Sensitive Area

0 60 120 240 360 Metres

DATA SOURCES:

Roads and Railways - Ontario Open Data
Watercourses - Land Information Ontario
Project Footprint - Initial Preferred Designs
TTC Data - Toronto Open Data Catalogue
Receptor Data - WSP

Project:	**New SmartTrack Stations**		
Figure Title:	**Finch-Kennedy SmartTrack Station - Noise and Vibration Sensitive Receptor Locations**		
Prepared By:	4TRANSIT PARSONS HATCH WSP	**Date:**	**June 21 2018**
Version: FE.NV.95-3	**Review:**	**Figure:** 4-2	

User Name: NureddinN

Document Path: J:\1442 Projects by Job Number\2017\17M-00334-02 Metrolinx RER\Noise and Vibration\MXD\Finch-Kennedy\Figure 2-2 Sensitive Receptor Locations.mxd

Based on the results summarized in Table 4-10, all receptors experience insignificant adjusted noise impact ratings. Additional noise mitigation and monitoring is not warranted.

Vibration levels were predicted using the methodology contained in the FTA Transit Noise and Vibration Impact Assessment publication (Federal Transit Administration, 2006).

Table 4-11 shows the two most impactful pieces of equipment and resulting Zone of Influence. It is noted that pile driving is not expected to occur during construction.

Table 4-11: Construction Vibration Zone of Influence

Equipment	Reference Peak Particle Velocity at 7.6 m (mm/s)	Zone of Influence (m)
Auger-Piling/Caisson Drilling	2.26	4.5
Vibratory Roller	5.33	8.0

Table 4-12 lists all properties that are less than 8 m away from the proposed construction zone (i.e., within the Zone of Influence).

Table 4-12: Structures within the Vibration Zone of Influence

Municipal Address	Distance from Construction Zone (m)
3250 Midland Avenue	0.0 (Adjacent to construction zone)
3260 Midland Avenue	0.0 (Adjacent to construction zone)
3262 Midland Avenue	0.0 (Adjacent to construction zone)
4120 Finch Avenue East	0.0 (Adjacent to construction zone)
4140 Finch Avenue East	0.0 (Adjacent to construction zone)
4168 Finch Avenue East	0.0 (Adjacent to construction zone)
4188 Finch Avenue East	5.6
17 Milliken Boulevard	7.3
27 Milliken Boulevard	7.0

Table 4-13 shows the measured and Project (year 2028) vibration levels for GO train pass-bys. Vibration levels at all receptors are expected to decrease after implementation of the Project. This is expected as trains would be travelling at slower speeds than existing conditions to service the Project.

Table 4-13: Operations Vibration Impact Assessment

Receptor	Objective Vibration Levels (mm/s) (1)(2)	Predicted Vibration Levels (mm/s) (1)	Exceeds Objective by more than 25%?	Investigate Mitigation?
R1	0.14	0.0021	No	No
R2	0.14	0.0026	No	No
R3	0.14	0.0036	No	No
R4	0.14	0.0063	No	No
R5	0.14	0.0115	No	No
R6	0.14	0.0120	No	No
R7	0.14	0.0095	No	No
R8	0.14	0.0024	No	No
R9	0.14	0.0068	No	No
R10	0.14	0.0014	No	No
R11	0.14	0.0087	No	No
R12	0.14	0.0104	No	No
R13	0.14	0.0077	No	No
R14	0.14	0.0021	No	No

(1) Root-mean-square particle velocity
(2) Highest value between the Protocol objective vibration velocity of 0.14 mm/s, or measured vibration velocity.

4.8.2 Potential Effects, Mitigation and Monitoring Measures

Potential effects, corresponding mitigation measures and monitoring activities relating to noise and vibration are described in Table 4-14.

Further details on potential effects, mitigation and monitoring are provided in Appendix H of this Volume.

Table 4-14: Noise and Vibration - Potential Effects, Mitigation and Monitoring

Feature / Location of Potential Effect	Description of Potential Effect	Mitigation Measure	Monitoring Activity
Noise - Construction			
Representative receptors shown in Figure 4-2	• Temporarily Increased Sound Levels due to Construction.	• A Noise and Vibration Control Plan must be developed prior to construction. The plan will include a complaint response protocol and will indicate that surrounding property owners and tenants will be informed of anticipated upcoming construction works, including any work at night. • A more detailed noise assessment of construction should be completed when the specifics of construction equipment are finalized, prior to construction start. This assessment should consider minimizing construction-related noise levels, while balancing construction schedules and expediting construction activity. • Trains passing construction zones may be required to use bells and/or whistles to warn construction personnel for safety reasons. This should be minimized as much as practical while promoting safety. • Construction equipment has safety features such as backup alarms (beeping sound). This is for the protection and safety of workers. Consideration will be given to the use of broadband rather than tonal backup beepers. • Construction should adhere to the City of Toronto noise by-laws (Noise Control By-Law, Municipal Code Chapter 591, By-law 1400-2007), summarized in Appendix H to the extent possible. • To the extent possible, nighttime construction activities should be avoided to reduce the potential impact of construction noise. Certain types of construction work can only be completed when trains are not in service (i.e., outside of business hours). Construction should be planned to minimize the number of nights where noisy nighttime construction activities may be required. • All construction equipment used should be in good repair and properly maintained to limit noise emissions. All construction equipment should be operated with effective muffling devices that are in good working order and idling of construction equipment kept to a minimum to reduce noise from construction activities. Unnecessary noise caused by faulty or non-operating components shall be addressed by regularly maintaining all equipment. • Noise emissions from construction equipment are to be in compliance with the limits set out in NPC-115 and NPC-118.	• None anticipated to be required at this time.
Noise - Operations			
Representative receptors shown in Figure 4-2	• Insignificant impacts.	• None.	• None.

Feature / Location of Potential Effect	Description of Potential Effect	Mitigation Measure	Monitoring Activity
Vibration - Construction			

Representative receptors shown in Figure 4-2	• Increased vibration levels.	• A Noise and Vibration Control Plan will be developed prior to construction. The plan will include a complaint response protocol and will indicate that surrounding property owners and tenants will be informed of anticipated upcoming construction works, including any work at night.
		• A more detailed vibration assessment of construction should be completed when the specifics of construction equipment are finalized, prior to construction start. This assessment should consider minimizing construction-related vibration levels, while balancing construction schedules and expediting construction activity.
		• It is recommended that the vibration limits in the City of Toronto bylaw not be exceeded. This may entail monitoring of vibration levels during construction. Anticipated vibration levels will be confirmed during detailed design.
		• During detailed design, the predicted Zone of Influence should be updated to confirm which structures fall within it. If a structure falls within the updated Zone of Influence, the following is recommended:
		  • Pre-construction consultations with owners/occupants;
		  • Pre-construction measurements of background vibration levels; and
		  • Pre-construction survey by means of a photographic record of potentially affected structure façades and surfaces, including visible sections of building foundations, building cladding, doors, windows, interior wall finishes, surface pavement, sidewalks, signs and trees. Each of the elements should be rated on their general condition (new, good, fair, poor, severe), and visible defects should be photographed.
			• Once a detailed construction vibration assessment has been completed, work that may exceed vibration limits in the City of Toronto bylaw or that may cause structural damage should be monitored.

Vibration - Operations			
Representative receptors shown in Figure 4-2	• Decreased vibration levels.	• None.	• None.

4.9 Traffic and Transportation

4.9.1 Overview

The Transportation Brief is based on 2031 forecasted ridership figures for the Project during the A.M and P.M. peak hours, which were provided by City Planning staff (see Table 4-15).

Table 4-15: Finch-Kennedy SmartTrack Station 2031 Forecasted Boarding and Alighting Data from City of Toronto

Peak Hour	Total Boardings	Transfer Boardings	Walk-ins[1]	Total Alightings	Transfer Alightings	Walk-offs[1]
A.M.	1290	1170 (90.7%)	120 (9.3%)	110	70 (63.6%)	40 (36.4%)
P.M.	160	120 (75.0%)	40 (25.0%)	1010	870 (86.1%)	140 (13.9%)

Note: (1) Total Walk-ins/Walk-offs = boarding/alighting not transferring to/from other transit services.

The mode split and number of trips generated by the Project are shown in Table 4-16. The only traffic generated by the Project will be passengers being picked-up or dropped off by private auto or taxi using the proposed access driveway. As shown in Table 4-16, the forecasted number of auto trips generated by the Project total 95 and 102 auto trips in the A.M and P.M. peak hours, respectively. Given this volume of site generated vehicle trips, it is anticipated that the traffic impacts of the Project will be minimal.

Table 4-16: 2031 Trips Generated by Mode at Finch-Kennedy SmartTrack Station

Mode	A.M. Peak				P.M. Peak			
	Boarding Mode Share	Trips Generated	Alighting Mode Share	Trips Generated	Boarding Mode Share	Trips Generated	Alighting Mode Share	Trips Generated
Walking	1.0%	12	36.3%	40	25.0%	40	1.9%	19
Local Transit	90.7%*	1170*	63.6%	70*	75.0%	120*	86.1%*	870*
Cycling	1.0%	12	0	0	0%	0	1.9%	19
PPUDO	7.4%	95	0	0	0%	0	10.1%	102
Drive & Park	0%	0	0	0	0%	0	0%	0
Carpool Passenger	0%	0	0	0	0%	0	0%	0
Total Auto (PPUDO, Drive & Park, Carpool)	**7.4%**	**95**	**0**	**0**	**0%**	**0**	**10.1%**	**102**
Total Trips:		**1290**		**110**		**160**		**1010**

Note: * these numbers are from the City of Toronto data in Table 4-15.

The City of Toronto's online development application database was used to identify any potential background developments that could pose a large impact to traffic in the area. No developments were determined to be relevant to this study, as the scale and type of neighbouring development applications (e.g. interior conversions to existing buildings) would not generate a significant amount of additional vehicle trips to the critical movements at the key intersections.

Total future traffic conditions were determined by adding the site-generated vehicles distributed with the future growth traffic volumes. The study area intersections were analyzed to determine the LOS, delay and critical movements, shown in Table 4-17. LOS is measured on a scale of A to F, in which LOS A indicates the intersection operates with little to no delay, while LOS F indicates excessive delays. A full definition of LOS is provided in Appendix I of this Volume.

Table 4-17: Total Future Traffic Volumes Intersections Analysis

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (Delay) in seconds	Critical Movements (v/c)	LOS (Delay) in seconds	Critical Movements (v/c)
Finch Avenue East and Milliken Boulevard	Signalized	B (12)	EB-L (0.94)	B (13)	--
Finch Avenue East and Midland Avenue	Signalized	C (30)	EB-L (0.93) WB-T (0.96)	C (21)	--
Midland Avenue and Silver Star Boulevard	Signalized	A (10)	--	B (13)	--
Midland Avenue and site access driveway	Unsignalized	B (14)	EB-L EB-R	B (13)	EB-L EB-R

(1) The LOS at an unsignalized intersection is defined by the movement with the highest delay under HCM 2000.
(2) Critical movements are those with a volume-to-capacity ratio (v/c) exceeding 0.85 for a signalized intersection or with a LOS of 'E' or 'F' for an unsignalized intersection.
(3) EB-L means eastbound-left movement; WB-T means westbound through movement; EB-R means eastbound-right movement.

The results of this analysis show that:

- The LOS for the three signalized intersections remain the same from existing conditions, with the exception of Finch Avenue East and Midland Avenue which drops from a LOS B to LOS C in the P.M. peak hour, which is still acceptable; and
- Traffic volumes for the two existing driveways off Midland Avenue that serve commercial and industrial buildings are not currently available. Nevertheless, it is expected that the consolidation of these two driveways and the resulting elimination of the turning conflicts

between vehicles accessing/egressing these separate side-by-side facilities will improve the operations at this location even with the additional traffic generated by the Project. The intersection of the proposed access road and Midland Avenue, based on site traffic only, is estimated to operate at a LOS B during both the A.M. and P.M. peak hours with significant reserve capacity to accommodate the current traffic using the two existing driveways.

An increase in pedestrian movements is anticipated as a result of developments and growth within and around the study area. The IPD for the proposed access road includes a sidewalk as part of the cross-section to provide safe and convenient pedestrian access from Midland Avenue. The consolidation of the two existing driveways at this location will also reduce turning conflicts at this location which will result in improved pedestrian conditions and safety.

Based on the IPD for the proposed access road, passenger vehicles would have no difficulty entering and exiting from Midland Avenue.

4.9.2 Potential Effects, Mitigation and Monitoring Measures

Potential effects, corresponding mitigation measures and monitoring activities relating to traffic and transportation are described in Table 4-18.

Further details on potential effects, mitigation and monitoring are provided in Appendix I of this Volume.

Table 4-18: Traffic and Transportation - Potential Effects, Mitigation and Monitoring

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
Traffic			

Trip Generation	• Traffic impacts are anticipated to be minimal.
	• The forecasted number of trips made by auto generated by the Project total 95 and 102 automobile trips in the A.M and P.M. peak hours, respectively.
		• Given the limited predicted traffic impacts of the Project, there are no significant measures required to mitigate the traffic impacts.
		• Some on-street regulations could be considered to minimize the impacts on traffic operations on the abutting arterial roads including:
		  • The introduction of parking/stopping restrictions within the Finch Avenue East underpass;
		  • Restrict the use of the bus lay-bys on Finch Avenue East for transit service only; and
		  • The introduction of No Stopping regulations on Midland Avenue in the vicinity of the proposed access road to ensure adequate sightlines, improve operations, and to prohibit informal PPUDO activities from occurring on-street at this location.
			• None at this time.

Access	• The LOS for the three signalized intersections remain the same from existing conditions, with the exception of Finch Avenue East and Midland Avenue which drops from a LOS B to LOS C in the P.M. peak hour. • The intersection of the proposed access road and Midland Avenue, based on site traffic only, is estimated to operate at a LOS B during both the A.M. and P.M. peak hours.		
Cyclists and Pedestrians			
Cyclist and Pedestrian Connectivity	• An increase in pedestrian activity is anticipated as a result of development in the area. • There are opportunities to improve pedestrian and cycling infrastructure to enhance safety and encourage access to the station using active transportation. For example, cycling facilities and bike storage will be provided at the Project on both sides of Finch Avenue East to encourage access to the Project by bicycle in a safe and convenient manner. • The proposed access road includes a sidewalk as part of the cross-section to provide safe and convenient pedestrian access from Midland Avenue. The consolidation of the two existing driveways at this location will also reduce turning conflicts at this location which will result in improved pedestrian conditions and safety.	• As part of the station design, opportunities to provide enhanced pedestrian and cycling connections to existing and future developments and improved pedestrian and cycling infrastructure, in accordance with City of Toronto standards and guidelines, should be explored. • Traffic control signals should be installed at the Finch Avenue East/Baylawn Drive intersection to facilitate the safe crossing of Finch Avenue by cyclists using the cycling facilities that begin west of Baylawn Drive. • Tactile strips should be provided across the bike lanes in advance of the pedestrian crossing locations, supplemented by stop signs and/or other advisory signs, to advise cyclists of possible pedestrian activity in the area. • City of Toronto staff should be requested to include, in their 2-year review of the Ten-Year Cycling Network Plan	• None anticipated at this time.

Feature	Description of Potential Effects	Mitigation Measures	Monitoring Activities
		scheduled in 2018, a review of the cycling infrastructure and routes in the vicinity of the Project in order to identify possible improvements to the cycling network (both on-street and on trails) to enhance convenience and safety for cyclists accessing this station. • Wayfinding signage and lighting should also be considered and installed around the proposed station.	

5. Permits, Approvals and Commitments to Future Work

5.1 Permits and Approvals

5.1.1 Federal

5.1.1.1 Canadian Environmental Assessment Act, 2012

Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the Regulations Designating Physical Activities identify the types of projects that may require a Federal EA. The Project does not constitute a designated project under CEAA 2012.

5.1.1.2 Species at Risk Act

The federal *Species at Risk Act*, 2002 (SARA 2002) provides a framework to ensure the survival of wildlife species and the protection of natural heritage in Canada. Under SARA, the federal government has responsibility for wildlife on federal lands. On private lands, SARA protection applies to: aquatic species listed as endangered, threatened or extirpated in Schedule 1 of SARA; migratory birds protected under the MBCA; and species in certain cases where provincial / territorial measures do not adequately protect a species.

No federal lands, aquatic species or migratory birds protected under the MBCA are anticipated to be impacted by the Project, and as such no permits are required under SARA.

5.1.1.3 Fisheries Act

As there are no anticipated effects to the watercourse within the study area, a Federal *Fisheries Act* Authorization is not required.

5.1.2 Provincial

5.1.2.1 Conservation Authorities Act

A small portion of the study area is regulated by the TRCA under *Ontario Regulation 166/06 - Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*. To ensure that development has regard for natural hazard features and the natural environment, while conforming to watershed development policies, the TRCA is authorized under Section 28 of the *Conservation Authorities Act* to implement and enforce their own regulation. Under the regulation, no person shall undertake development or permit another person to undertake development in, or on, the areas within the jurisdiction of a Conservation Authority.

Metrolinx, as a Provincial Crown agency, is not generally subject to the *Conservation Authorities Act*; regardless, Metrolinx endeavours to minimize impacts to natural features protected by the TRCA. Metrolinx will follow the *Voluntary Project Review Process per the Proponents and Projects Exempt from the TRCA Regulatory Approval Process* and request that the TRCA reviews and comments on detailed design activities associated with Project construction, maintenance or emergency activities. Once TRCA concerns are satisfied, a Voluntary Project Review Letter is provided by TRCA staff.

5.1.2.2 Endangered Species Act, 2007

The ESA, 2007 provides specific protection to Endangered and Threatened species and their habitat. Only one Threatened or Endangered SAR was confirmed in the study area: Barn

Swallow. A notice of activity registration under the ESA, 2007 is not anticipated to be required for this species as no effects to its protected habitat (e.g., breeding habitat) are anticipated.

5.1.2.3 Environmental Protection Act

Dewatering during construction may be required to facilitate creation of an isolated dry work area and may require registration on the EASR system (if dewatering is over 50,000 L/day but under 400,000 L/day).

To improve general air quality around the station during maintenance and operation, MOECC EASR recommendations for exempt equipment (O. Reg. 524/98) equipment that has minimal air quality impacts, as well as application to the EASR for equipment that qualifies (O. Reg. 1/17 and O. Reg.419/05) will be adhered to.

5.1.2.4 Ontario Water Resources Act

A Permit to Take Water may be required if dewatering during construction exceeds 400,000 L/day).

Approvals for discharge of pumped water will be required, which could include one or a combination of MOECC Environmental Compliance Approval (ECA) (under the *Ontario Water Resources Act* (OWRA), Section 53), Municipal Discharge Permits, and/or Conservation Authority Approval (through the Voluntary Project Review process). The need for these permits will be determined during detailed design.

5.1.3 Municipal

Metrolinx, as a Provincial Crown Agency, is not generally subject to municipal permitting and approval requirements; regardless, Metrolinx works in co-operation with local municipalities to adhere to the intent of the relevant permit/approval requirements to the extent possible. Metrolinx is in the process of establishing a Vegetation Compensation Protocol for RER projects; vegetation that is removed for the Project will be compensated for in accordance with the provisions of this protocol.

Removal and/or damage of woody vegetation located in adjacent lands, beyond the Stouffville rail corridor, may require municipal tree removal permits. To support the permit applications, an Arborist Report will be completed during detailed design to supplement the Tree Inventory Plan. Metrolinx will work in co-operation with the City of Toronto in the spirit of meeting by-law requirements, specifically the Private Tree By-law and Trees on City Streets By-law.

Municipal Discharge Permits may also be required for the discharge of pumped water associated with construction dewatering activities.

Construction should adhere to the City of Toronto noise by-laws (Noise Control By-Law, Municipal Code Chapter 591, By-law 1400-2007), to the extent possible. It is recommended that the vibration limits in the City of Toronto bylaw not be exceeded. This may entail monitoring of vibration levels during construction. Vibration levels will be confirmed during detailed design.

5.2 Commitments to Future Work

Metrolinx is committed to implementing the mitigation measures and monitoring activities outlined in Section 4. Commitments to future work to be completed during the detailed design, as well as during construction, are outlined in Table 5-1.

Table 5-1: Commitments to Future Work

Discipline	Commitments
Detailed Design	
General	• Mitigation measures and monitoring requirements documented in Section 4 of this Volume of the EPR related to detailed design will be implemented.
Natural Environment	• Metrolinx, as a Provincial Crown agency, is not generally subject to the *Conservation Authorities Act*; regardless, Metrolinx endeavours to minimize impacts to natural features protected by the TRCA. Metrolinx will follow the Voluntary Project Review Process per the Proponents and Projects Exempt from the TRCA Regulatory Approval Process and request that the TRCA reviews and comments on detailed design activities associated with Project construction, maintenance or emergency activities. Once TRCA concerns are satisfied, a Voluntary Project Review Letter is provided by TRCA staff. • The ESA provides specific protection to Endangered and Threatened species and their habitat. Only one Threatened or Endangered SAR was confirmed in the study area: Barn Swallow. A notice of activity registration under the ESA is not anticipated to be required for this species as no effects to its protected habitat (e.g., breeding habitat) are anticipated. • Metrolinx, as a Provincial Crown Agency, is not generally subject to municipal permitting and approval requirements; regardless, Metrolinx works in co-operation with local municipalities to adhere to the intent of the relevant permit/approval requirements to the extent possible. Metrolinx is in the process of establishing a Vegetation Compensation Protocol for RER projects and vegetation that is removed for the Project will be compensated for in accordance with the provisions of this protocol. Opportunities for natural heritage enhancement will be explored through the Vegetation Compensation Protocol in consultation with TRCA. • Efforts will be made to coordinate with Toronto Hydro, Toronto Water and other utility companies that may be affected by utility relocations to help minimize the overall impacts of the Project on the natural heritage system. • Infrastructure and utility works will either be completed by Metrolinx as part of this Project, or by utility companies. Metrolinx and its Contractors will follow TRCA regulatory requirements. • A Soil Management Plan will be developed by a Qualified Professional as defined in O. Reg. 153/04 for managing soil materials on site (includes excavation, location of stockpiles, reuse and off-site disposal). • During detailed design and prior to construction, a Stormwater Management Report will be completed to determine potential effects and mitigation measures. The report will be completed in consultation with the TRCA and the MOECC. Stormwater management design will consider guidance provided by the MOECC Stormwater Management Planning and Design Manual (2003) and MTO Drainage Management Manual (2008), as well as the TRCA Stormwater Management Criteria (2012) and Low Impact Development Stormwater Management Planning and Design Guide (2010). The approach to stormwater management will aim to prevent temperature spikes in watercourses. • Measures to mitigate a potential loss of green space and reduce storm runoff will be identified in detailed design. • Suitable human-made structures within the study area should be inspected for evidence of active bird nests during the breeding bird season prior to the onset of construction activities in order to determine appropriate nesting preventative measures (e.g., netting). • Cultural woodland and cultural thicket communities will be examined closely for the presence of Butternut within 25 m of the Project. • A Flood Contingency Plan will be developed during detailed design and prior to construction.
Geology and Groundwater	• Soil and bedrock conditions, as well as bedrock elevations, will be confirmed through future geotechnical investigations to be undertaken in support of detailed design. • The TRCA's Geotechnical Engineering Design and Submission Plan Guidelines will be referenced during the detailed design phase. • Hydrogeological and geo-environmental studies will be carried out, which may identify recommendations for groundwater mitigation measures and monitoring. Hydrogeological and geo-environmental studies will be provided to TRCA for review.

Discipline	Commitments
	• Ongoing engagement will occur with the CTC source protection authority during detailed design.
Trees	• Removal and/or damage of woody vegetation located in adjacent lands, beyond the Stouffville rail corridor, may require municipal tree removal permits. To support the permit applications, an Arborist Report will be completed during detailed design to supplement the Tree Inventory Plan. Metrolinx will work in co operation with the City of Toronto in the spirit of meeting by-law requirements, specifically the Private Tree By-law and Trees on City Streets By-law. • An update of the tree removal count of the Project will be completed. This should be based upon a more detailed level of design, with available access permissions and more detailed survey information, to the extent possible. • An update of the tree inventory will be completed to account for detailed grading, work zones and proposed clearing, to illustrate TPZ and their protection measures (types and locations), and tree removal zones, in accordance with the completion of an Arborist Report. The Arborist Report will be completed during detailed design and will contain at a minimum the following information in addition to details of tree location, size, species, conditions and category: 1. Recommendations for tree/vegetation protection and preservation measures for all trees/vegetation that are to be retained; 2. Details of tree pruning; 3. Details of all trees/vegetation recommended for removal, including removal measures; 4. Mitigation and monitoring measures to ensure success of preservation and removal measures; 5. Should vegetation compensation be required, it will be in accordance with the Metrolinx Vegetation Compensation Protocol; and 6. Mapping. • Assessment of trees will be completed within or adjacent to the work zones, as defined by the detailed design, as part of the completion of an Arborist Report to determine if trees will be impacted. • Preparation of detailed tree removal, restoration, and compensation plans in coordination with a Certified Arborist and/or Landscape Architect (licensed to practice in the Province of Ontario) to assist with species selection, planting locations and measures to promote establishment success.
Archaeology	• Archaeological recommendations are based on a Stage 1 AA undertaken for this Project. Archaeological recommendations have been made based on the background historic research, locations of known or registered archaeological sites, previous AAs, and indicators of archaeological potential as outlined in the 2011 S&G. The recommendations for detailed design include: ○ Areas determined to be undisturbed will be subjected to a Stage 2 AA test pit survey at 5-meter intervals, in accordance with Section 2.1.2 of the 2011 S&G prior to construction activities to ensure no cultural heritage resources will be impacted; ○ Areas determined to be disturbed do not require further assessment; and ○ Should deeply buried archaeological materials be encountered during construction, all work will cease and a professionally licenced archaeologist will be consulted to assess the cultural heritage value and significance of the archaeological deposits; and ○ If final limits of the Project are altered and fall outside the current study area, an additional Stage 1 AA is required to assess the new footprint. • Figure 3-3, in Section 3.4.2 of this EPR Volume, indicates areas of archaeological potential requiring Stage 2 AA. Metrolinx will: ○ Complete all required AA (Stage 2 and Stage 3 if recommended by the Stage 2AA) as early as possible, prior to the completion of detail design, and well in advance of any ground disturbance; ○ Undertake future work in a manner that protects archaeological sites by conserving them in their original location or through archaeological fieldwork, and endeavour to conserve significant archaeological resources in their original location through documentation, protection, and avoidance of impacts. Where activities could disturb significant archaeological resources or

Discipline	Commitments
	areas of archaeological potential, Metrolinx will take appropriate measures to mitigate impacts; and ○ Include provisions in contract as recommended by archaeological assessment(s) (e.g. in case archaeological resources are discovered, protection of sites). All future Stage 2 AA findings will be shared with all First Nations communities that were engaged during the Stage 1 AA process.
Socio-Economic and Land Use Characteristics	• Confirm effects on utilities. Additional subsurface utility engineering (SUE) investigations may be conducted, as required, to confirm existing utilities. A review of existing and proposed future utilities plans, in addition to on-going consultation with utility companies and the City of Toronto, will be conducted during the detailed design stage. • Any relocations, service interruptions, or utility protection projects will be identified as early as possible to allow for project coordination and construction management plans to be created with consideration of utility needs. • Specific property requirements will be determined during detailed design. Ongoing consultation with affected property owners will help identify appropriate site-specific mitigation measures. Where access to property is required, ongoing consultation with affected landowners will help identify appropriate site-specific mitigation measures. • A lighting plan will be developed where the quality of light produced, and type of light sources used on the exterior of buildings, signs, pedestrian walkways, and other areas of the site, are compatible with, and appropriate to the overall design and use of the site.
Air Quality	• To improve air quality around the station during maintenance and operation, MOECC EASR recommendations for exempt equipment (O. Reg. 524/98) that has minimal air quality impacts, as well as application to the EASR for equipment that qualifies (O. Reg. 1/17 and O. Reg. 419/05) will be adhered to during detailed design.

Noise and Vibration	• A more detailed noise assessment of construction will be completed when the specifics of construction equipment are finalized, prior to construction start. This assessment should consider minimizing construction-related noise levels, while balancing construction schedules and expediting construction activity.
	• A more detailed vibration assessment of construction will be completed when the specifics of construction equipment are finalized, prior to construction start. This assessment should consider minimizing construction-related vibration levels, while balancing construction schedules and expediting construction activity.
	• A vibration monitoring plan will be completed during detailed design.
	• During detailed design, the predicted Zone of Influence will be updated to confirm which structures fall within it. If a structure falls within the updated Zone of Influence, the following is recommended:
	  • Pre-construction consultations with owners/occupants;
	  • Pre-construction measurements of background vibration levels; and
	  • Pre-construction survey by means of a photographic record of potentially affected structure façades and all surfaces, including visible sections of building foundations, building cladding, doors, windows, interior wall finishes, surface pavement, sidewalks, signs and trees. Each of the elements should be rated on their general condition (new, good, fair, poor, severe), and visible defects should be photographed.

Traffic and Transportation	• City of Toronto staff should be requested to include, in their 2-year review of the Ten-Year Cycling Network Plan scheduled in 2018, a review of the cycling infrastructure and routes in the vicinity of the Project in order to identify possible improvements to the cycling network (both on-street and on trails) to enhance convenience and safety for cyclists accessing this station.
Construction[11]	
General	• Mitigation measures and monitoring requirements documented in Section 4 of this Volume of the EPR related to the construction phase will be implemented.

[11] Construction phase commitments include pre-construction commitments, completed following detailed design but prior to ground disturbance.

Discipline	Commitments
	• An Environmental Mitigation and Monitoring Plan (EMMP) will be developed prior to construction to outline the responsibilities for carrying out monitoring and reporting activities, including timing and frequency of monitoring activities, as well as the compliance process. The EMMP will include all mitigation measures, categorized by Project phase, and will identify the party responsible for implementation.
Natural Environment	• Develop an ESC Plan prior to construction for implementation throughout construction. The ESC Plan will include consideration of the Greater Golden Horseshoe Area Conservation Authorities' Erosion and Sediment Control Guideline for Urban Construction and OPSS 805 (Erosion and Sediment Control Measures) (Ministry of Transportation, 2015) This plan will encompass all areas of soils disturbance, particularly in the vicinity of the Markham Branch of Highland Creek.
Geology and Groundwater	• Dewatering during construction may be required to facilitate creation of an isolated dry work area and may require registration on the EASR system (if dewatering is over 50,000 L/day but under 400,000 L/day). A Permit to Take Water may be required if dewatering during construction exceeds 400,000 L/day. • Approvals for discharge of pumped water will be required, which could include one or a combination of MOECC Environmental Compliance Approval (ECA) (under the *Ontario Water Resources Act* (OWRA), Section 53), Municipal Discharge Permits, and/or Conservation Authority Approval (through the Voluntary Project Review process). The need for these permits will be determined during detailed design. • Municipal Discharge Permits may also be required for the discharge of pumped water associated with construction dewatering activities.
Archaeology	• If human remains are encountered during project work, all activities must cease immediately and the local police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.
Socio-Economic and Land Use Characteristics	• Site-Specific Construction Traffic Control and Management Plans will be prepared and implemented prior to Project construction to maintain reasonable access through work zones, to the extent possible.
Air Quality	• An Air Quality Management Plan will be developed for implementation during construction to address construction equipment and vehicle exhaust, fugitive dust and odour.
Noise and Vibration	• Construction should adhere to the City of Toronto noise by-laws (Noise Control By-Law, Municipal Code Chapter 591, By-law 1400-2007), to the extent possible. It is recommended that the vibration limits in the City of Toronto bylaw not be exceeded. This may entail monitoring of vibration levels during construction. Anticipated vibration levels will be confirmed during detailed design. • A Noise and Vibration Control Plan will be developed prior to construction. The plan will include a complaint response protocol and will indicate that surrounding property owners and tenants will be informed of anticipated upcoming construction works, including any work at night.
Operations	
General	• Mitigation measures and monitoring requirements documented in Section 4 of this Volume related to operations will be implemented.

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